Google

Santa Cruz Medical Facilities

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Rating ▾ Hours ▾

**Santa Cruz Health Center**
3.6 ★★★½☆ (7) · Community h...
1080 Emeline Ave
Closed · Opens 9AM Wed · (831) ...
"Their integrated system keeps my medical team of my...
WEBSITE DIRECTIONS

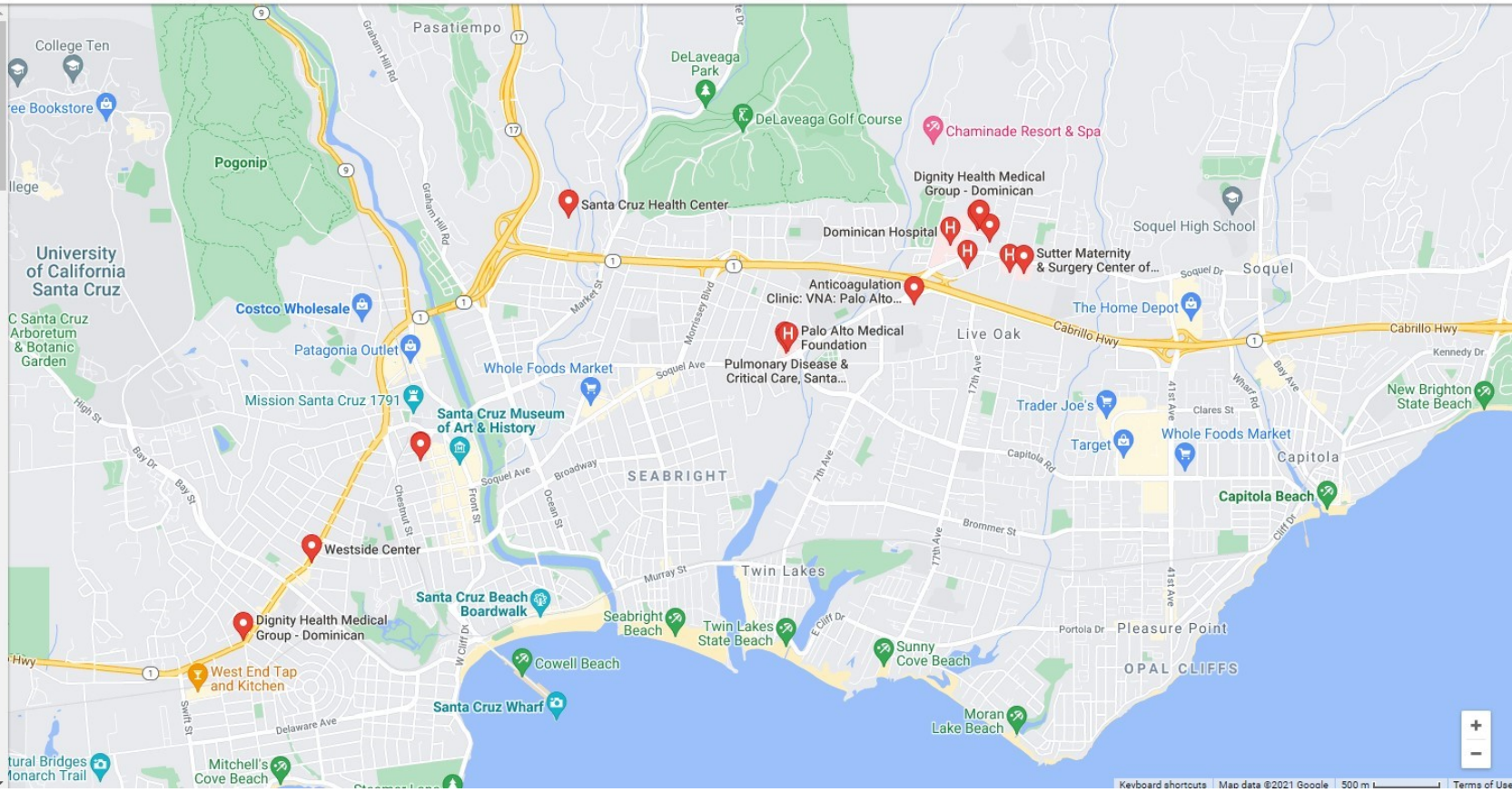
**Westside Center**
3.7 ★★★½☆ (31) · Medical clinic
1301 Mission St
Closed · Opens 8AM Wed · (831) ...
Online care
WEBSITE DIRECTIONS

**Santa Cruz Center**
5.0 ★★★★★ (2) · Medical clinic
2025 Soquel Ave 2nd Floor · In Pa...
Closed · Opens 8AM Wed · (831) ...
Online care
WEBSITE DIRECTIONS

**Cypress Medical Center**
5.0 ★★★★★ (1) · Medical Center
1667 Dominican Way
(831) 464-3801
DIRECTIONS

**Pediatrics: Santa Cruz Main Clinic: Palo Alto Medical Foundation**
3.8 ★★★★☆ (6) · Medical clinic
2025 Soquel Ave 2nd Floor
Open · Closes 9PM · (831) 458-55...
WEBSITE DIRECTIONS

**Santa Cruz Community Health Centers**
5.0 ★★★★★ (3) · Doctor
WEBSITE DIRECTIONS



Google

Santa Cruz Medical Facilities

Sign in

Rating ▾ Hours ▾

**Westside Center**
3.7 ★★★½☆ (31) · Medical clinic
1301 Mission St
Closed · Opens 8AM Wed · (831) …
Online care
WEBSITE DIRECTIONS

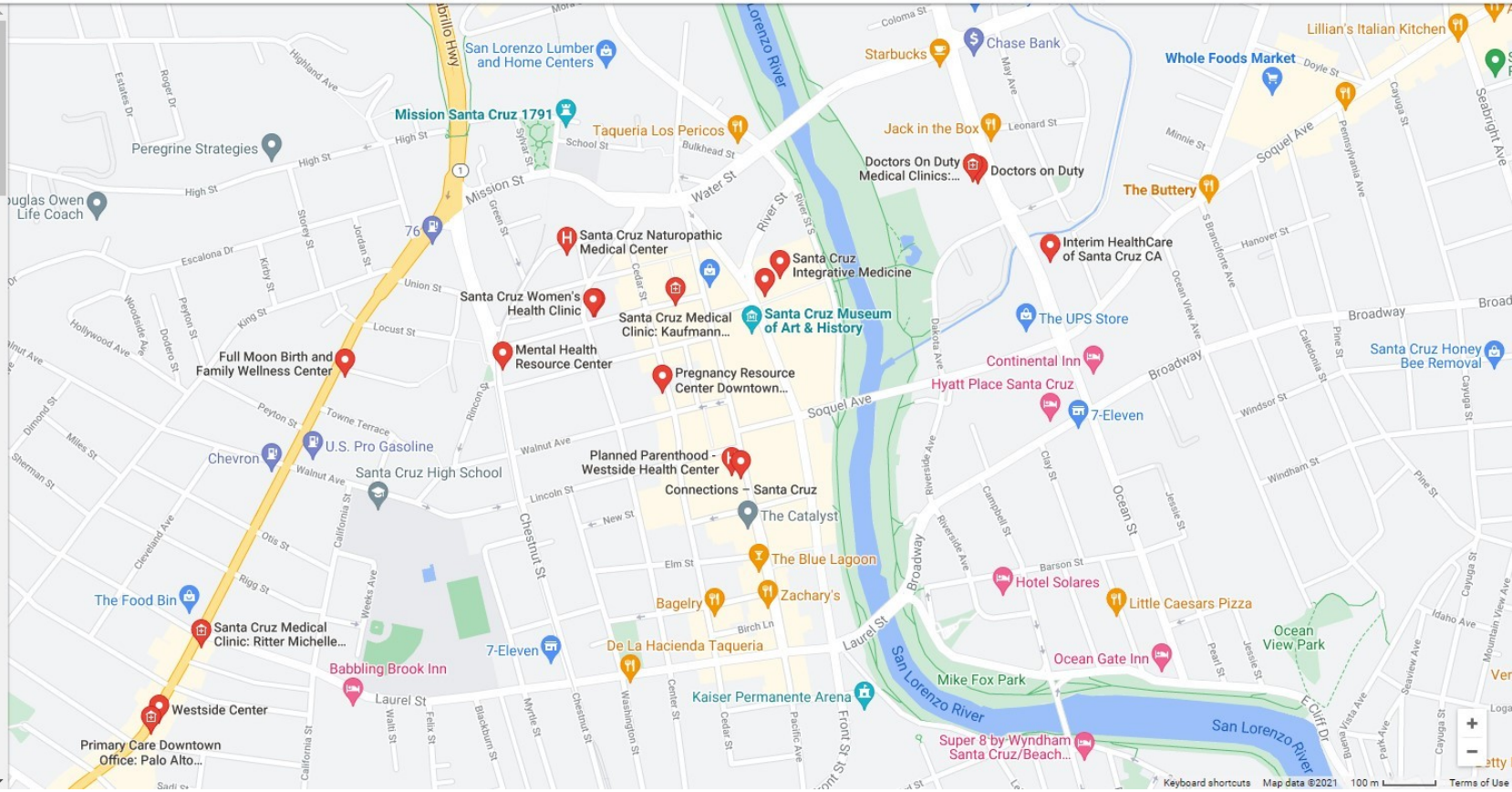
**Santa Cruz Community Health Centers**
5.0 ★★★★★ (3) · Doctor
250 Locust St
(831) 427-3500
WEBSITE DIRECTIONS

**Sutter Urgent Care - Westside**
3.5 ★★★½☆ (17) · Urgent care …
1301 Mission St 1st Floor
Closed · Opens 9AM Wed · (831) …
Their website mentions **health care**
WEBSITE DIRECTIONS

**Santa Cruz Women's Health Clinic**
3.7 ★★★½☆ (26) · Women's he…
250 Locust St
Open · Closes 8PM · (831) 427-35…
"This place is the heart of Santa Cruz's medical care."
WEBSITE DIRECTIONS

**Doctors on Duty**
4.2 ★★★★☆ (92) · Medical clinic
615 Ocean St
Closes soon · 6PM · (831) 425-79…
"What a wonderful facility!"
WEBSITE DIRECTIONS

**Santa Cruz Medical Clinic: Ritter Michelle**



Google

Santa Cruz Medical Facilities

Sign in

Rating ▾ Hours ▾

**Westside Center**
3.7 ★★★½☆ (31) · Medical clinic
1301 Mission St
Closed · Opens 8AM Wed · (831) …
Online care
WEBSITE DIRECTIONS

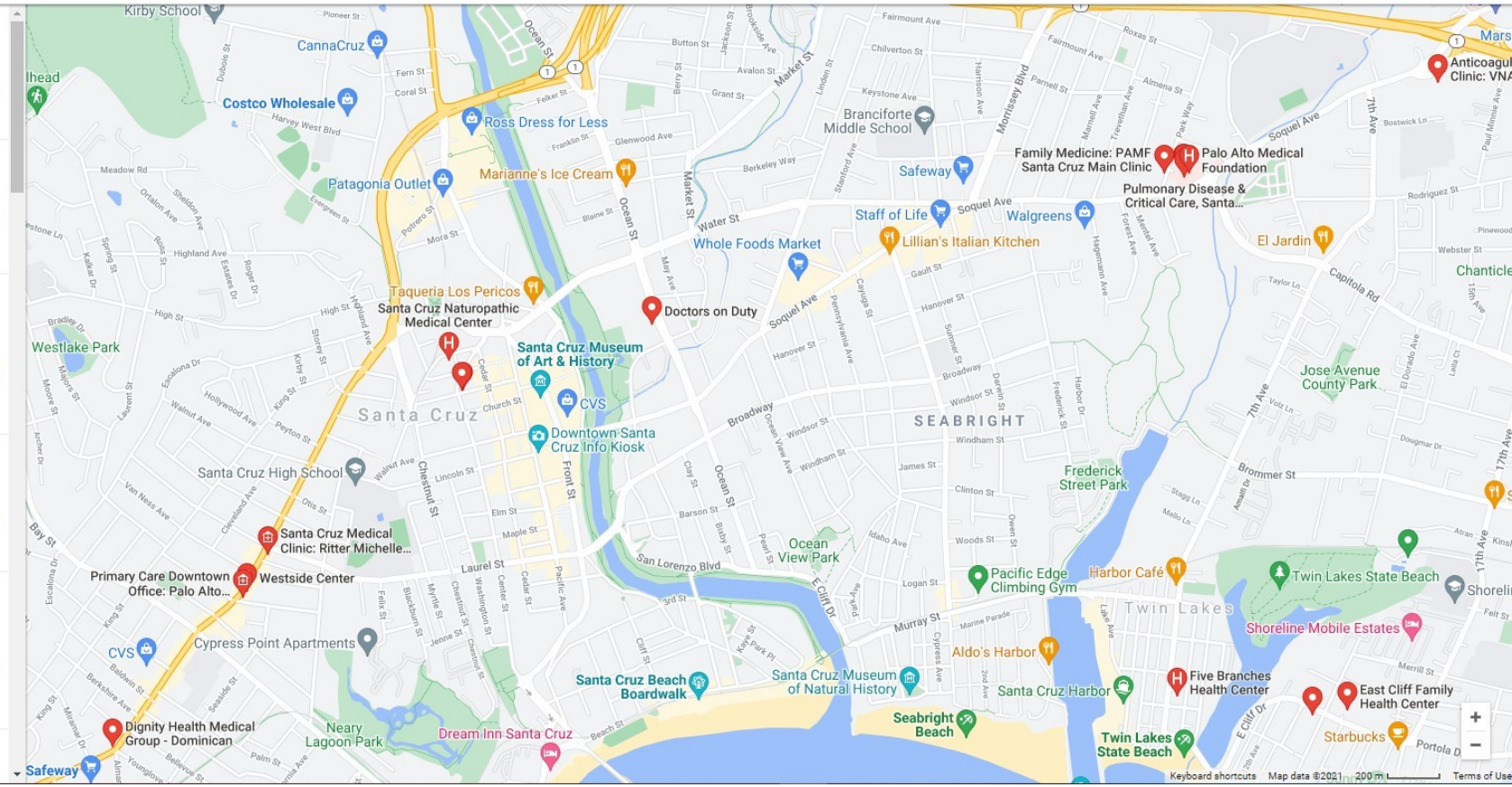
**Santa Cruz Center**
5.0 ★★★★★ (2) · Medical clinic
2025 Soquel Ave 2nd Floor · In Pa…
Closed · Opens 8AM Wed · (831) …
Online care
WEBSITE DIRECTIONS

**Pediatrics: Santa Cruz Main Clinic: Palo Alto Medical Foundation**
3.8 ★★★★☆ (6) · Medical clinic
2025 Soquel Ave 2nd Floor
Open · Closes 9PM · (831) 458-55…
WEBSITE DIRECTIONS

**Santa Cruz Community Health Centers**
5.0 ★★★★★ (3) · Doctor
250 Locust St
(831) 427-3500
WEBSITE DIRECTIONS

**Sutter Urgent Care - Santa Cruz Center**
3.7 ★★★½☆ (18) · Urgent care …
2025 Soquel Ave 2nd Floor · In Pa…
Open · Closes 8PM · (831) 458-55…
Online care
WEBSITE DIRECTIONS

**Dignity Health Medical Group - Dominican**



Google

Santa Cruz Medical Facilities

Sign in

Rating ▾ Hours ▾

**Santa Cruz Health Center**
3.6 ★★★½☆ (7) · Community h...
1080 Emeline Ave
Closed · Opens 9AM Wed · (831) ...
"Their integrated system keeps my medical team of my...
WEBSITE DIRECTIONS

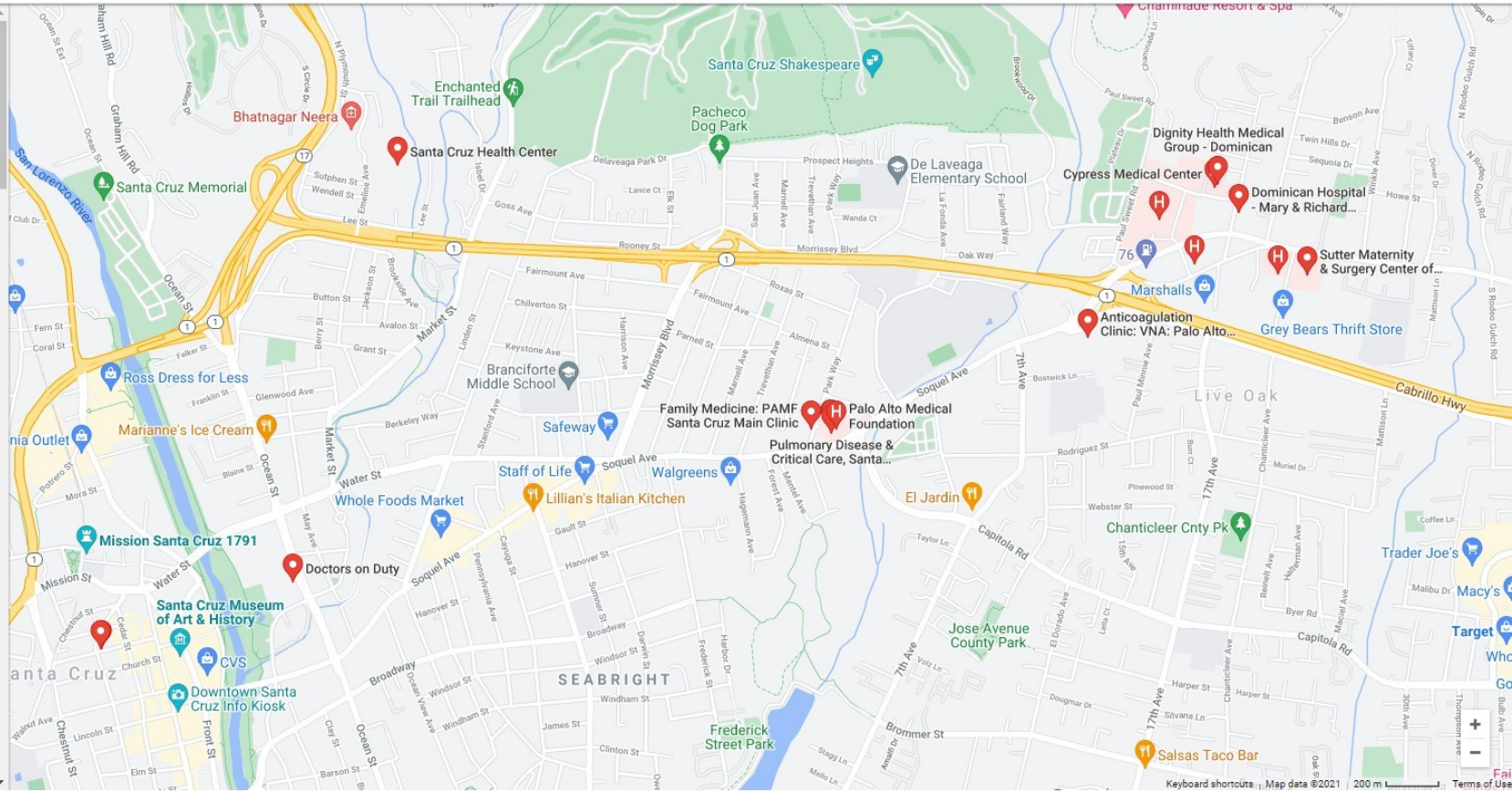
**Santa Cruz Center**
5.0 ★★★★★ (2) · Medical clinic
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Online care
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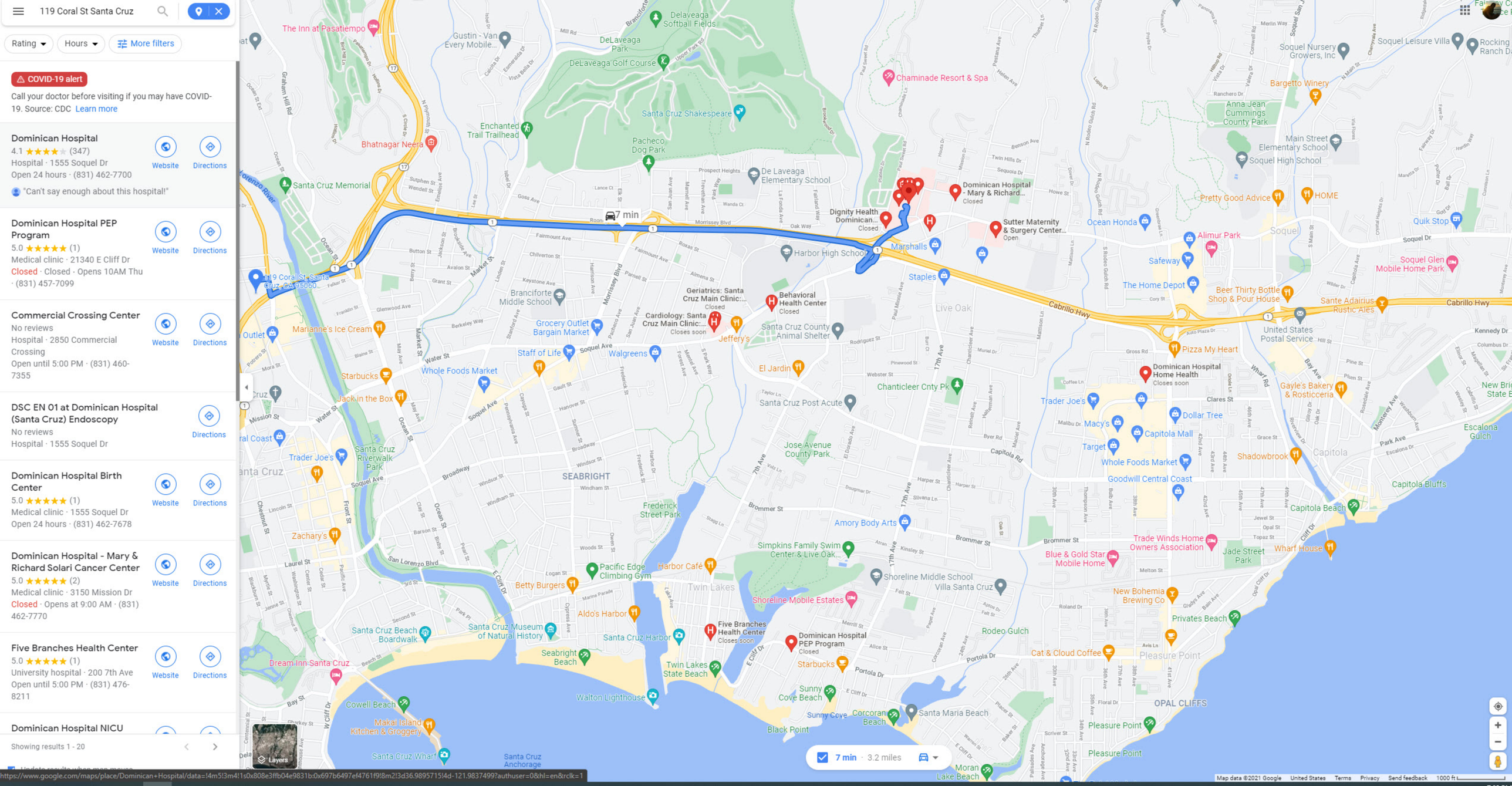
**Cypress Medical Center**
5.0 ★★★★★ (1) · Medical Center
1667 Dominican Way
(831) 464-3801
DIRECTIONS

**Pediatrics: Santa Cruz Main Clinic: Palo Alto Medical Foundation**
3.8 ★★★★☆ (6) · Medical clinic
2025 Soquel Ave 2nd Floor
Open · Closes 9PM · (831) 458-55...
WEBSITE DIRECTIONS

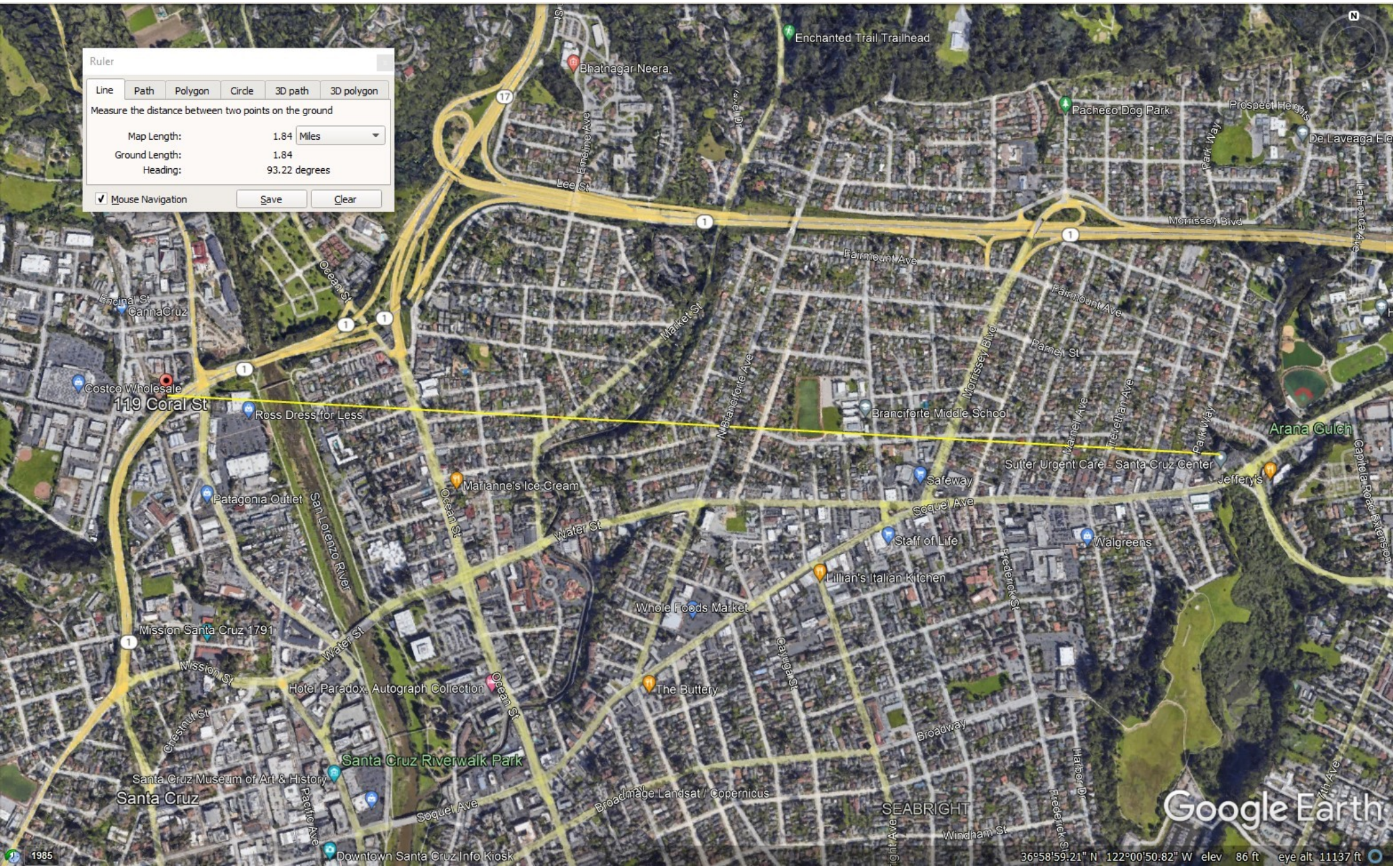
**Santa Cruz Community Health Centers**
5.0 ★★★★★ (3) · Doctor
250 Locust St
(831) 427-3500
WEBSITE DIRECTIONS

**Sutter Urgent Care - Santa Cruz Center**
3.7 ★★★½☆ (18) · Urgent care
WEBSITE DIRECTIONS




119 Coral St Santa Cruz
Rating
Hours
More filters
COVID-19 alert
Call your doctor before visiting if you may have COVID-19. Source: CDC Learn more
Dominican Hospital
4.1 ★★★★☆ (347)
Hospital · 1555 Soquel Dr
Open 24 hours · (831) 462-7700
"Can't say enough about this hospital!"
Website
Directions
Dominican Hospital PEP Program
5.0 ★★★★★ (1)
Medical clinic · 21340 E Cliff Dr
Closed · Closed · Opens 10AM Thu · (831) 457-7099
Commercial Crossing Center
No reviews
Hospital · 2850 Commercial Crossing
Open until 5:00 PM · (831) 460-7355
DSC EN 01 at Dominican Hospital (Santa Cruz) Endoscopy
No reviews
Hospital · 1555 Soquel Dr
Dominican Hospital Birth Center
5.0 ★★★★★ (1)
Medical clinic · 1555 Soquel Dr
Open 24 hours · (831) 462-7678
Dominican Hospital - Mary & Richard Solari Cancer Center
5.0 ★★★★★ (2)
Medical clinic · 3150 Mission Dr
Closed · Opens at 9:00 AM · (831) 462-7770
Five Branches Health Center
5.0 ★★★★★ (1)
University hospital · 200 7th Ave
Open until 5:00 PM · (831) 476-8211
Dominican Hospital NICU
Showing results 1 - 20
Layers
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Dominican Hospital - Mary & Richard...
Closed
Dignity Health Dominican...
Closed
Sutter Maternity & Surgery Center...
Open
Geriatrics: Santa Cruz Main Clinic:...
Closed
Behavioral Health Center
Closed
Cardiology: Santa Cruz Main Clinic:...
Closes soon
Dominican Hospital Home Health
Closes soon
Five Branches Health Center
Closes soon
Dominican Hospital PEP Program
Closed
7 min · 3.2 miles
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United States
Terms
Privacy
Send feedback
1000 ft


Ruler
Line
Path
Polygon
Circle
3D path
3D polygon
Measure the distance between two points on the ground
Map Length: 2.59 Miles
Ground Length: 2.59
Heading: 81.67 degrees
Mouse Navigation
Save
Clear
DeLaveaga Golf Course
Chaminade Resort & Spa
Dominican Hospital
Soquel Dr
Marshalls
Harbor High School
Soquel Ave
Live Oak
Market St
Morrissey Blvd
Costco Wholesale
Patagonia Outlet
Ocean St
Soquel Ave
Whole Foods Market
Mission St
Hotel Paradox, Autograph Collection
Santa Cruz Museum of Art & History
Santa Cruz
Soquel Ave
SEABRIGHT
Ocean St
7th Ave
17th Ave
Brommer St
Image Landsat / Copernicus
Google Earth
1985
36°59'22.34" N 121°59'04.49" W elev 106 ft eye alt 15072 ft


Ruler
Line
Path
Polygon
Circle
3D path
3D polygon
Measure the distance between two points on the ground
Map Length: 1.84 Miles
Ground Length: 1.84
Heading: 93.22 degrees
Mouse Navigation
Save
Clear
119 Coral St
Costco Wholesale
Ross Dress for Less
Enchanted Trail Trailhead
Bhatnagar Neera
Pacheco Dog Park
Prospect Heights
De Laveaga Ele
Lee St
Morrissey Blvd
Fairmount Ave
Ocean St
Encinal St
CannaCruz
Market St
Parker St
Branciforte Middle School
Arana Gulch
Sutter Urgent Care - Santa Cruz Center
Jeffery's
Safeway
Marianne's Ice Cream
Patagonia Outlet
San Lorenzo River
Soquel Ave
Water St
Staff of Life
Walgreens
Lillian's Italian Kitchen
Whole Foods Market
Mission Santa Cruz 1791
Mission St
Hotel Paradox, Autograph Collection
The Buttery
Cayuga St
Broadway
Chestnut St
Santa Cruz Riverwalk Park
Santa Cruz Museum of Art & History
Santa Cruz
Pacific Ave
Downtown Santa Cruz Info Kiosk
SEABRIGHT
Windham St
Harbor Dr
Frederick St
Capitola Road Extension
Image Landsat / Copernicus
Google Earth
1985
36°58'59.21" N 122°00'50.82" W elev 86 ft eye alt 11137 ft

**Community Life Services**
5.0 ★★★★★ (2)
Social services organization · 740 Front St Suite 135
(831) 600-7778
Website Directions

**Laurel Street Center**
5.0 ★★★★★ (3)
Social services organization · 214 Laurel St
(831) 420-0290
Directions

**Santa Cruz Equal Employment**
No reviews
Social services organization · 701 Ocean St #310
(831) 454-2600
Directions

**Inspire Supported Living**
No reviews
Social services organization · 309 Isbel Dr
(831) 429-5002
Directions

**Special Parents Information**
No reviews
Social services organization · 740 Front St #175
(831) 423-7713
Website Directions

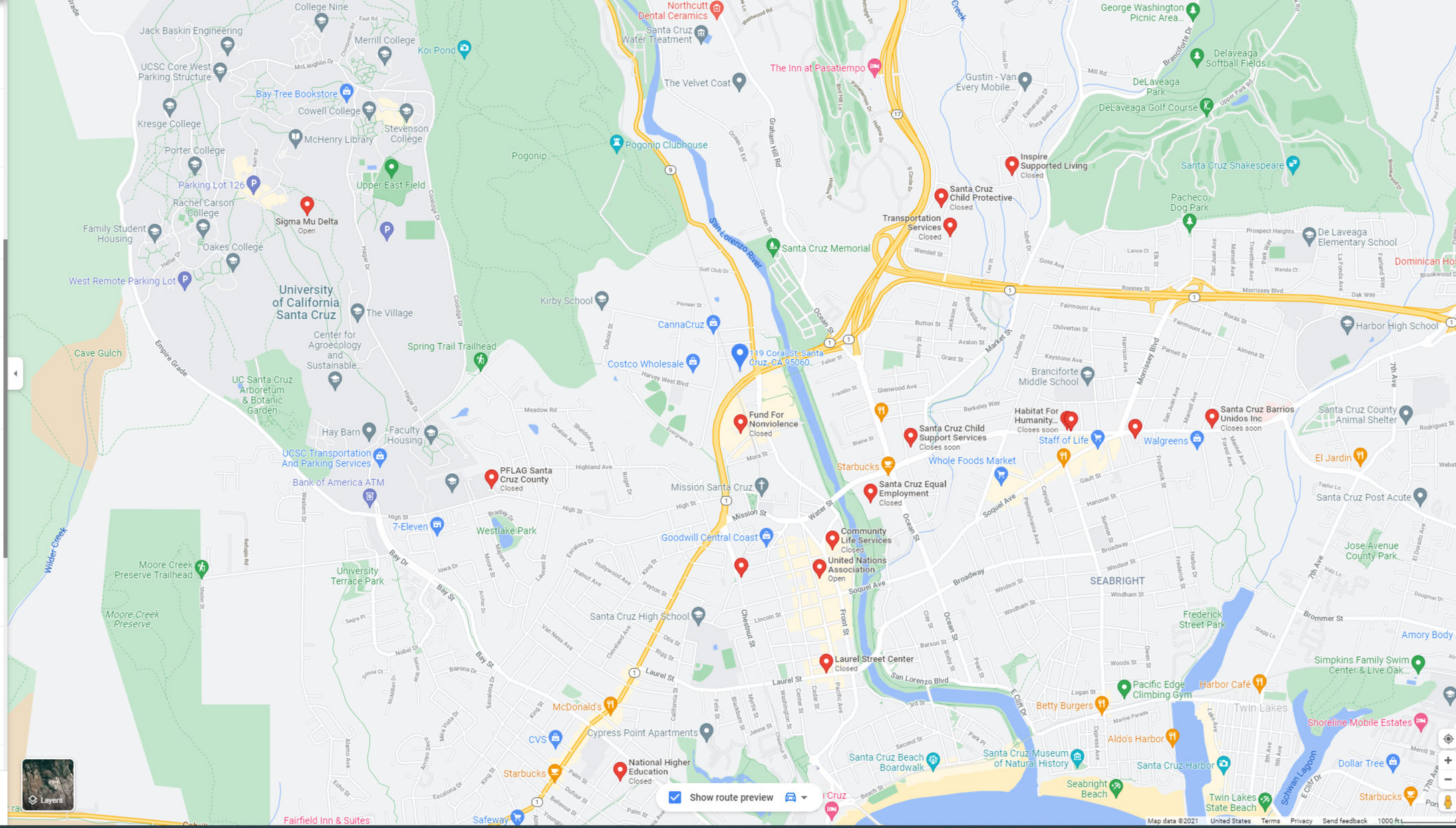
**Santa Cruz Barrios Unidos Inc**
4.9 ★★★★★ (22)
Social services organization · 1817 Soquel Ave
Closing soon: 5:00 PM · (831) 457-8208
Website Directions

**Transportation Services**
No reviews
Social services organization · 1010 Emeline Ave
(831) 427-3435
Directions

**Women, Infants & Children (WIC)**
4.3 ★★★★½ (3)
Social services organization · 1105 Water St
Open until 6:00 PM · (831) 426-3911
Website Directions

**National Higher Education**

Showing results 1 - 20




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# City of Santa Cruz

# 2015 Urban Water Management Plan









Prepared by: City of Santa Cruz Water Department

August 2016

City of Santa Cruz Water Department

# 2015 Urban Water Management Plan

Santa Cruz City Council

Cynthia Mathews, Mayor
Cynthia Chase, Vice Mayor
Pamela Comstock
Don Lane
Richelle Noroyan
Micah Posner
David Terrazas

Water Commission

Walt Wadlow, Chair
Linda Wilshusen, Vice Chair
David Baskin
Doug Engfer
Andy Schiffrin
Doug Schwarm
David Stearns

Rosemary Menard, Water Director

*Prepared by*
Toby Goddard, Administrative Services Manager
Katie Moore, Associate Planner

*Assisted by*
Heidi Luckenbach, Deputy Water Director and Engineering Manager
Kevin Crossley, Senior Civil Engineer
Amy Poncato, Administrative Assistant III
Catherine Borrowman, Professional & Technical Assistant
Lindsay Edelman, Water Conservation Representative

August 2016

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K Water Supply Advisory Committee – Final Report on Agreements and Recommendations
L City of Santa Cruz Water Shortage Contingency Plan
M Santa Cruz Municipal Code Chapter 16.01 – Water Shortage Regulations and Restrictions
N City Council Resolution – Drought Cost Recovery Fee

O Santa Cruz Municipal Code Chapter 16.02 – Water Conservation
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Q City of Santa Cruz Water Department – Long Range Financial Plan
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Y Cooperative Water Transfer Pilot Project for Groundwater Recharge and Water Resource Management

# Chapter 1

# INTRODUCTION AND OVERVIEW

## 1.1 Urban Water Management Planning Act

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

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

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

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

## 1.2 Recent Changes to the Water Code

The Act has been amended numerous times by the Legislature over the years in response to the State's water shortages, droughts, and other factors. A significant

amendment was made in 2009, after the drought of 2007-2009 and as a result of the governor's call for a statewide 20 percent reduction in per capita water use by the year 2020. The Water Conservation Act of 2009, also known as SB X7-7, required urban water suppliers to establish water use targets for 2015 and 2020 that would result in statewide savings of 20 percent by 2020 (Appendix B). Under the law, each urban water supplier is required to determine its baseline daily per capita water use and to calculate future water use targets in accordance with technical methodologies developed by the California Department of Water Resources, and to include this information beginning in its 2010 Urban Water Management Plan. Progress towards decreasing daily per capita water use and achieving future water use targets is then to be documented in subsequent plans starting with this 2015 update.

Recent legislative amendments to the Water Code since 2010 include the following:

- Water suppliers are required to provide a narrative description of their water demand management measures over the past 5 years, as well as the measures a supplier plans to implement to achieve its water use targets.

- Water suppliers are required to submit their 2015 plan electronically to the Department of Water Resources by July 1, 2016,

- Water suppliers are required to use standardized forms, tables, or displays specified by the Department of Water Resources, to facilitate statewide planning.

- Plans must quantify and report on distribution system water losses for the most recent 12-month period using a standardized water balance methodology developed by the American Water Works Association.

- Agencies are authorized, but not required, to include certain energy–related information for collection, treatment, and distribution of water supplies, as well as the water savings estimated to result from adopted codes, standards, or ordinances.

A summary of the changes to the Water Code since 2010 is included in Appendix C.

## 1.3 Urban Water Management Plans in Relation to Other Planning Efforts

Urban Water Management Plans serve a variety of purposes and are intended to be consistent with and support other local, regional, and statewide plans and processes.

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

## 1.4 City of Santa Cruz' 2015 Urban Water Management Plan

This document constitutes the sixth update of the City's Urban Water Management Plan. The first version was adopted by City Council in 1986. The plan was most recently updated in 2010/11 and adopted in late 2011. Since then, circumstances and events have evolved in a way that was difficult to foresee only a few short years ago. Some of the interrelated factors that have changed in the last five years include the following:

- **New Vision for the City's Water Supply.** The City of Santa Cruz has long faced challenges with the reliability of its water supply and had been actively pursuing ocean desalination as a supplemental water source for more than a decade. In spring 2014, the Santa Cruz City Council changed course and appointed a committee of 14 residents representing diverse viewpoints to take an exhaustive look at the City's water issues and ways to address them. The Water Supply Advisory Committee (WSAC) worked for 18 months in an open, public, and transparent process to develop recommendations to ensure a more stable and reliable water supply. In addition to more conservation, the WSAC recommended the City embark on a program to enhance regional groundwater storage using in-lieu water exchanges and/or aquifer storage and recovery with neighboring water districts. Advanced treated recycled water or desalination were recommended as backup plans.

- **Historic Drought Conditions.** The City of Santa Cruz, along with the rest of the State of California, has recently faced one of the most severe droughts in its history. At the local level, the Santa Cruz City Council declared a water shortage in each of the last four years and instituted mandatory water rationing in both 2014 and 2015. At the state level, Governor Brown in January 2014 proclaimed a State of

Emergency to exist throughout California due to the ongoing drought, leading to emergency conservation regulations being imposed on all urban water suppliers to achieve a statewide 25 percent reduction in urban water use in 2015. While water conditions improved in 2016 for parts of California, including Santa Cruz, all urban water suppliers remain subject to updated emergency water restrictions through at least January 2017, as well as other statewide orders aimed at permanently using water more wisely, eliminating water waste, and strengthening drought resilience.

- **Endangered Species Act Issues and Ecosystem Restoration.** The City has not yet finalized a flow agreement with state and federal fishery agencies but has been voluntarily releasing higher flows at various points of diversion to protect endangered Coho salmon and threatened steelhead trout. Improving habitat conditions to restore declining fish populations, while consistent with community values, will further limit the availability of water for municipal purposes in the future. The ultimate resolution of fish flow requirements for the City's sources of supply will be a result of forthcoming negotiations with state and federal fishery agencies.

- **Sustainable Groundwater Management.** In 2014, California enacted landmark legislation to bring the state's groundwater basins into a more sustainable regime of pumping and recharge. Facing declining groundwater supplies, the City recently joined together with two overlying water districts and the County of Santa Cruz to form a Joint Powers Agreement for the creation of a local Groundwater Sustainability Agency (GSA) required by the act. The GSA will oversee the preparation of a cooperative groundwater management plan for the Santa Cruz Mid-County Groundwater Basin, the status of which was recently designated by the State to be in a condition of critical overdraft.

- **Aging Infrastructure.** Key components of the City water system, including the North Coast System, the Newell Creek Dam Inlet/Outlet pipe, and water treatment facilities have reached the end of their useful life and are overdue for renewal and replacement. The Water Department's long-range Capital Improvement Program envisions a total of almost $120 million in needed infrastructure reinvestment projects over the next 10 years, adding pressure on limited financial resources.

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

## 1.5 Report Format

For this 2015 submittal cycle, the City has elected to modify the basic structure and organization used in previous plans to better align the document and accompanying tables with the organization recommended in DWR's Guidebook for Urban Water Suppliers (CA DWR, 2016). Required content is grouped by topic as follows:

**Chapter 1 – Introduction and Overview**: This section covers the background, purpose, and scope of an Urban Water Management Plan.

**Chapter 2 – Plan Preparation:** This section covers the process used to develop the 2015 plan, including efforts in coordination and outreach.

**Chapter 3 – System Description:** This section describes the City's water service area including population, climate, and other factors affecting the City's water management planning, including governance and the Water Department's organizational structure.

**Chapter 4 – System Water Use:** This section covers the past, current, and projected water uses within the City's water service area. It also provides information on distribution system water losses.

**Chapter 5 – Baselines and Targets:** This section provides information about the City's baseline per capita water use and urban water use targets, describes the methods for calculating baseline and target consumption, and success in achieving its 2015 target.

**Chapter 6 – System Supplies:** This section describes and quantifies the current and projected sources of water available to the City, including surface water, groundwater, and potential new sources, transfers, or exchanges of water.

**Chapter 7 – Water Supply Reliability:** This section characterizes the reliability of the City water supply system, provides an updated assessment of the system reliability under differing hydrologic conditions and describes the overall strategy and work plan the City is pursuing to improve its water supply reliability.

**Chapter 8 – Water Shortage Contingency Planning:** This section summarizes the City's 5-stage plan for addressing water shortages and describes actions that would be undertaken in response to a catastrophic interruption of water supplies, including a regional power outage, earthquake, or other emergency situation.

**Chapter 9 – Demand Management Measures:** This section describes the measures currently being implemented by the City to promote conservation and discusses the planning process underway to guide water conservation activities in future years.

**Chapter 10 – Plan Adoption, Submittal, and Implementation:** This section describes the steps taken to adopt and submit the Urban Water Management Plan update, and to make the plan available for public use and reference.

## 1.6 UWMPs and Funding Eligibility

In order for an urban water supplier to be eligible for any state water grants or loans administered by DWR, the agency must have a current Urban Water Management Plan on file that has been determined by DWR to address the requirements of the Water Code.

Beginning in 2016, urban water suppliers must also comply with the requirements of the Water Conservation Act of 2009 in order to be eligible for state water grants and loans, meaning an agency must both meet its interim water use target and report compliance in its 2015 UWMP.

# Chapter 2

# PLAN PREPARATIOIN

## 2.1 Basis for Preparing a Plan

In accordance with the California Water Code, every urban water supplier with 3,000 or more service connections or supplying more than 3,000 acre-feet of water per year are required to prepare an Urban Water Management Plan every five years. With 24,534 active service connections, the City of Santa Cruz clearly meets the definition of "Urban Water Supplier" and therefore must prepare a plan.

The Santa Cruz water system also qualifies under the California Health and Safety Code, Section 116275, as a "Public Water System" that provides drinking water for human consumption and is regulated by the State Water Resources Control Board, Division of Drinking Water. The City operates a single, retail drinking water system. It receives no water from any wholesale supplier nor does it supply either raw or treated water to another agency at the present time.

**Table 2-1. Public Water Systems**

| Public Water System Number | Public Water System Name | Number of Municipal Connections 2015 | Volume of Water Supplied 2015 |
|---|---|---|---|
| CA4410010 | Santa Cruz Water Department | 24,534 | 2,452 |
| | **TOTAL** | 24,534 | 2,452 |

NOTES: Volume of water supplied in million gallons

## 2.2 Regional Planning and Compliance

***CWC 10620***

***(d)(1)*** *An urban water supplier may satisfy the requirements of this part by participation in area wide, regional, watershed, or basin wide urban water management planning where those plans will reduce preparation costs and contribute to the achievement of conservation and efficient water use.*

The City of Santa Cruz actively participates in several regional, interagency, groundwater and watershed basin management efforts. As indicated in Table 2-2, however, the City is choosing to prepare an individual Urban Water Management Plan.

| Table 2-2. Plan Identification (Select One) | | |
|---|---|---|
| ☑ | Individual UWMP | |
| ☐ | Regional UWMP (RUWMP) | |
| | Select One: | |
| | ☐ | RUWMP includes a Regional Alliance |
| | ☐ | RUWMP does not include a Regional Alliance |
| NOTES: | | |

***CWC 10608.20***

***(a)(1)*** *…Urban retail water suppliers may elect to determine and report progress toward achieving these targets on an individual or regional basis as provided in subdivision (a) of Section 10608.28…*

Similarly, for the purpose of determining, reporting, and assessing compliance with its urban water use baselines and targets described in Chapter 5, the City of Santa Cruz is choosing to report as an individual supplier.

## 2.3 Reporting Year and Units of Measure

All information in this plan, except where otherwise noted, is reported on a calendar year basis, and volumes are expressed in units of million gallons.

| Table 2-3: Agency Identification | |
|---|---|
| Type of Agency (select one or both) | |
| ☐ | Agency is a wholesaler |
| ☑ | Agency is a retailer |
| Fiscal or Calendar Year (select one) | |
| ☑ | UWMP Tables Are in Calendar Years |
| ☐ | UWMP Tables Are in Fiscal Years |
| Units of Measure Used in UWMP (select from Drop down) | |
| Unit | MG |
| NOTES: | |

## 2.4 Coordination and Outreach

The process of developing the City's 2015 Urban Water Management Plan really began with the Water Supply Advisory Committee process starting in 2014. This intensive process included an enormous amount of data collection, analysis, modeling, and evaluation of myriad topics and issues associated with water supply planning over an 18-month period. The Committee itself consisted of 14 individuals appointed by the City Council representing diverse viewpoints and interests; including residents, business organizations, environmental organizations, Water Commission members, and an outside City water customer representative. The process was supported by a facilitation team, a technical team, an independent review panel, and by Water Department staff.

All Committee meetings were open to the public with numerous opportunities for public input. The Committee had its own website to share materials, agendas, and to communicate with the public. The committee hosted several public workshops, enrichment sessions, a strategies and ideas convention, open houses, and other outreach activities. Many of the work products developed for the Committee, including a new econometric water demand model, were intended to also serve in updating the City's Urban Water Management Plan.

In late 2015, City staff participated in a webinar and attended a workshop sponsored by DWR to become familiar with changes to the law, the 2015 guidebook, new UWMP tables and tools, and changes in the reporting of wastewater and recycled water.

Written notice regarding the plan review and update was sent to both the City of Capitola and the County of Santa Cruz in December 2015, more than 60 days prior to the public hearing, as required by Section 10621(b) of the Act (Appendix D). Notices were provided both to the City Manager/County Administrative Officer and the Director of Planning/Community Development of these two jurisdictions.

In February 2016, the City hosted and led a meeting to coordinate preparation among all major public water agencies, wastewater utilities, and land use agencies in Santa Cruz County. This meeting was also attended by representatives of the following organizations:

- California Department of Water Resources
- Association of Monterey Bay Area Governments
- Santa Cruz County Local Agency Formation Commission.
- Regional Water Management Foundation (local IRWM entity)

- Resource Conservation District of Santa Cruz County
- Santa Cruz County Environmental Health

Water Department staff prepared the draft urban water management plan in winter and spring of 2016 with the help of the state's *Guidebook for Urban Water Suppliers* (DWR, 2016). Throughout development of this plan, City staff was communicating and coordinating with neighboring water agencies, city and county land use agencies within the service area, as well as the staff from the City's wastewater treatment facilities, City of Scotts Valley, and the Santa Cruz County Sanitation District in accordance with section 10620(d)(2) of the Act.

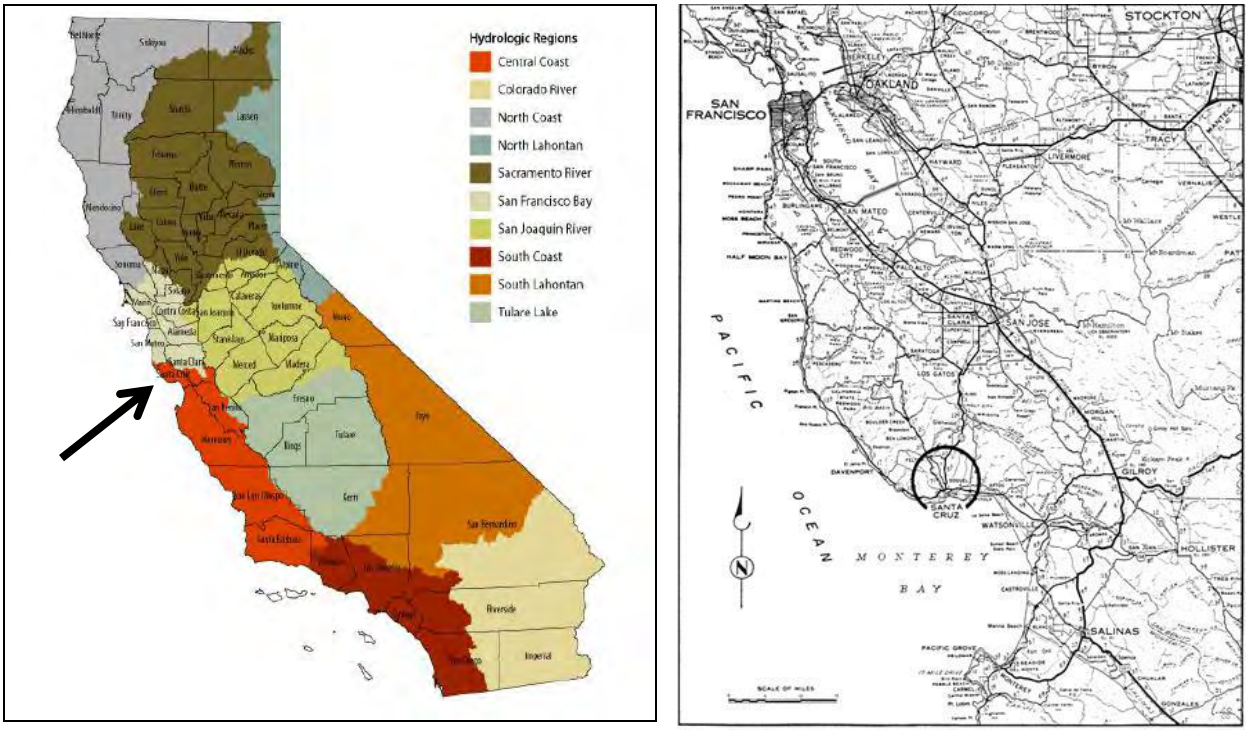
# Chapter 3

# SYSTEM DESCRIPTION

## 3.1 General Description of Service Area

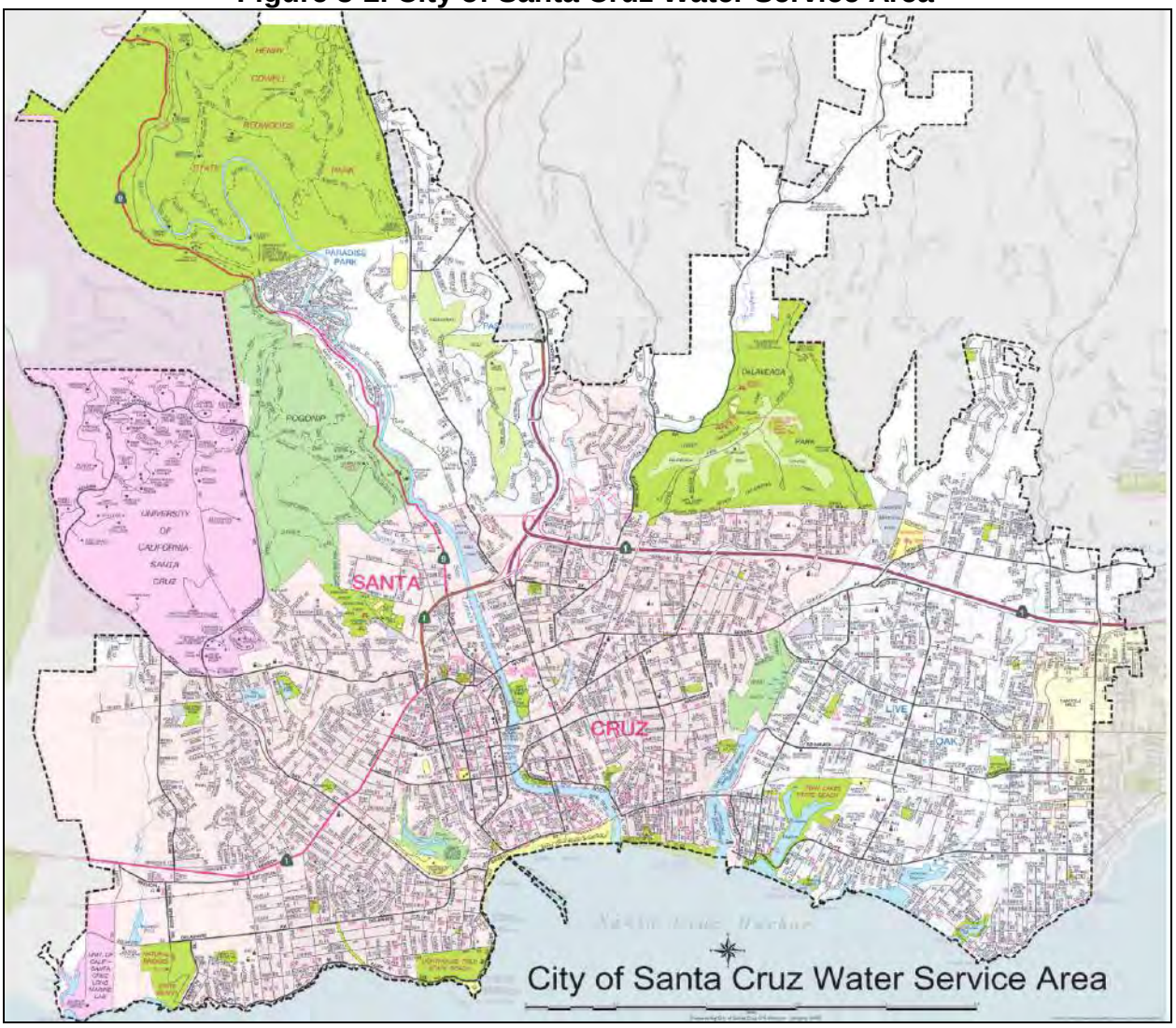
The City of Santa Cruz is located on the central coast of California along the northern shore of Monterey Bay. The City's position on the northern end of the state's Central Coast Hydrologic Region (Region 3) and vicinity relative to the San Francisco Bay Area are shown below in Figure 3-1.

**Figure 3-1. California Hydrologic Region and Vicinity Maps**




Water service is provided to an area approximately 20 square miles in size, including the entire City of Santa Cruz, adjoining unincorporated areas of Santa Cruz County, a small part of the City of Capitola, and coastal agricultural lands north of the city. A generalized map of the water service area, excluding the north coast, is provided in Figure 3-2. No significant changes to the City's service area boundary have occurred in many years.

**Figure 3-2. City of Santa Cruz Water Service Area**




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

The University of California, Santa Cruz is situated atop the upper west side of the City overlooking the downtown area and Monterey Bay. The campus is nationally recognized

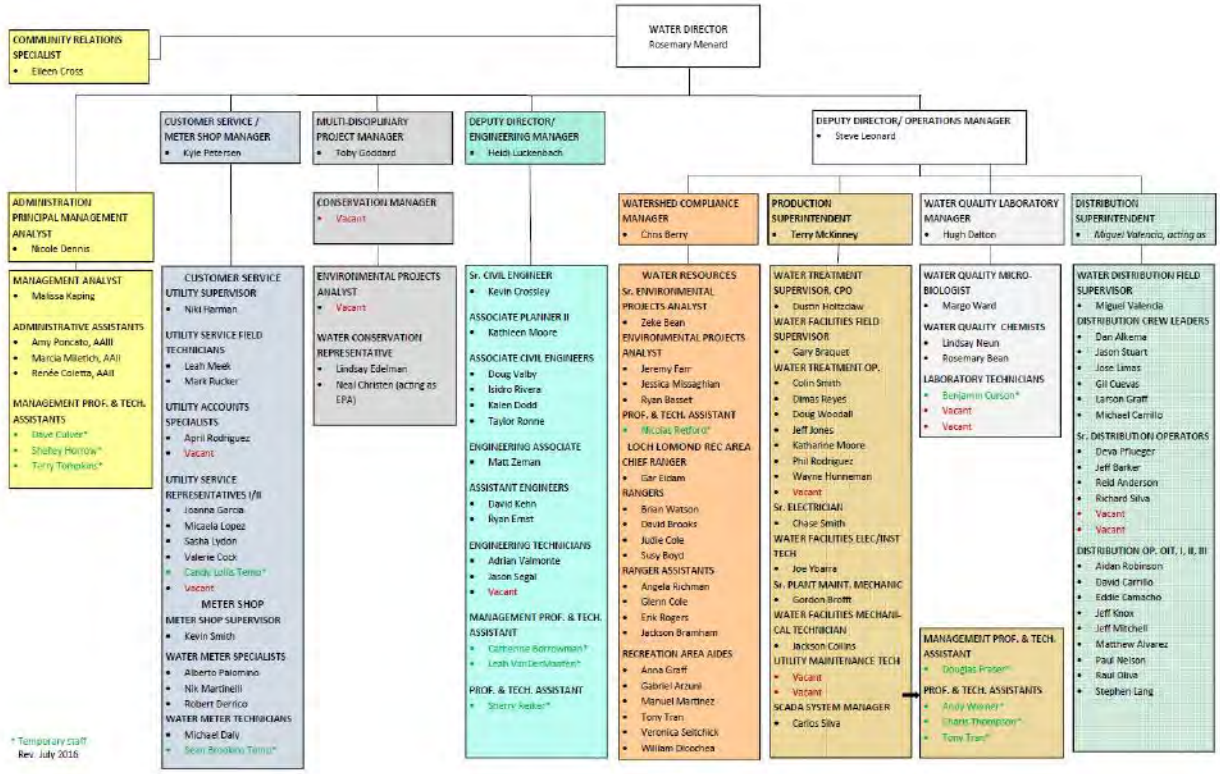
for its quality of instruction, its academic stature, and its research impact. It currently accommodates an enrollment of slightly more than 17,000 students during the academic year.

## 3.2 Water Department

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

The Department is organized into eight sections. These include Administration, Customer Service, Water Conservation, Engineering, Water Resources/Recreation, Water Production, Water Quality, and Water Distribution. There is currently the equivalent of 102 full-time staff positions in the Water Department. An organization chart of the Water Department is shown in Figure 3-3.

**Figure 3-3. Water Department Organization**



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

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

The Department operates financially as an enterprise in which all the costs of running the system are paid by water rates, service charges, and related revenues. The Water Fund receives no tax or general fund revenues. In addition to providing water service, the Department has responsibility for billing and customer service functions related to sewer, refuse, and recycling services inside the City limits.

Long-range goals and policies for guiding growth and development in the City, including civic and community facilities like the water system, are contained in the City's 2030 General Plan. The General Plan includes a series of policy statements regarding water service that support and promote the General Plan's overarching goal of achieving a safe, reliable, and adequate water supply. (Appendix E). Some of these policies will need updating with the change in direction for the City's future water supply resulting from the recent WSAC process.

## 3.3 Service Area Climate

Santa Cruz enjoys a pleasant Mediterranean climate that is characterized by warm, mostly dry summers and mild, wet winters. Due to its proximity to Monterey Bay, fog and low overcast are common during the night and morning hours, especially in the summer. Monthly and annual climate data for Santa Cruz are shown in Table 3-1 below.

Mean monthly temperatures range between 51 to 65 degrees, with the warmest weather usually occurring during August and September. Extreme temperatures are rare and short-lived, with weather conditions being moderated by the oceanic influence and presence of summer fog.

Rainfall in Santa Cruz averages 31.35 inches annually, but varies considerably from year to year. The bulk of seasonal rainfall occurs between November and March. In the

watershed above the City's reservoir in the Santa Cruz Mountains, rainfall averages nearly 50 inches per year.

**Table 3-1. Climate Data for Santa Cruz**

| Month | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mean High Temp (F) | 62.2 | 64.4 | 66.4 | 69.5 | 71.9 | 74.7 | 75.3 | 76.2 | 76.4 | 73.2 | 66.8 | 61.9 | 69.9 |
| Mean Low Temp (F) | 41.3 | 43.3 | 44.4 | 46.0 | 48.9 | 51.8 | 54.0 | 54.3 | 53.0 | 49.5 | 44.9 | 41.2 | 47.7 |
| Mean Temp (F) | 51.9 | 53.8 | 55.4 | 57.8 | 60.4 | 63.2 | 64.7 | 65.2 | 64.7 | 61.4 | 55.8 | 51.5 | 58.8 |
| Precipitation (in) | 6.28 | 6.24 | 4.63 | 1.97 | 0.84 | 0.19 | 0.01 | 0.04 | 0.27 | 1.45 | 3.75 | 5.68 | 31.35 |
| Evapotran-spiration (in) | 1.5 | 1.8 | 2.6 | 3.5 | 4.3 | 4.4 | 4.8 | 4.4 | 3.8 | 2.8 | 1.7 | 1.2 | 36.6 |

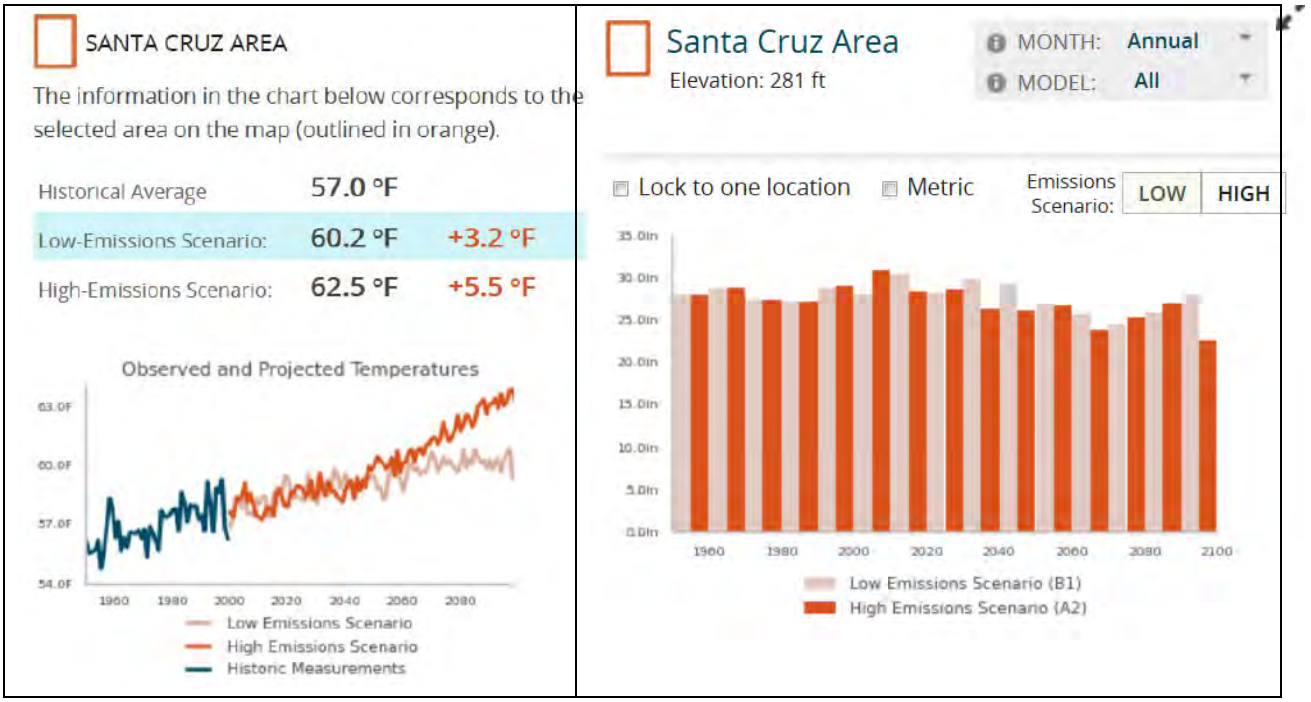
NOTES: National Climate Data Center 1981-2010 Monthly Normals; CA Department of Water Resources

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

Like other coastal communities, the marine influence on local air temperature, humidity, and cloud cover helps keep demand for water relativity low in the City's service area. The presence of summer fog moderates outdoor water use during peak summer season compared to inland locations within Santa Cruz County and elsewhere in California.

Future average temperatures in Santa Cruz are expected to increase. Figure 3-4 below shows two projections of mean temperature to 2100 under different climate change scenarios (Cal-Adapt.org, 2016). A temperature increase of between 3.2 and 5.5 degrees F compared to the historic average is predicted by the end of the century. Conversely, models of future mean annual precipitation show a slight decline over time. The City's Climate Adaptation Study indicates changing temperatures and precipitation will impact ecosystems, fire risk, water quality and quantity, human and environmental health (City of Santa Cruz, 2009). As a coastal community, the City of Santa Cruz recognizes the significance of climate change to the City's economic well-being, public health, and environment, and has begun taking steps as a local agency to respond. Impacts of ongoing climate change on water demand, water supply, and water system reliability are discussed further in Chapters 4, 6, and 7.

**Figure 3-4. Projected Mean Temperature and Annual Precipitation for Santa Cruz Area**




## 3.4 Service Area Population and Demographics

The current population residing in the Santa Cruz water service area is estimated to be 95,251 people. Approximately two thirds of the total population, almost 64,000, lives inside the City limits. Within the City, about 9,100 people including students, faculty, staff, and their families reside on the UC Santa Cruz campus. It is estimated that another 31,462 people, or 34 percent of the service area population, live outside the City limits. Since the 2010 US Census, the water service area population has grown by approximately 4,000 persons, mostly inside the City limits.

Table 3-2 shows the current and projected population for the water service area out to 2035, in five year increments.

These figures are derived from a regional growth forecast prepared by the Association of Monterey Bay Area Governments (AMBAG, 2014). According to the forecast, the total number of people receiving water service is expected to grow by about 17,000 people and reach more than 112,000 in 2035. This equates to a population growth rate of less than one percent per year.

| Table 3-2. Population - Current and Projected | | | | | | |
|---|---|---|---|---|---|---|
| Population Served | 2015 | 2020 | 2025 | 2030 | 2035 | 2040*(opt)* |
| City of Santa Cruz | 63,789 | 66,860 | 70,058 | 73,375 | 76,692 | n/a |
| County of Santa Cruz, City of Capitola | 31,462 | 32,543 | 33,562 | 34,614 | 35,698 | n/a |
| Total | 95,251 | 99,403 | 103,620 | 107,989 | 112,390 | n/a |
| NOTES: AMBAG 2014 Regional Growth Forecast (adopted June 11, 2014), and City of Santa Cruz GIS section. | | | | | | |

Population is a key factor in determining water use. However, reductions in per capita water use over the last decade have more than offset gradual population increases; that is, even though the service area population has been slowly but steadily rising, total water use has declined. More information on per capita water use is covered in Chapter 5 of this report.

## 3.5 Housing

According to utility billing records, there are some 37,003 housing units within the City's water service area. The number of housing units, broken down by account type and jurisdiction is shown in Table 3-3 below. Approximately 19,029, or a little over half of all households in the service area are classified as single family accounts[1]. The other 17,974 homes are multiple family dwelling units consisting of various housing types including duplexes, condominium and townhouse complexes, apartments, mobile homes and alternative housing types such as live/work units, mixed use development, single room occupancy, and accessory dwelling units. The figures below do not include dormitory rooms, apartments, and other housing units located on the UC Santa Cruz main campus, nor does it include residential units associated with mixed use/commercial accounts. A large proportion of the local housing stock (over 50 percent) is rented.

Each of the three jurisdictions served by the City has a recently adopted Housing Element that addresses its required regional fair share of the statewide housing needs established by AMBAG. These documents set forth goals and objectives for housing construction, rehabilitation, and conservation for the period 2015-2023.

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

| Table 3-3. Housing Units, by Account Type and Jurisdiction | | | |
|---|---|---|---|
| Jurisdiction | Single Family | Multi-family | Total |
| City of Santa Cruz | 12,273 | 10,034 | 22,307 |
| County of Santa Cruz | 6,622 | 7,821 | 14,443 |
| City of Capitola | 134 | 119 | 253 |
| **Service Area Total** | 19,029 | 17,974 | 37,003 |
| NOTES: 2015 Annual Sales Report, EDEN Multi-residential units counts report Feb 3, 2016 | | | |

The regional housing goals for the three jurisdictions served by the City are shown below in Table 3-4. For this housing element cycle, the City is planning for an additional 747 units. The County is planning for a total of 1,837 units to be built Countywide through 2023, of which perhaps 372 units would be located within the City water service area. Capitola has a goal to construct 143 units by 2023 in its housing element, but only a small number of these are expected to fall into the City's water service area. Together, these housing plans represent a total residential development potential in the near term of about 1149 new homes within the City's water service area, of which an estimated 414, about one-third, are planned for lower income categories.

| Table 3-4. Regional Housing Goals | | | | |
|---|---|---|---|---|
| Period: 2015-2023 | Total Housing Units | | Units in Lower Income Categories | |
| | Entire Jurisdiction | City Water Service Area | Entire Jurisdiction | City Water Service Area |
| City of Santa Cruz | 747 | 747 | 298 | 298 |
| County of Santa Cruz | 1,837 | 372 | 636 | 110 |
| City of Capitola | 143 | 30 | 57 | 6 |
| Service Area Total | -- | 1,149 | -- | 414 |
| NOTES: County housing estimates within City water service area based on personal communication with Sarah Neuse, Santa Cruz County Planning Department. Capitola housing estimates within the City water service area based on personal communication with Richard Grunow, Community Development Director. | | | | |

It is important to note that while each jurisdiction must demonstrate it has land zoned that can accommodate its fair share of the regional housing needs, it does not necessarily mean such housing actually will be constructed. Some of the units listed above are already permitted and under construction. The City is planning to incentivize smaller, more vertical, mixed-use or multifamily-type housing units along its major transportation corridors. What type of housing is ultimately built, though, will depend largely on market forces. And despite the collective vision for increased housing in the community, actual progress remains slow. In the last five years, only 204 new single family units, and 6 multifamily projects have been built.

## 3.6 Community Growth and Development

All three jurisdictions served by the Santa Cruz water system have general plans, local coastal programs, zoning regulations, and development standards that determine the location, type, and density of growth allowed in the region. The General Plan serves as the principal policy and planning document guiding long-range land use and conservation decisions in cities and counties.

The cities of Santa Cruz and Capitola have both completed comprehensive updates to their General Plans in the last few years. The Santa Cruz City General Plan timeline extends to 2030, and Capitola's has a 20 to 30 year planning horizon. The County's current General Plan was adopted in 1994. It has recently prepared and adopted a Sustainable Santa Cruz County plan addressing sustainable land use, housing, economic development, and transportation objectives in the urban area of the County, part of which is served by the City's water system (Santa Cruz County, 2015). The time horizon of that plan is through 2035.

In addition to city and county General Plans, the University of California has Long Range Development Plans (LRDPs) for both its main campus (UCSC, 2005) and its marine science campus (UCSC, 2008, revised 2013) located on the western edge of the City. These plans provide a comprehensive framework to guide physical development, land use, and resource protection to meet the University's academic and institutional objectives through the year 2020.

The size of the City water service area has remained relatively fixed over time due to a long-standing prohibition against new water connections along the north coast, the acquisition of open space lands which created a greenbelt around the City, and the County's urban services boundary, all of which have served to inhibit urban sprawl. Accordingly, most growth and redevelopment that does happen going forward is

expected to be concentrated within the confines of the existing service area boundary. Any proposed changes to the City's service area boundary that do come forward are subject to approval by both City Council and the Santa Cruz Local Agency Formation Commission (LAFCO).

Within the City of Santa Cruz, only a small amount of land remains undeveloped. The same is true in the parts of the County and City of Capitola served by the City. Because of the relative scarcity of raw land, the majority of future growth in the area is likely to be achieved through redevelopment, remodeling, increased density on underutilized land, and infill development in the urban core and along major transportation corridors, along with new construction on the little amount of vacant land remaining

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

## 3.7 Employment and the Economy

The State Employment Development Department estimates employment within the City's water service area in 2014 (the most recent year for which complete data exists) to average about 42,800, which represents roughly 50 percent of all non-farm jobs in Santa Cruz County (CA EDD, 2016). The three largest employment sectors are health care and social assistance, retail trade, and educational services (Table 3-5).

The University is a key component of the region's economic fabric in terms of employment, spending, research, and business creation. It is the area's largest single employer. Other top employers include the County of Santa Cruz, City of Santa Cruz, Plantronics, and the Santa Cruz Beach Boardwalk. Tourism and lodging are additional major economic drivers in the community. Commercial development is centered in downtown Santa Cruz including River Street, around 41$^{st}$ Avenue in Capitola, and along the major transportation corridors including Mission, Ocean, and Water Streets and Soquel Avenue. The Harvey West area and west side of Santa Cruz support a diverse mix of light industry, retail, high tech, research, and consumer goods and service enterprises. Regional hospitals, medical, and health care facilities and services are concentrated along Soquel Drive in unincorporated Santa Cruz County.

The local economy has rebounded from the great recession, continuing on trend to pace behind the San Jose market by about six months as reflected by reduced unemployment, an improved housing market, increased development activity, a vibrant tourism base, and sustainable increases in sales and hotel revenues. Like other coastal communities, the housing supply is very tight and housing affordability has become a major political, economic, and social issue for families, residents, and employers alike.

**Table 3-5. Employment in Santa Cruz Water Service Area, 2014**

| Major Industry NAICS Sector | NAICS Classification | Employment |
|---|---|---|
| Agriculture, Forestry, Fishing & Hunting | 11 | 144 |
| Utilities | 22 | ***** |
| Construction | 23 | 1,157 |
| Manufacturing | 31-33 | 2,015 |
| Wholesale Trade | 42 | 1,021 |
| Retail Trade | 44-45 | 6,160 |
| Transportation & Warehousing | 48-49 | 431 |
| Information | 51 | 408 |
| Finance & Insurance | 52 | 680 |
| Real Estate & Rental & Leasing | 53 | 568 |
| Professional, Scientific, & Technical Skills | 54 | 1,986 |
| Management Of Companies And Enterprises | 55 | 177 |
| Admin & Support & Waste Mgmt & Remediation | 56 | 1,714 |
| Educational Services | 61 | 5,282 |
| Health Care & Social Assistance | 62 | 7,722 |
| Arts, Entertainment, & Recreation | 71 | 1,460 |
| Accommodation & Food Services | 72 | 5,622 |
| Other Services | 81 | 1,737 |
| Non-Classified | 99 | ***** |
| Government | 92 | 599 |
| **Sub-Total** | | 38,989 |
| **Multiple Sites (Government Only)** | | 3,829 |
| Federal | | 210 |
| Local | | 3,620 |
| **Service Area Total** | | **42,818** |

NOTES: Source: Andy Wong, CA Employment Development Department, Labor Market Information Division, 2016

# Chapter 4

# SYSTEM WATER USE

This chapter describes the City's customer classification system, summarizes trends in water consumption, and presents projections of water use out to the year 2035. It also covers information on distribution system losses, water for low income housing units, and future water savings expected water savings from plumbing codes and standards.

## 4.1 Customer Classification System

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

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

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

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

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

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

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

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

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

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

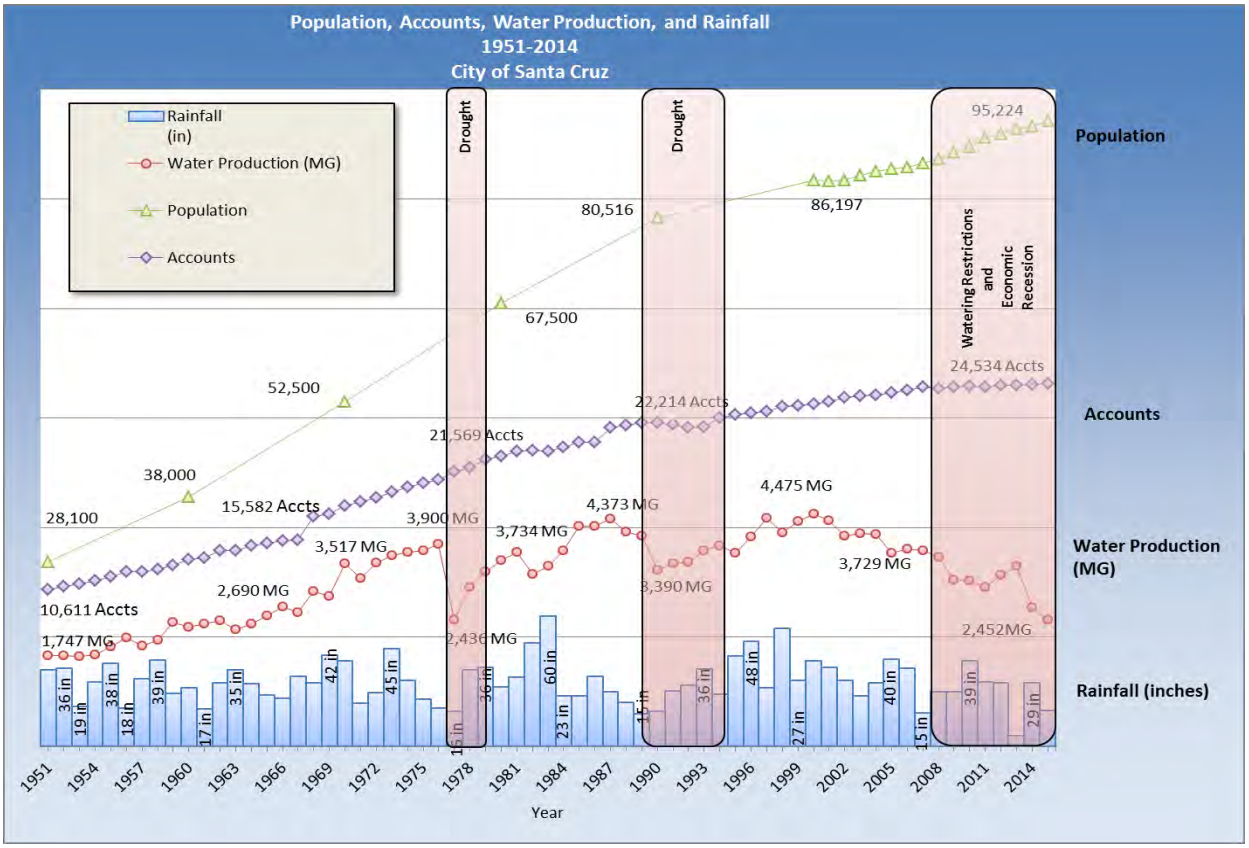
In addition to designating accounts into various customer classes, the City also groups its customers into either “inside-City” or “outside-City” categories for billing purposes.

Except for coast irrigation which receives raw water, all water supplied is potable water. The City does not currently provide recycled water within its service territory. Moreover, no water is presently sold to other agencies, or used for groundwater recharge, saline water intrusion barriers, conjunctive use, or any combination thereof. The potential future use of treated water for transfer, exchange, or groundwater recharge is discussed in Chapter 7.

## 4.2 Historical Water Use

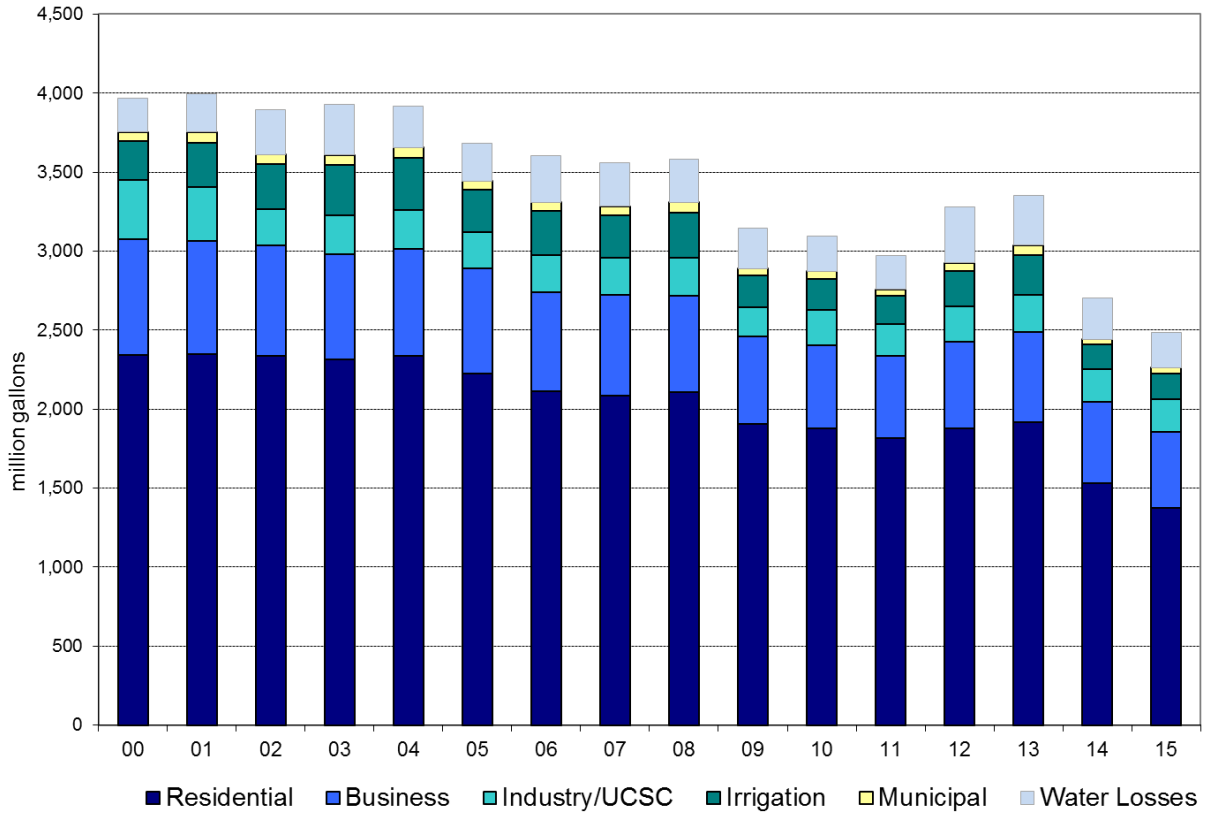
The overall trend in population, number of accounts and total annual water use going back to the 1950s is presented below in Figure 4-1.

**Figure 4-1. Historic Trends for City of Santa Cruz**



Until recently, the general trend in system demand was one in which water use rose roughly in parallel with account and population growth over time, except during two major drought periods in the late 1970s and the early 1990s. Around 2000, this pattern changed and system demand began a long period of decline, accelerated by pricing changes, drought, economic downturn, and other factors. In 2015, after 2 years of water rationing, annual water use fell to a level of about 2.45 billion gallons, similar to the level experienced during the 1970s drought. A breakdown of annual water consumption by City's major customer classes since 2000, along with system water losses, is illustrated in Figure 4-2.

**Figure 4-2. Annual Water Consumption by Customer Category (million gallons)**




## 4.3 Water Use by Sector

Actual demands for potable water in calendar year 2015 are reported by customer class in Table 4.1 below. As illustrated above, both the level and the composition of demand have been strongly affected by the recent drought. Compared to two years before, total system water demand was down nearly 900 million gallons or 27 percent due to local drought response and implementation of water rationing during 2015. In addition to the potable water demand listed below, the City also supplied 34 million gallons of raw water to coast irrigation accounts in 2015.

| Table 4-1. Demands for Potable Water – Actual | | | |
|---|---|---|---|
| Use Type | 2015 Actual | | |
| | Additional Description *(as needed)* | Level of Treatment When Delivered | Volume (mg) |
| Single Family | Individually meter dwellings | Drinking Water | 835 |
| Multi-Family | 2 or more dwelling units | Drinking Water | 538 |
| Commercial | | Drinking Water | 485 |
| Industrial | | Drinking Water | 43 |
| Industrial | UC Santa Cruz | Drinking Water | 160 |
| Institutional/Governmental | Municipal (city) accounts | Drinking Water | 35 |
| Landscape | Dedicated Irrigation Accounts | Drinking Water | 46 |
| Landscape | Golf Irrigation | Drinking Water | 87 |
| Losses | | Drinking Water | 223 |
| | | **TOTAL** | 2,452 |
| NOTES: System water losses are considered provisional until 2015 annual water audit is completed. Figures above do not include raw water sales of 34 mg in 2015 for coast irrigation, or 2 mg received from Soquel Creek Water District during a major valve replacement project. No drinking water was otherwise used for groundwater recharge, saline water intrusion barrier, wetlands or wildlife habitat, or for sales, transfers, or exchanges to other agencies. | | | |

## 4.4 Distribution System Water Losses

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

The City has conducted audits of the distribution system annually since the late 1990's to account for unmetered water uses and to track how much water is lost to leakage over time. The City uses AWWA water balance software to help quantify and track water losses associated with the water distribution system and identify areas for improved efficiency and cost recovery. Total water losses vary from year to year, averaging 265 million gallons per year or about 7.5 percent of treated water production.

The volume of water loss for calendar year 2014, which is the most recent 12-month period available, is presented in Table 4-2. The City is currently conducting a Water Loss Control project to examine the City's water system and operations practices to better validate where losses are occurring, evaluate options, and set forth a formal strategy to improve water accountability and reduce lost water. More information on distribution system water losses is covered in Chapter 9.

**Table 4-2. 12 Month Water Loss Audit Reporting**

| Reporting Period Start Date (mm/yyyy) | Volume of Water Loss (million gallons) |
|---|---|
| 01/2014 | 261 |
| NOTES: AWWA Water Audit Software, V5.0 for Calendar Year 2014 | |

## 4.5 Water Demand Projections

One of the first requests made by the WSAC was for the Water Department to update the demand forecast to reflect current information on water usage and to account for effects of conservation, water rates, and other factors expected to impact the future demand for water. Accordingly, the Water Department contracted with M.Cubed to develop two products: 1) an interim forecast to assist the WSAC process, and 2) a separate econometric demand forecast for the service area extending to year 2035.

The forecast of future water demand is a foundational component of any Urban Water Management Plan. In recent years the historical patterns of water demand have been upended by a variety of factors, including the cumulative effects of tighter efficiency standards for appliances and plumbing fixtures, greater investment in conservation, a significant uptick in water rates, an equally significant downturn in economic activity during the Great Recession, and on-going drought. These events have resulted in even more uncertainty than usual regarding future water demand and have placed even greater importance on sorting out the effect each has had on demand in recent years as well as how they are likely to affect demand going forward.

Econometric demand forecasting develops statistically-based models of average water use per service by customer class. A demand forecast was developed based on these models covering the period 2020-2035 and incorporating empirical relationships between water use and key explanatory variables, including season, weather, water rates, household income, employment, conservation, and drought restrictions. The approach builds on similar models of water demand developed for the California Urban Water Conservation Council (Western Policy Research, 2011), Bay Area Water Supply and Conservation Agency (Western Policy Research, 2014), California Water Service

Company (A&N Technical Services, 2014, M.Cubed 2015), and Contra Costa Water District (M.Cubed 2014).

The statistical models of demand were estimated using historical data on customer class water use, weather, water price, household income, conservation, and other economic variables driving water demand. The monthly models of water demand were combined with service and housing growth forecasts to predict future water demands. The demand models explain 90 to 99% of the observed variation in historical average use over the 14-year estimation period.

A description of the model and forecasts of average demand by customer class are detailed in Appendix F. The forecasts include adjustments for future effects of water rates, plumbing codes and the City's baseline conservation program and are predicated on average weather and normal (predicted) income and growth.

Additional modeling was conducted to factor in updated information on passive and active conservation savings through the 2035 planning period (Maddaus Water Management, 2016). The resulting water demand projection, by customer class, is presented in Table 4-3. As summarized below, system water demands are expected to decline and then stabilize at a level of about 3.2 billion gallons per year.

**Table 4-3. Demands for Potable Water - Projected**

| Use Type | Additional Description | Projected Water Use (mgy) | | | | |
|---|---|---|---|---|---|---|
| | | 2020 | 2025 | 2030 | 2035 | 2040-opt |
| Single Family | Individually metered dwellings | 1,277 | 1,223 | 1,191 | 1,170 | n/a |
| Multi-Family | 2 or more dwelling units | 772 | 714 | 690 | 678 | n/a |
| Commercial | | 574 | 541 | 525 | 519 | n/a |
| Industrial | | 56 | 59 | 60 | 61 | n/a |
| Institutional/ Governmental | Municipal (city) accounts | 46 | 42 | 40 | 40 | n/a |
| Landscape | Dedicated Irrigation | 112 | 119 | 134 | 144 | n/a |
| Landscape | Golf Irrigation | 58 | 52 | 47 | 47 | n/a |
| Other | UC Santa Cruz | 196 | 234 | 271 | 308 | n/a |
| Water Losses | | 236 | 241 | 247 | 253 | n/a |
| **TOTAL** | | 3,327 | 3,225 | 3,205 | 3,220 | n/a |

NOTES: David Mitchell, M Cubed, October 2015, and by Maddaus Water Management, February 2016

Total water demands are presented in Table 4-4.

**Table 4-4. Total Water Demands (mgy)**

| | 2015 | 2020 | 2025 | 2030 | 2035 | 2040 *(opt)* |
|---|---|---|---|---|---|---|
| Potable and Raw Water | 2,452 | 3,327 | 3,225 | 3,205 | 3,220 | n/a |
| Recycled Water Demand | 0 | 0 | 0 | 0 | 0 | 0 |
| **TOTAL WATER DEMAND** | 2,452 | 3,327 | 3,225 | 3,205 | 3,220 | n/a |

NOTES: Excludes 34 mg of raw water for coast ag in 2015, projection of coast ag use not available; See Chapter 6 for information on recycled water as a potential source of supply.

## 4.6 Estimating Future Water Savings

***CWC 10631***

***(e)(4)(A)*** *If available and applicable to an urban water supplier, water use projections may display and account for the water savings estimated to result from adopted codes, standards, ordinances, or transportation and land use plans identified by the urban water supplier, as applicable to the service area.*

***(B)*** *To the extent that an urban water supplier reports the information described in subparagraph (A), an urban water supplier shall do both of the following: (i) Provide citations of the various codes, standards, ordinances, or transportation and land use plans utilized in making the projections.(ii) Indicate the extent that the water use projections consider savings from codes, standards, ordinances, or transportation and land use plans. Water use projections that do not account for these water savings shall be noted of that fact.*

The City is in the final stages of completing a Water Conservation Master Plan, described later in Chapter 9. A major part of this planning effort was to model the impact of natural replacement of existing fixtures and appliances on future water use inside homes and businesses, as well as the impact of fixture codes on water use in new development. The model takes into account the existing proportion and characteristics of fixtures from a recent Baseline Water Use Survey, estimated annual replacement rate, fixture life, and assumed market share at various points in the planning horizon (Envirosmart Solutions Group, 2013).

Different federal and state laws regulate the sale or manufacturing of various water using fixtures and appliances. The following laws and regulations were taken into account to estimate the decrease in water use expected to occur over the next 20 years:

- California Energy Commission Appliance Efficiency Regulations, Sept 2015 (toilets, urinals, faucets, and showerheads)
- U.S. Department of Energy standards (residential clothes washers, dishwashers)
- Federal Energy Policy Act of 1992 (toilets, urinals, showerheads, faucets, pre-rinse spray valves)
- 2013 California Green Building Code (new development)
- AB 715 (toilets, urinals)

The estimated cumulative impact of plumbing codes on water use over the next 20 years is a reduction of some 329 million gallons or 8.6 percent of baseline water demand (Table 4-5).

**Table 4-5. Future Cumulative Water Savings From Plumbing and Appliance Codes**

| | 2020 | 2025 | 2030 | 2035 | 2040 *(opt)* |
|---|---|---|---|---|---|
| Water Savings (mgy) | 94 | 179 | 269 | 329 | n/a |

NOTES: Maddaus Water Management, Inc., 2016

## 4.7 Water Use for Lower Income Households

In its demand forecast, the City expects nearly 1,000 new housing units to be built in its service area by 2025. Table 3-4 on page 3-8 (Chapter 3) provides details about these housing units, including the 414 units that are planned for lower income categories. The water demand for these low income units, while not separately calculated, is well within the range of housing units factored into the City's demand forecast.

## 4.8 Climate Change

Information in Section 3.3 on the service area climate suggests a gradually hotter and somewhat drier climate can be expected to occur in Santa Cruz in future years. Indeed, in 2014 and 2015, at the height of the current drought, the mean annual temperature was between 2 and 3 degrees higher than the historic, long-term average temperature. It is not unreasonable, given normal seasonality of water use, to expect that a warmer and drier future could result in an overall increase in water demand.

Using parameters from the econometric demand models, weather effects on City water demand were investigated using historical data on sales and weather and expressed as the expected change in demand per a 1(one) degree F increase in average maximum daily air temperature over the entire year (M.Cubed, 2016). The analysis shows, based on current water use patterns, demand would increase from between 0.19 to 1.38

percent for one degree increase in average daily high temperature for every customer group except industrial. Results are summarized in Table 4-6. Golf consumption shows the largest increase in demand due to change in maximum daily temperature and multifamily consumption is the least responsive. Total system demand would be expected to increase by about 0.45 percent per one degree F increase in average daily high temperature (Appendix G). Therefore, in the higher scenario for projected temperature in year 2100 shown in Figure 3-4, if average temperature in Santa Cruz were to rise by 5.5 degrees, water demand could be expected according to this analysis to increase by 2.5 percent.

**Table 4-6. Expected % Change in Demand per 1 Degree F Change in Monthly Average Maximum Daily Air Temperature**

| | |
|---|---|
| SFR | 0.62 |
| MFR | 0.19 |
| BUS | 0.29 |
| MUN | 1.09 |
| IRR | 0.80 |
| GOLF | 1.38 |
| IND | 0.00 |
| Weighted Average | 0.45 |

NOTES: M.Cubed, 2016. UCSC not listed since it was not modeled in econometric demand forecast.

# Chapter 5

# SB X7-7 BASELINES AND TARGETS

This chapter provides a description and calculations for the City's baseline daily per capita water use and future water use targets, in accordance with technical methods developed by the California Department of Water Resources, as required by Water Code section 10608.

> ***CWC 10608.20***
>
> ***(e)*** *An urban retail water supplier shall include in its urban water management plan . . . the baseline daily per capita water use, urban water use target, interim water use target, along with the bases for determining those estimates, including references to supporting data.*

## 5.1 Background Information

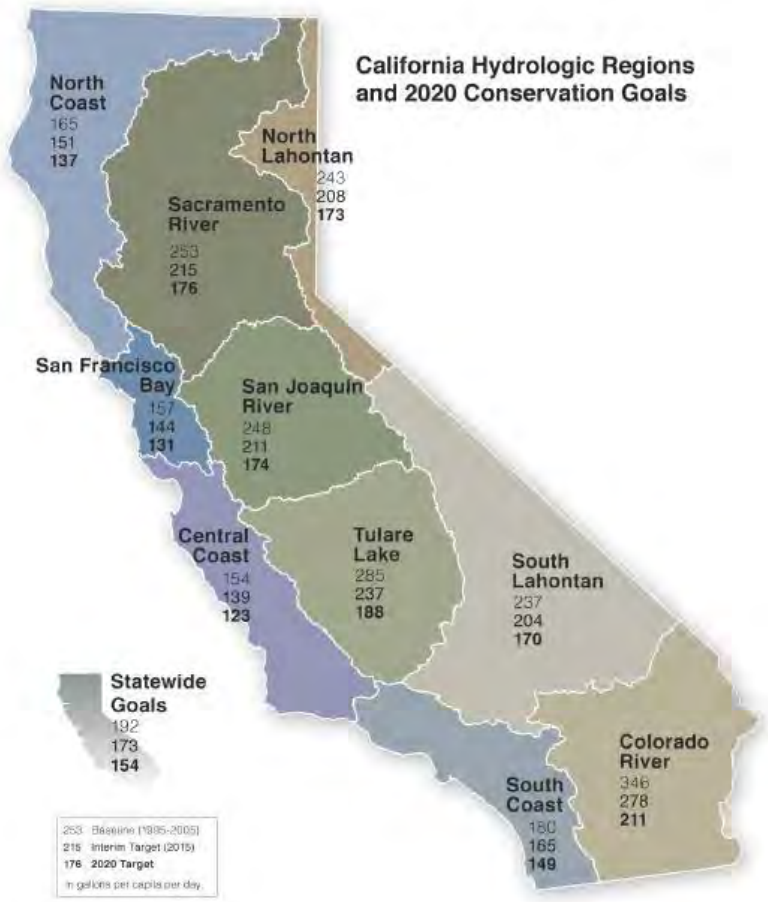
In February 2008, the Governor introduced a seven-part comprehensive plan for improving the Sacramento-San Joaquin Delta. As part of this effort, the Governor directed state agencies to develop a plan to reduce statewide per capita water use by 20 percent by the year 2020.

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

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

The final 20x2020 Water Conservation Plan was issued February 2010 (DWR, 2010). It reported urban water use currently varies between **152 gpcd** in the Central Coast region (Region 3) to **346 gpcd** in the Colorado River region (Region 10) and averages **192 gpcd** statewide**.** The report concluded that California could achieve a 20 percent reduction in urban per capita water use to an average of **154 gpcd** using current and new conservation actions. It also established for water resources planning purposes baseline values and future water use targets for each of the state's ten hydrologic regions, summarized in Figure 5-1.

**Figure 5-1. Regional Urban Water Use Targets**



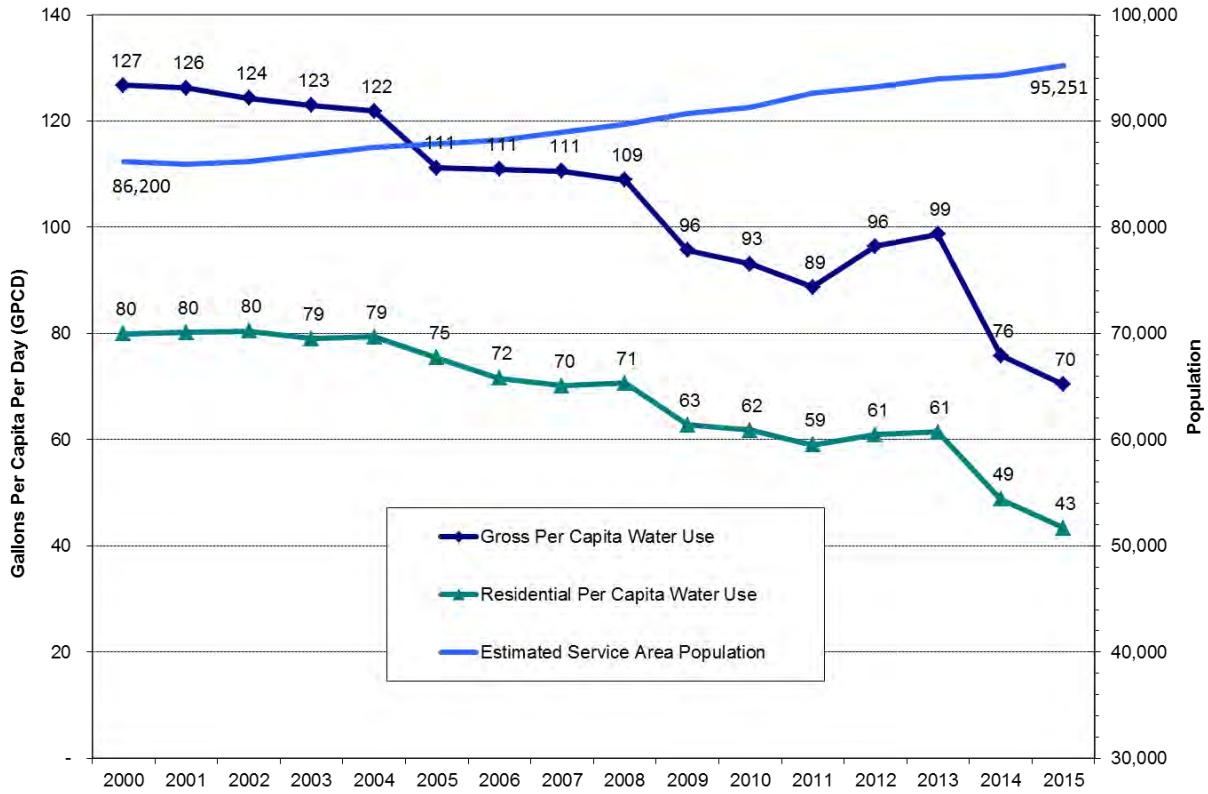

With the enactment of the Water Conservation Act of 2009, also known as SB X7-7, the state is required to set a goal to reduce urban per capita water use by 20 percent by the year 2020. Each retail urban water supplier must determine its baseline water use during their baseline period and also target water use for the years 2015 and 2020 in order to help the State achieve the 20 percent reduction. A copy of the law is included as Appendix B.

To provide for consistent implementation of the law, suppliers are required to conform to Technical Methodologies prepared by the CA Department of Water Resources, which details the process that urban water suppliers are to follow and the options available for complying with the legislation (DWR, February 2016). Water suppliers have some flexibility in setting and revising water use targets. For instance, a water supplier may set its water use target and comply individually, or as part of a regional alliance. The City of Santa Cruz is electing to report as an individual retail supplier.

In this 2015 Plan, water agencies must demonstrate compliance with their established water use target for the year 2015. This will also demonstrate whether or not the agency is currently on track to achieve its 2020 target. Retail water agencies are also required to separately complete and submit the standard tables in the SB X7-7 verification form.

Figure 5-2 below shows the City's per capita water use and estimated population since 2000. The top line labeled **Gross Per Capita Water Use** is the metric that water agencies are required to calculate and to reduce under SB X7-7. It represents all the treated water entering the distribution system over one year's time, divided by the total population, and expressed in gallons per person per day. As explained further below, gross per capita water use includes residential and nonresidential uses of water in the community, as well as unmetered uses such as firefighting and losses that occur due to leakage on the distribution system.

**Figure 5-2. Per Capita Water Use and Service Area Population**




The bottom line labeled Residential Per Capita Water Use is included for reference only. It represents the total annual metered water consumption at single and multiple

residential accounts, divided by the residential population[1]. It is intended to show the estimated average amount of water used by a person both indoors and outdoors at their home on a daily basis. This metric better approximates how most people relate to their own personal water use at their property. It is also the same metric used by the State Water Board to set urban water reduction targets in 2014 and 2015, explained in Section 5.9 below.

Over the last 15 years, the City's gross per capita water use has declined from about **127 gpcd** in 2000 to **70 gpcd** in 2015. Similar to the pattern in total water use discussed in Chapter 4, the trend in per capita water has been mostly declining over this period, for various reasons. These include the cumulative effects of more conservation, higher water rates, economic downturn, drought, and industrial closures. The steep drop in 2014 and 2015 reflects the effect of water rationing that was instituted both years as a result of a declared emergency water shortage.

As is described below, the City's gross per capita water use is presently far below both its **2015 interim target of 111 gpcd** and its **2020 target of 110 gpcd,** as determined in accordance with DWR's technical methodologies. Accordingly, the City is presently in compliance with all requirements of SB X7-7.

The remainder of this Chapter strictly follows the DWR Guidebook for demonstrating and documenting compliance with the City' water use target for the year 2015.

## 5.2 Updating Calculations from 2010 Urban Water Management Plan

In accordance with Water Code section 10608.20, an urban retail water supplier may update its 2020 urban water use target in its 2015 Urban Water Management Plan. In the 2010 plan, the City elected to use **Target Method 3** (for an explanation of the four target methods, see section 5.7). No change to the target method is being made in this 2015 plan.

The 2010 plan also used both 2000 and 2010 U.S. Census data at the block level in its baseline population calculations. As a result, no recalculation of the baseline population calculations is needed for this 2015 plan. It should be noted, however, that the annual population estimates from the CA Department of Finance (CA DOF) for the Santa Cruz City in non-census years were slightly revised since the 2010 plan, and those revisions

[1] Residential population differs from total population. There are several thousand students, families, and staff living on the University main campus, which is classified as an industrial account. Only the people living in residences off-campus are counted for the purpose of calculating R-GPCD.

have been incorporated in this update. The change in population inside the City estimated by CA DOF ranged from a decline of 0.1 percent in 2001 to an increase of 0.6 percent in 2009 (-62 to +341 persons). These small revisions made no difference in the City's base daily per capita water use.

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

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

Step 1 - determining baseline daily per capita water use – involves several steps on its own, as listed below:

1A. Establishing the baseline period,
1B. Estimating the service area population for each year in the baseline period,
1C. Measuring gross water use, typically expressed in million gallons per year, and
1D. Determining the daily per capita water use in each of the baseline years.

The calculations for Step 1, A-D are detailed further below in Sections 5.3 through 5.6. Steps 2 through 4 are then described in Section 5.7.

## 5.3 Baseline Period (Step 1A)

Under SB X7-7, water suppliers must define two baseline periods. The first is a continuous 10-year baseline period (or 15-year period if more than 10 percent of system water demand is met through recycled water) ending no earlier than December 2004 and no later than December 2010. The City does not provide recycled water service so the 15-year baseline period does not apply. The 10-year baseline period selected by the City of Santa Cruz is **2001-2010**.

The second is a continuous five-year baseline period ending no earlier than December 2007 and no later than December 2010. This second baseline period is used to confirm that the selected target meets the minimum water use reduction requirement (see section 5.7 on target confirmation). The 5-baseline period selected by the City of Santa Cruz is **2003-2007**. Both the 10-year and the 5-year baseline periods presented in this plan are the same as were reported in the 2010 plan.

## 5.4 Service Area Population (Step 1B)

Estimates of the City's water service area population are based on the sum of separate population estimates for inside and outside the Santa Cruz city limits.

Inside the City limits, population data is readily available on an annual and decennial basis for the City as a whole. The City uses data published by both the U.S. Census Bureau for census years and the California Department of Finance in non-census years.

Outside the City limits, however, including parts of unincorporated Santa Cruz County and the City of Capitola that are served by the City water system, population data are available only every ten years through the census. Moreover, because the City's service area boundary in those jurisdictions does not coincide neatly with census tract or block boundaries, estimates must be derived using a Geographic Information System at the census block level. In split census blocks, population is apportioned based the percentage of each individual block that is located within the water service area.

For non-census years, it is standard practice among water utilities to estimate population growth by using a people-per-residential connection method. Between 2000 and 2010, approximately 425 residential accounts were added to the system outside the City limits. But because census data indicated that the overall population outside the City actually declined during this period, this approach was not considered to be applicable or appropriate for that time period. Therefore, annual estimates of the outside city population were derived simply by interpolating between the 2000 and 2010 census years. Between 2010 and 2015, the outside City population was determined using a people-per-connection method.

## 5.5 Gross Water Use (Step 1C)

Gross water use[2] is a measure of water that enters the distribution system of a supplier over a specified period of time. Gross water use includes not just residential consumption but all the other uses of water in a community, including schools, parks, and commercial buildings such as restaurants, hotels, and office buildings. It also captures water used for public purposes, such as firefighting and water main flushing, and losses that arise from leaks on the water system.

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

Gross water use was determined in a manner that is consistent with the definition in Water Code section 10608.12(g) and the method outlined in the AWWA Manual M36 as part of the City's annual distribution system water audit process (AWWA, 2016). These annual water use figures represent the total amount of treated water entering the distribution system from the City's Graham Hill and Live Oak water treatment plants, after corrections have been applied to adjust for both production meter accuracy and net change in distribution system storage at the beginning and end of the year.

Gross water use does not include raw water sales to coast agriculture, since it is fed to these customers before it reaches the water treatment plant.

## 5.6 Baseline Daily Per Capita Water Use (Step 1D)

The calculation of baseline daily per capita water use combines information described above and is provided in Tables 5-1 below. The City's baseline daily per capita use is **113 gpcd**.

**Table 5-1: Gallons Per Capita Per Day (GPCD)**

| Baseline Year | | Service Area Population | Gross Water Use (million gallons) | Daily Per Capita Water Use (GPCD) |
|---|---|---|---|---|
| 10 Year Baseline GPCD | | | | |
| Year 1 | 2001 | 85,972 | 3,962 | 126 |
| Year 2 | 2002 | 86,158 | 3,909 | 124 |
| Year 3 | 2003 | 86,865 | 3,898 | 123 |
| Year 4 | 2004 | 87,556 | 3,895 | 122 |
| Year 5 | 2005 | 87,864 | 3,567 | 111 |
| Year 6 | 2006 | 88,170 | 3,570 | 111 |
| Year 7 | 2007 | 88,929 | 3,590 | 111 |
| Year 8 | 2008 | 89,666 | 3,565 | 109 |
| Year 9 | 2009 | 90,728 | 3,169 | 96 |
| Year 10 | 2010 | 91,291 | 3,103 | 93 |
| **10 Year Average Baseline GPCD** | | | | **113** |

| 5 Year Baseline GPCD | | | | |
|---|---|---|---|---|
| **Baseline Year** | | Service Area Population | Gross Water Use | Daily Per Capita Water Use |
| Year 1 | 2003 | 86,865 | 3,898 | 123 |
| Year 2 | 2004 | 87,556 | 3,895 | 122 |
| Year 3 | 2005 | 87,864 | 3,567 | 111 |
| Year 4 | 2006 | 88,170 | 3,570 | 111 |
| Year 5 | 2007 | 88,929 | 3,590 | 111 |
| **5 Year Average Baseline GPCD** | | | | **116** |
| NOTES: | | | | |

## 5.7 2015 and 2020 Targets

***CWC 10608.20***

***(e)*** *An urban retail water supplier shall include in its urban water management plan due in 2010. . . urban water use target, interim urban water use target,…along with the bases for determining those estimates, including references to supporting data (10608.20(e)).*

***CWC 10608.20***

***(g)*** *An urban retail water supplier may update its 2020 urban water use target in its 2015 urban water management plan…*

### 5.7.1 Select and Apply a Target Method (Step 2)

Under SB X7-7, urban water suppliers must next set a 2020 water use target using one of the following four methods:

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

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

Method 3: Ninety-five percent of the applicable state hydrologic region target as stated in the State's April 30, 2009, draft 20x2020 Water Conservation Plan.

Method 4: A method developed by CA DWR that identifies water savings obtained through identified practices and subtracts them from the agency's baseline GPCD.

As mentioned above, the City of Santa Cruz elected in 2010 to use **Method 3**. For the Central Coast Region, 95 percent of the region's 2020 target is **117 gpcd** (0.95 x 123 gpcd = 117 gpcd). 100 percent of the City's water service area is located within the Central Coast region.

### 5.7.2 5-Year Baseline – 2020 Target Confirmation (Step 3)

> ***CWC 10608.22***
>
> *Notwithstanding the method adopted by an urban retail water supplier pursuant to Section 10608.20, an urban retail water supplier's per capita daily water use reduction shall be no less than 5 percent of base daily per capita water use as defined in paragraph (3) of subdivision (b) of Section 10608.12. This section does not apply to an urban retail water supplier with a base daily per capita water use at or below 100 gallons per capita per day.*

Water Code section 10608.22 requires water suppliers to achieve at least a 5 percent minimum reduction in per capita water use, as compared to a different, 5-year baseline period, as mentioned earlier in section 5.3. The 5-year baseline period may end no earlier than December 2007 and no later than December 2010. The 5-year baseline period selected by the City of Santa Cruz is **2003-2007**.

As indicated in Table 5-1 above, the City's 5-year baseline water use calculates out to be **116 gpcd.** Accordingly, the City's maximum allowable gpcd target in 2020 (per section 10608.22) is **110 gpcd** (0.95 x 116 gpcd = 110 gpcd).

### 5.7.3 Calculate the 2015 Interim Urban Water Use Target (Step 4)

The last step in complying with SB X7-7 requires calculating an interim urban water use target, meaning the midpoint between the base daily per capita water use and the 2020 target water use for measuring progress in the year 2015. The City's interim urban water use target is:

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

### 5.7.4 Baselines and Targets Summary

All the discussion above regarding baseline periods, baseline GPCD, 2015 interim target and 2020 target is summarized in Table 5-2 below:

**Table 5-2. Baselines and Targets Summary**

| Baseline Period | Start Year | End Year | Average Baseline GPCD* | 2015 Interim Target * | Confirmed 2020 Target* |
|---|---|---|---|---|---|
| 10-15 year | 2001 | 2010 | 113 | 111 | 110 |
| 5 Year | 2003 | 2007 | 116 | | |

*All values are in Gallons per Capita per Day (GPCD)

NOTES:

## 5.8 2015 Compliance Daily per Capita Water Use

All water suppliers are required to calculate their actual 2015 water use to determine whether or not they have met their per capita 2015 target and to assess their progress toward meeting their 2020 target. Beginning in 2016, eligibility for state grants and loans is conditioned on an agency meeting its 2015 target.

Table 5-2 below documents the City of Santa Cruz has not only met but far surpassed its 2015 target and is therefore in compliance with the requirements in SB X7-7.

**Table 5-2. 2015 Compliance**

| Actual 2015 GPCD | 2015 Interim Target GPCD | **Optional Adjustments to 2015 GPCD** Enter "0" for adjustments not used *From Methodology 8* | | | | | 2015 GPCD *(Adjusted if applicable)* | Did Supplier Achieve Targeted Reduction for 2015? Y/N |
|---|---|---|---|---|---|---|---|---|
| | | Extraordinary Events | Economic Adjustment | Weather Normalization | TOTAL Adjustments | Adjusted 2015 GPCD | | |
| 70 | 111 | 0 | 0 | 0 | 0 | 70 | 70 | Yes |

**All values are in Gallons per Capita per Day (GPCD)*

NOTES:

## 5.9 Drought Emergency Water Conservation and R-GPCD

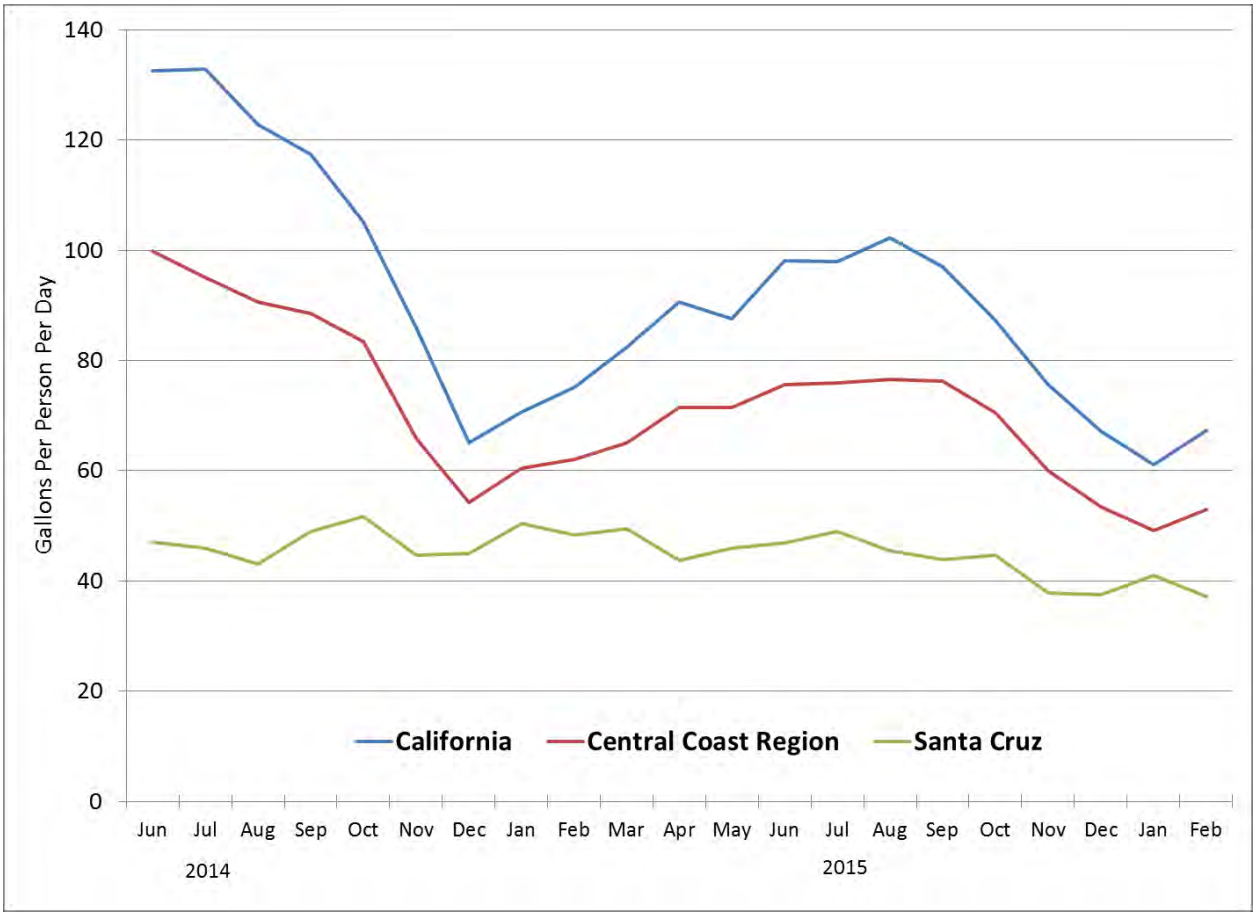
Beginning June 2014, urban water suppliers were required under separate drought emergency regulations to submit monthly reports to the State Water Resources Control Board on their urban water conservation efforts. These reports initially focused on the total monthly water production compared to the amount produced in the same month during 2013.

Shortly thereafter, beginning October 15, 2014, urban water suppliers were required to report R-GPCD (residential per capita water use) on a monthly basis to the State Water Board as an informational metric. An agency's monthly R-GPCD differs from the annual GPCD calculation discussed above. It takes into account the percentage of total monthly potable water production being used for residential purposes and the residential population served. Unlike gross daily per capita water use, R-GPCD does not include commercial, industrial or institutional water or non-revenue water (water losses).

On April 1 2015, the Governor issued an Executive Order that directed the State Board to impose restrictions on water suppliers to achieve a 25 percent reduction in potable urban usage. The regulations that were adopted shortly thereafter gave agency-specific reduction targets based on their R-GPCD. Agencies with a higher R-GPCD were required to cutback more than agencies with a lower R-GPCD. Targets ranged from 8 percent for agencies, including the City of Santa Cruz, whose average R-GPCD was less than 65 gallons per person per day, up to 36 percent for agencies whose R-GPCD was 215 gallons per person per day, or more.

Figure 5-3 below shows the R-GPCD for the City of Santa Cruz compared to the statewide and the Central Coast Hydrologic Region averages for the period June 2014 through February 2016, as reported by the State Water Resources Control Board on its Conservation Reporting website in April 2016. Over this period, as a result of strict water rationing in effect through October 2015, the City consistently had one of the lowest levels for R-GPCD in all of California. The City will continue to report and track R-GPCD through at least January 2017, as required under statewide emergency water conservation regulations.

**Figure 5-3. Reported Residential Water Use Per Capita (R-GPCD)**




## 5.10 New Water Use Targets

On May 9, 2016, the Governor issued Executive Order B-37-16. One of the provisions in this order was that the CA Department of Water Resources work with the State Water Resources Control Board to develop new targets as part of a permanent framework for urban water agencies. These new targets would build upon the state law requirements that the state achieve a 20 percent reduction in urban per capita water use by 2020. The targets would be customized to the unique conditions of each water agency, would generate more statewide conservation than existing requirements, and would be based on strengthened standards for:

- Indoor residential per capita water use;
- Outdoor irrigation, in a manner that incorporates landscape area, local climate, and new satellite imagery data;
- Commercial, industrial, and institutional water use; and
- Water lost through leaks

A draft framework for these new water use targets is planned for early 2017. It is unknown how this new target will change the current 2020 requirement for the City.

# Chapter 6

# SYSTEM SUPPLIES

This chapter describes the City's water supply system, presents supply source production volumes, and discusses possible future sources and opportunities to enhance the City's existing supply portfolio, including potential transfers, exchanges, and recycled water. Potential new sources are discussed further, in terms of planning for supply reliability, in Chapter 7.

The Santa Cruz water system relies predominantly on local surface water supplies, which include the North Coast sources, the San Lorenzo River, and Loch Lomond Reservoir. Together, these surface water sources represent approximately 95 percent of the City's total annual water production. The balance of the City's supply comes from groundwater, all of which is extracted from wells in the Purisima Formation in the mid-County area. These main production elements of the City's water supply system are illustrated below in Figure 6-1.

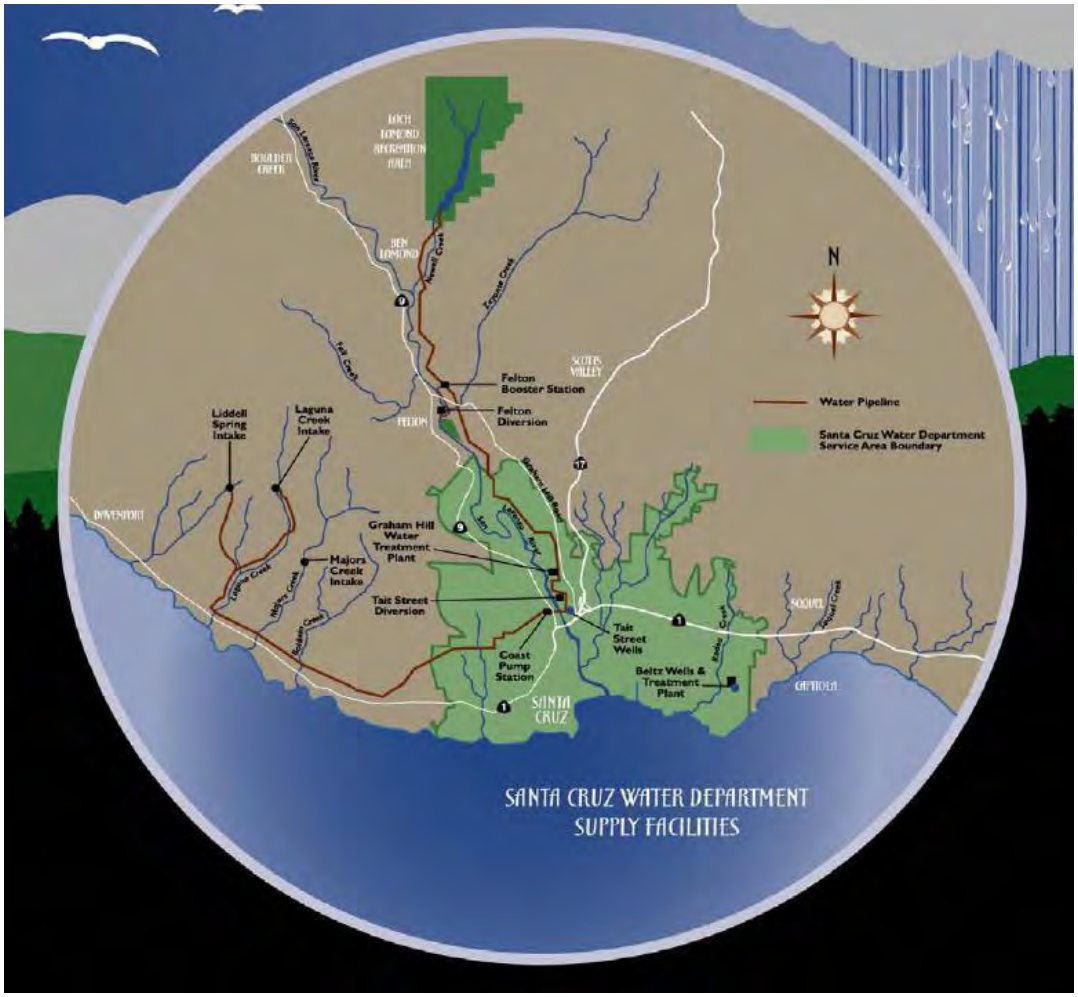
## 6.1 Purchased or Imported Water

The City of Santa Cruz does not now, nor does it plan to, import water, either from outside the Central Coast Hydrologic Region, or outside the Santa Cruz County boundaries. All of its water resources are obtained from local sources. The system relies entirely on rainfall, surface runoff, and groundwater infiltration occurring within watersheds located in Santa Cruz County. No water is purchased from state or federal sources or imported to the region from outside the Santa Cruz area.

## 6.2 Groundwater

Even though groundwater constitutes only up to about 5 percent of the entire City water supply on an annual basis, it has been a crucial component of the water system for meeting peak season demands, maintaining pressure in the eastern portion of the distribution system, and for weathering periods of drought since the facilities were acquired from the Beltz Water Company in 1964.

**Figure 6-1. City of Santa Cruz Water Supply System**



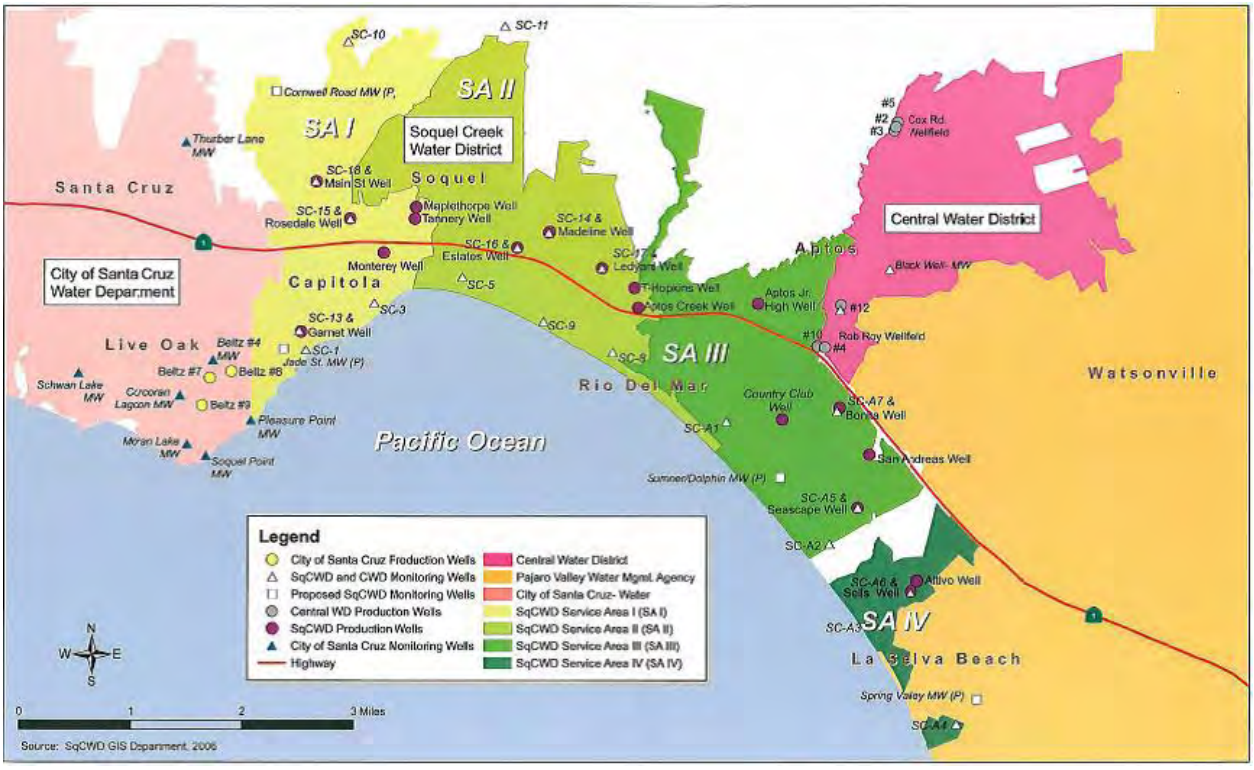

The Live Oak Well system consists of four production wells and two water treatment plants located in the eastern portion of the City water service area. The facilities were originally acquired by the City from the Beltz Water Company in 1964, and are still referred to as the "Beltz" wells. Wells 8 and 9 were installed in 1998 as replacement wells for Wells 1 and 2, which were damaged in the 1989 Loma Prieta earthquake. Well 7, which began operating in 1974, has been replaced by Well 10. The newest well, Beltz 12 and associated water treatment facilities, were completed in 2015.

The geographical area from which the City pumps groundwater is identified as the *West Santa Cruz Terrace Groundwater Basin* (Basin Number 3-26), whose western and eastern boundaries coincide roughly with the City's water service area (CA DWR, Bulletin 118). The entire production of the City's Live Oak well field is derived from the Purisima Formation, which is the primary groundwater aquifer underlying the entire

Mid-county region and makes up most of what is commonly referred to elsewhere as the “Soquel-Aptos” basin. As will be discussed in Section 6.2.2, a request to redefine the basin includes the reassignment of the eastern portion of the West Santa Cruz Terrace Groundwater Basin into the new Santa Cruz Mid-County Groundwater Basin.

Groundwater from the Purisima Formation is used by the City, the Soquel Creek and Central Water Districts, several small water systems, and numerous private rural water wells. A map of the public water supplier’s monitoring and production well networks within the region is shown in Figure 6-2. The City’s groundwater production and monitoring wells are concentrated on the western side, shown in the light pink area.

**Figure 6-2. Public Water System Production and Monitoring Wells**




## 6.2.1 Basin Description

The Purisima Formation is a collection of distinct geologic units composed of sandstone interbedded with layers of siltstone and claystone. These units, designated as AA through FF, vary in thickness and hydrogeological characteristics, with AA being the deepest and oldest unit. The formation is relatively shallow under the City’s water service area, but dips southeast, becoming deeper and thicker towards Capitola and Aptos and outcrops at the cliffs along the Monterey Bay shoreline. The A zone is the

primary supply for both the City's Live Oak (Beltz) wells and the Soquel Creek Water District's Service Area 1 wells and is continuous and connected between these areas of groundwater extraction (Hopkins Groundwater Consultants, 2009). Recharge is thought to occur from deep percolation of rainfall in the upper watersheds and along streambeds of Branciforte Creek, Arana Gulch, Rodeo Creek and Soquel Creek.

To better understand how the Purisima Formation responds to pumping stresses and to detect seawater intrusion, the City has installed and maintains a network of 34 monitoring wells at 14 sites. Groundwater levels and water quality, including chlorides, pH, total dissolved solids, general minerals, and other constituents are measured at regular intervals. Several new inland monitoring wells were added in 2012 and 2013. Data collected from these monitoring wells are shared with adjoining public water agencies interested in management and planning of groundwater supply.

### 6.2.2 Groundwater Management

The City of Santa Cruz Water Department has not itself prepared a groundwater management plan; however, a groundwater management plan has been prepared by the Soquel Creek and Central Water Districts for the Soquel-Aptos Area consistent with Assembly Bill 3030. This plan was originally prepared in 1996 then updated in 2007 and currently serves as a living document with the most recent update having occurred in 2013.

A new framework for sustainable management of groundwater supplies was provided in 2014 when Governor Brown signed the landmark Sustainable Groundwater Management Act or SGMA. Key milestones of SGMA are shown in the sidebar to the right.



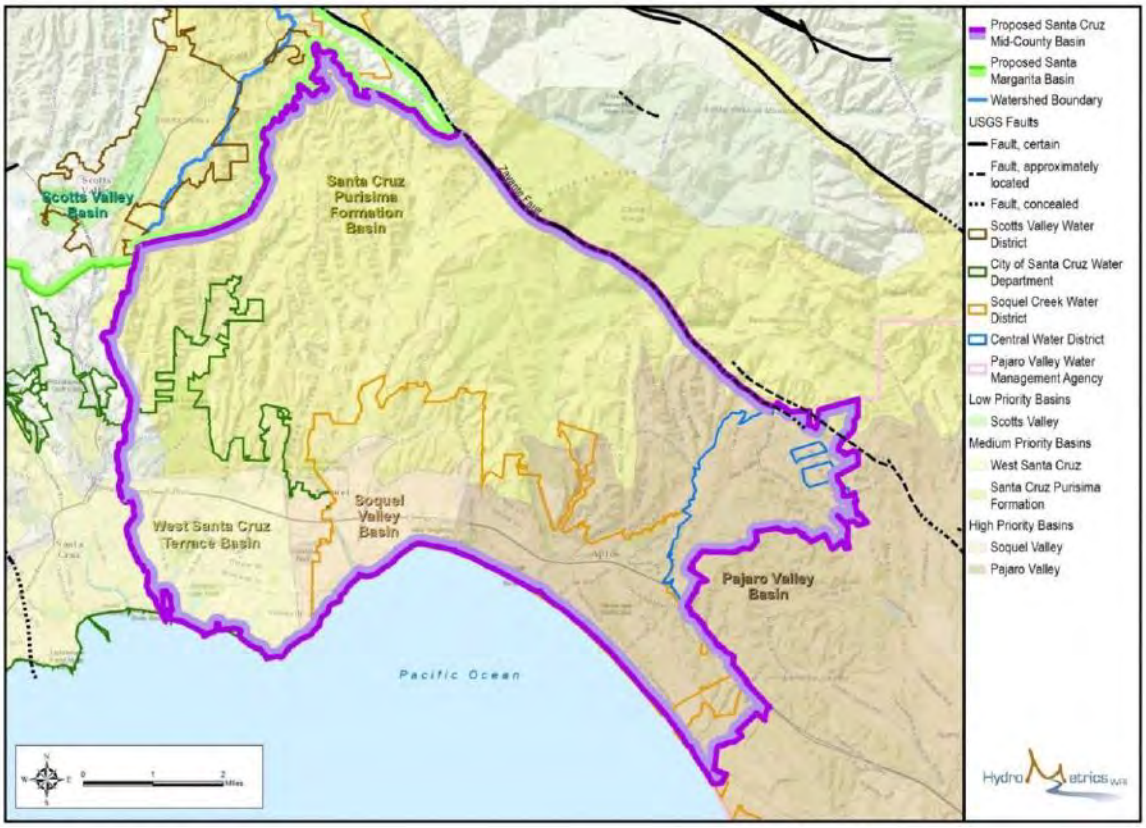

In July 2015, the Soquel-Valley Groundwater Basin (Basin Number 3-01) was identified by the Department of Water Resources as one of 21 groundwater basins to be reclassified as **critically overdrafted**. This was done on the basis of seawater intrusion detected at the coastline, and the local declaration of a Groundwater Emergency by Soquel Creek Water District in 2014.

In September 2015, the Soquel-Aptos Groundwater Management Committee (SAGMC) was formed which

includes representatives from the County of Santa Cruz, Central Water District, Soquel Creek Water District, the City of Santa Cruz, and private well owners. This group is a joint exercise of powers entity with interest in management of the Soquel-Aptos groundwater basin. Its efforts include collecting, maintaining and sharing data; undertaking cooperative research and resource management initiatives; jointly pursing groundwater management grants and studies; and facilitating requirements of the Sustainable Groundwater Management Act. The SAGMC also provides public outreach and education on groundwater topics and issues.

The SAGMC established a Groundwater Sustainability Agency Formation Subcommittee and appointed six members. Following the framework provided by the state, the subcommittee was charged with creating an approved Groundwater Sustainability Agency prior to the June 2017 deadline. Additional activities recently initiated by the SAGMC include requesting a basin boundary revision, developing quarterly monitoring reports, conducting an evaluation of shallow wells, and making progress on a comprehensive groundwater model by integrating information available for the entire management area.

**Figure 6-3. Proposed Santa Cruz Mid-County Basin Boundary Area**



Part of the recently completed work to redefine the boundary includes changing the name from Soquel-Aptos to Santa Cruz Mid-County Groundwater Basin, as illustrated in Figure 6-3. In early 2016 the SAGMC drafted a joint powers agreement (JPA) to create a fully empowered and independent Santa Cruz Mid-County Groundwater Agency (MGA) as authorized by the Sustainable Groundwater Sustainability Act (Appendix I). With the establishment of the Agency, the focus will shift from agency creation to the development of the Groundwater Sustainability Plan (GSP) that is required to be completed and submitted to the state in 2020. The City is a partner agency in the JPA and will have an allocated share of the total annual budget for the MGA that is consistent with the contributions provided under the previous planning and management efforts for the Soquel-Aptos Basin.

### 6.2.3 Overdraft Conditions

At this time, no court or board has adjudicated the right to pump groundwater from the Purisima aquifer, nor has the California Department of Water Resources identified the West Santa Cruz Terrace basin as critically overdrafted. Even so, the aquifer from which the City pumps long has been recognized locally as being threatened by the problem of over-pumping, as evidenced by a decline in static water levels and a broad, persistent trough consistently below sea level surrounding the Soquel Creek Water District's production wells, signaling that cumulative groundwater production exceeds the long-term sustainable yield of the aquifer.

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

### 6.2.4 Groundwater Pumping

In 2010, the City was advised by its hydrogeologist that the yield of the Live Oak (Beltz) well field was substantially less than half the 420 mgy annual production that the City had long assumed for water supply planning purposes, and that the dry season

pumping rate that can be sustained without causing seawater intrusion in average years was closer to 170 mgy (Hopkins Groundwater Consultants, 2010). As a direct result of these findings, the City relocated pumping further inland to a new well site, shown as "Beltz 12" on the Figure 6-4 aerial image. This unexpected loss of drought year groundwater yield is emblematic of the continuing change and uncertainty facing the City in its effort to provide a safe, reliable, and adequate municipal water supply.

**Figure 6-4. Location of Beltz Well Sites**

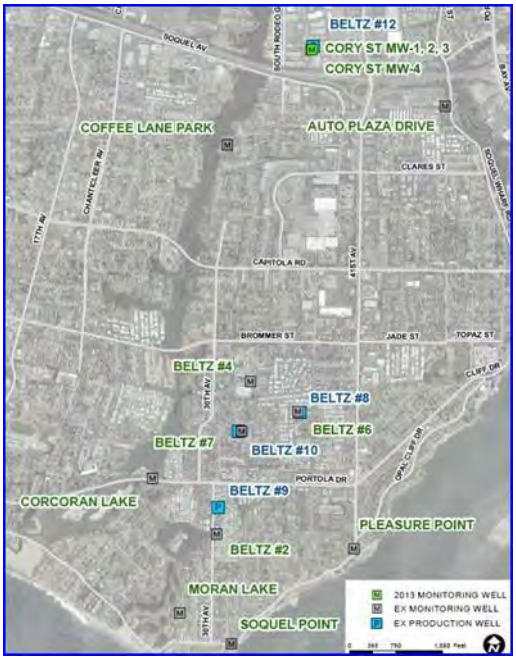



Table 6-1 below shows the actual volume pumped from the City's well fields during the peak season over the last five years. Average volume over this time is 164 mgy. As a result of the hydrogeology work, the City has limited groundwater pumping to a volume far below 420 mgy level. The current agreed upon sustainable yield volume is 170 mgy and has been utilized by the City when planning for the operation of the well fields. Due to the severe drought conditions in 2014, the City did rely on groundwater for a somewhat higher volume in order to meet peak demand in the dry summer months.

**Table 6-1. Groundwater Volume Pumped (mgy)**

| Groundwater Type | Location or Basin Name | 2011 | 2012 | 2013 | 2014 | 2015 |
|---|---|---|---|---|---|---|
| Alluvial Basin | West Santa Cruz Terrace Groundwater Basin (3-26) | 163 | 163 | 160 | 188 | 145 |
| | **TOTAL** | 163 | 163 | 160 | 188 | 145 |

## 6.3 Surface Water

As presented in Chapter 3, the surface water system supplies are located both within and outside of the City of Santa Cruz with a mix of flowing sources and a storage reservoir. The map provided as Figure 6-1 in the introductory section illustrates the various surface water sources and the conveyance systems that comprise the supply facilities of the City. Each of the surface water sources are briefly described in the following sections.

### 6.3.1 North Coast Creeks and Springs

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

**Figure 6-5. Laguna Creek Diversion Dam**



### 6.3.2 San Lorenzo River

The San Lorenzo River is the City's largest source of water supply. The main surface water diversion is located at Tait Street near the City limits just north of Highway 1. Use of this source dates back to the 1870s and was consolidated under public ownership in

1917. The Tait Street Diversion is supplemented by shallow, auxiliary wells located directly across the river. These wells are potentially hydraulically connected to the river and tied to the City's appropriative rights for surface diversion. The drainage area above the Tait Street Diversion is 115 square miles.

**Figure 6-6. San Lorenzo River Diversions at Tait Street and at Felton**





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

While the City is the largest user of water from the San Lorenzo River basin, two other water districts, several private water companies and numerous individual property owners share the San Lorenzo River watershed as their primary source for drinking water supply (Figure 6-7).

### 6.3.3 Newell Creek and Loch Lomond Reservoir

Loch Lomond Reservoir is located near the town of Ben Lomond in the Santa Cruz Mountains. The reservoir was constructed in 1960 and has a maximum capacity of 2,810 million gallons (mg). In addition to providing surface water storage, the reservoir and surrounding watershed are used for public recreation purposes, including fishing, boating, hiking, and picnicking (swimming and wading are prohibited). The Newell Creek watershed above the reservoir is about nine square miles. In addition to the City, the San Lorenzo Valley Water District is entitled by contract to receive a portion of the water stored in Loch Lomond.

**Water System Operations**

The Water Department follows a variety of policies, procedures, and legal restrictions in operating the water supply system. In general, the system is managed to use available flowing sources to meet daily demands as much as possible. Groundwater and stored water from Loch Lomond are used mainly in the summer and fall months when flows in the coast and river sources decline and additional supply is needed to meet higher daily water demands. On a typical summer day, the North coast sources yield 1-2 mgd, the San Lorenzo River produces 7.5 mgd, groundwater makes up 0.8 mgd, and the reservoir contributes an average of 1-2 mgd.

The amount of water produced from each of the City surface water sources is controlled by different water rights. A summary of these water rights is presented below.

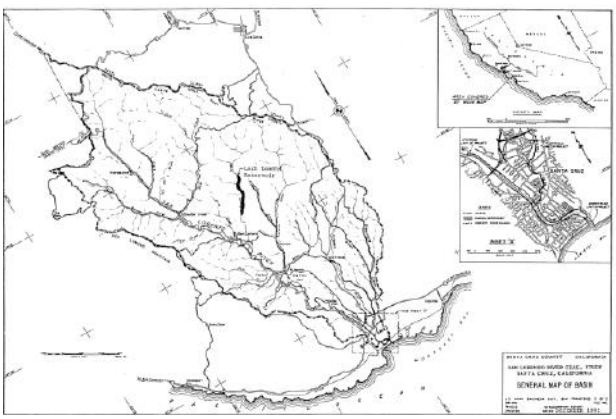
**Summary of Water Rights Held by the City of Santa Cruz**

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

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

The City in 2007 voluntarily began releasing in-stream flows from the North Coast system on an interim basis in connection with an ongoing pursuit of an Incidental Take Permit under the Federal Endangered Species Act. Over the last 3 years, the City has dramatically reduced its diversion of water from Laguna Creek and increased instream flow releases on the San Lorenzo River to benefit fisheries habitat. Water system operations are likely to continue shifting toward using less flowing water and more water from reservoir storage to meet demand in the future (See Chapter 7).

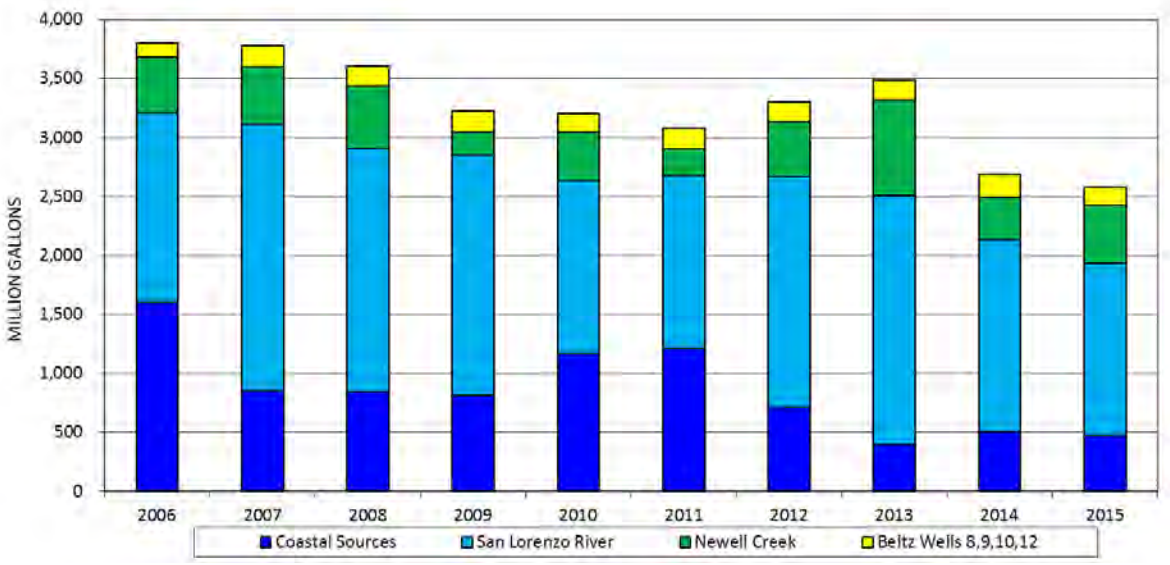
**Figure 6-7. San Lorenzo River Watershed and Loch Lomond Reservoir**





Gross annual production volumes from the City's surface and groundwater sources over the past 10 years are shown in Figure 6-8, broken down by source of supply. During the past decade, the North Coast sources represented 26 percent of the total water supply, the San Lorenzo River represented 55 percent, Newell Creek (Loch Lomond Reservoir) represented 14 percent, and Live Oak (Beltz) wells contributed the remaining 5 percent.

**Figure 6-8. Annual Production Volumes by Source of Supply (million gallons)**




## 6.4 Storm Water

At this time, local urban storm runoff is not used by the City to meet its urban water demands. The City is regulated, however, by the California Regional Water Quality Control Board and has responsibility to reduce the amount of pollutants discharged in urban runoff, and to improve and protect water quality. The City is currently covered

under the State's General Permit for Storm Water Discharges from Small Municipal Storm Sewer Systems (MS4s). The General Permit requires the City to develop and implement a comprehensive Storm Water Management Program (SWMP). A complete description of this program is provided in the Storm Water Annual Report.

The City of Santa Cruz, through its Public Works Department, maintains seven miles of underground storm water pipelines, eight miles of surface storm ditches, one pump station, approximately 1,500 catch basins, and 125 outfalls. The City also maintains the U.S. Army Corps of Engineers flood control channel and levee system on the San Lorenzo River, which is approximately three miles long with five pump stations. The City's operations and maintenance program for the flood control facilities on the San Lorenzo River includes removal of sand and silt from the channels of the river and Branciforte Creek; maintenance of pumps, gates and levees; and removal of weeds and growth in drainage ditches and catch basins. As a best management practice the City has routine street sweeping and regularly cleans the storm drain pipeline system, among other activities.

Storm water system management maintenance in the unincorporated area and Capitola is provided by the Santa Cruz County Flood Control and Water Conservation District, Zone 5, operated through the County Public Works Department. The County Board of Supervisors serves as the Board of Directors for the District. Facilities include underground storm drain systems and above ground ditches and watercourses.

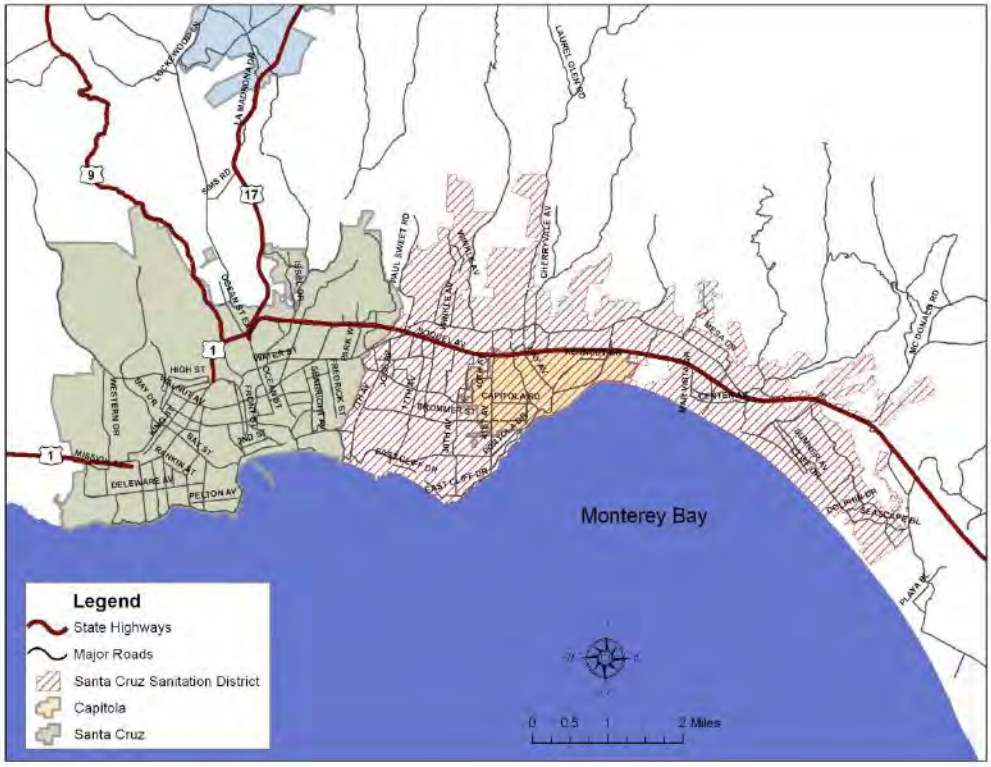
## 6.5 Wastewater and Recycled Water

The City of Santa Cruz owns and operates a city-wide wastewater collection and regional wastewater treatment and disposal facility providing service to a total urban population of approximately 130,000 people in an area extending from Santa Cruz out to the communities of Seascape and Aptos in unincorporated Santa Cruz County (Figure 6-9).

The City's Wastewater Treatment Facility (WWTF) is not currently permitted for and does not now produce recycled water for offsite reuse. Treated wastewater is reused internally within the wastewater plant to meet its major process water needs, including chemical mixing, contact and non-contact cooling water, equipment washing, heating, and cleaning. The 1998 upgrade of the plant to provide reuse water for on-site activities reduced potable water demand at the WWTF by about 90 percent. It now operates using only 3 to 4 million gallons per year for sanitary, irrigation, and other miscellaneous onsite uses. The only use of recycled water outside the WWTF has been that used by

the City's Public Works crews in trucks for flushing the sanitary sewer system as a way to conserve potable water during the recent drought.

**Figure 6-9. Geographic Area Served by Santa Cruz Wastewater Facility**




Over the years, the City has commissioned several engineering studies regarding the potential uses of recycled water for agricultural irrigation, landscape irrigation, groundwater recharge, direct potable reuse, and use of recycled water from neighboring water districts. These studies include the following:

- Alternative Water Supply Study (Carollo Engineers, 2000)
- Evaluation of Regional Water Supply Alternatives (Carollo Engineers, 2002)
- Integrated Water Plan Environmental Impact Report (City of Santa Cruz, 2005)
- Opportunities and Limitations for Recycled Water Use (Kennedy/Jenks, 2010)
- Current and Potential Future Opportunities for Indirect and Direct Potable Reuse of Recycled Water Use (Kennedy/Jenks, 2010)

The City of Santa Cruz is once again actively investigating the feasibility of recycled water though a regional Recycled Water Facilities Planning Study, funded in part by a grant from the State Water Board Division of Financial Assistance, Water Recycling

Funding Program. In addition, the City has been working to establish a small recycled water facility and is coordinating with the Pasatiempo Golf Club on a project to use treated wastewater from the Scotts Valley wastewater plant instead of potable water supplied by the City for the majority of its irrigation needs. A groundbreaking ceremony for the golf club's recycled water project was recently held. These two projects are described further in Section 6.5.4 in the discussion on beneficial uses of recycled water within the service area.

### 6.5.1 Recycled Water Coordination

As presented in Section 2.4, preparation of this 2015 UWMP was coordinated with all local water, wastewater, groundwater, and planning agencies throughout the water service area and Santa Cruz County. For this recycled water section, in particular, coordination involved working with the following entities:

- Santa Cruz Public Works Department (regional WWTF operator)
- Santa Cruz County Sanitation District (local wastewater collection agency)
- City of Scotts Valley Public Works (local WWTF operator)
- Scotts Valley Water District
- Soquel Creek Water District
- Pasatiempo Golf Course

### 6.5.2 Wastewater Collection, Treatment, and Disposal

#### 6.5.2.1 Wastewater Collection

Municipal wastewater generated within the City limits is delivered to the treatment plant through a collection system consisting of 160 miles of gravity mains, 3.5 miles of force main, and 21 pumping stations. The City's collection system, treatment plant and ocean disposal system are managed and operated by the City's Public Works Department.

The Santa Cruz County Sanitation District, a special district operated through the Santa Cruz County Public Works Department, collects wastewater from the Live Oak, Capitola, Soquel, Aptos, and Seacliff areas through a system consisting of 188 miles of gravity main, 14 miles of force main, and 35 pump stations. It transports wastewater from a central pumping facility in Live Oak to the Santa Cruz WWTF for treatment and disposal. This wastewater is generated from outside the service area of the City of Santa Cruz and is treated within the service area. Table 6-2 summarizes wastewater collected from these two agencies in 2015.

| Table 6-2. Wastewater Collected Within Service Area in 2015 | | | | | | |
|---|---|---|---|---|---|---|
| Wastewater Collection | | | Recipient of Collected Wastewater | | | |
| Name of Wastewater Collection Agency | Wastewater Volume Metered or Estimated? | Volume of Wastewater Collected in 2015 (mgy) | Name of Wastewater Treatment Agency Receiving Collected Wastewater | Treatment Plant Name | Is WWTP Located Within UWMP Area? | Is WWTP Operation Contracted to a Third Party? |
| City of Santa Cruz | Metered | 1,480 | City of Santa Cruz | Wastewater Treatment Facility | Yes | No |
| Santa Cruz County Sanitation District | Metered | 1,149 | City of Santa Cruz | Wastewater Treatment Facility | Yes | No |
| **Total Wastewater Collected from Service Area in 2015:** | | 2,629 | | | | |

With the exception of some outlying areas and individual parcels that have onsite wastewater systems, the vast majority of the estimated 95,251 persons residing in the City of Santa Cruz water service area are served by these two wastewater collection systems. A third-party organization is not operating a facility under contract in the Santa Cruz service area.

In addition to the City and County Sanitation District, two small County Service Areas serving the communities of Rollingwoods and Woods Cove are connected to the City's wastewater system. Dry weather flows from Neary Lagoon are also diverted through the WWTF to help protect water quality at local beaches for public health and recreation.

### 6.5.2.2 Wastewater Treatment

The City's treatment plant was modernized in the late 1990's from the advanced primary level to provide full secondary treatment in order to meet State and Federal waste discharge requirements (Figure 6-10).

The treatment process consists of screening, grit removal, primary sedimentation, biological treatment (trickling filters), secondary clarification, and disinfection (UV).

Bio-solids removed from the wastewater stream are treated by gravity thickening, anaerobic digestion, and dewatering by centrifuges.

**Figure 6-10. City of Santa Cruz Wastewater Treatment Facility**




The City's WWTF is designed to treat an average dry weather flow of 17 million gallons per day (mgd) and can accommodate peak wet weather flows of up to 81 mgd. Typical dry weather flows in past years have ranged between 9-10 mgd. Due to strict conservation measures in recent years, the amount of wastewater generated in the City and the Sanitation District's service areas has dropped substantially, averaging 6.5 mgd during the dry season and totaling 2,629 million gallons in 2015.

In 2013 the WWTF was awarded Plant of the Year by the California Water Environment Association (for facilities in the range of 5-20 million gallons per day). The award is based on the review of infrastructure, management practices and compliance records.

### 6.5.2.3 Wastewater Disposal

Wastewater effluent from the WWTF is disinfected with UV prior to being discharged to the Pacific Ocean through a deep water outfall extending 12,250 feet on the ocean bottom and terminating one mile offshore at a depth of approximately 110 feet below sea level. A 2,100 foot diffuser at the end of the pipe provides a minimum initial dilution of 139 parts seawater to one part wastewater.

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

The City of Scotts Valley treats its wastewater separately and transmits secondary treated effluent to Santa Cruz for combined disposal through the City's ocean outfall. Since 2002, the City of Scotts Valley, in conjunction with Scotts Valley Water District, has operated a 1.0 mgd tertiary treatment plant and delivered recycled water within its service area mainly for landscape irrigation purposes.

Table 6-3 below provides the total amount of wastewater treated and disposed by the City's wastewater treatment facility in 2015.

**Table 6-3: Wastewater Treatment and Discharge Within Service Area in 2015**

| ☐ | No wastewater is treated or disposed of within the UWMP service area. The supplier will not complete the table below. |
|---|---|

| Wastewater Treatment Plant Name | Discharge Location Name or Identifier | Discharge Location Description | Wastewater Discharge ID Number *(optional)* | Method of Disposal | Does This Plant Treat Wastewater Generated Outside the Service Area? | Treatment Level | 2015 volumes (mgy) | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | Wastewater Treated | Discharged Treated Wastewater |
| Wastewater Treatment Facility | Monterey Bay/Pacific Ocean Bay Outfall | Deep water outfall | 3-440102001 | Ocean outfall | Yes | Secondary, Undisinfected | 2,629 | 2,629 |
| | | | | | | **Total** | 2,629 | 2,629 |

NOTES: Treatment and discharge volumes are presented as equal to satisfy the objective of this table. The recycled water that is reused within the Facility is not considered eligible for designation as recycled water under current Title 22 requirements. Figures presented do not include Scotts Valley waste discharge volumes.

### 6.5.3 Recycled Water System

As mentioned above, the City does not operate a recycled water system in its service area at this time. The only use of recycled water outside the WWTF has been that used

by the City's Public Works crews in trucks for flushing the sanitary sewer system as a way to conserve potable water during the recent drought.

### 6.5.4 Recycled Water Beneficial Uses

#### 6.5.4.1 Current and Planned Uses of Recycled Water

Title 22 California Code of Regulations, Division 4, Chapter 3, Sections 60301-60355 is the regulation overseeing the reuse or recycling of municipal wastewater to protect public health. Level of treatment and bacteriological water quality standards define what uses are legally allowed. The quality of wastewater produced at the City's treatment plant currently would be best classified under the Title 22 criteria as "Secondary, Undisinfected", even though the wastewater plant provides ultraviolet disinfection, and the City consistently meets its receiving water limitations contained in its NPDES permit for bacteriological objectives. The City's treated wastewater is therefore potentially suitable for only very limited agricultural applications and for flushing sanitary sewers according to the standards in Title 22.

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

As mentioned earlier, the City is undertaking a regional Recycled Water Facilities Planning Study (RWFPS) under a contract with Kennedy/Jenks Consultants. The goals of the RWFPS are:

- to assess beneficial reuse of wastewater from a resource recovery perspective
- to evaluate local and regional recycled water projects
- to identify near-term, mid-term and long-term projects
- to meet the schedule for the WSAC Implementation Plan, and
- to initiate a strategy for continued outreach related to recycled water.

Table 6-4 below lists the number and type of recycled water projects that are being considered in the planning study. This planning study is scheduled to be completed in 2017. The scope of work for this project is included as Appendix J.

| Table 6-4. List of Potential Recycled Water Projects Under Investigation | | | | |
|---|---|---|---|---|
| **Project No:** | **Recycled Water Use** | **Source Water** | **Treatment** | **Project Area(s)** |
| **1a** | Industrial Use/ Landscape Irrigation | Santa Cruz WWTF | Tertiary | City, District and County |
| **1b** | | Local Raw Wastewater | MBR Tertiary | UC Santa Cruz |
| **2a** | Irrigation | Santa Cruz WWTF | Tertiary | North Coast Agricultural Irrigation |
| **2b** | | Santa Cruz WWTF -or- SVWD WWTP | Secondary or Tertiary | Pasatiempo + Other Landscape |
| **2c** | | Santa Cruz WWTF | Tertiary | Landscape |
| **3** | Seawater Barrier | Santa Cruz WWTF | Advanced Treatment | Lower Groundwater Basins |
| **4a** | Groundwater Replenishment | Santa Cruz WWTF | Advanced Treatment | Upper/Lower Purisma Formation and Soquel Valley Groundwater Basin |
| **4b** | | Local Raw Wastewater | MBR + Advanced Treatment | |
| **4c** | | Santa Cruz WWTF -and- Scotts Valley WWTP | Advanced Treatment | Santa Margarita GW Basin |
| **5** | Reservoir Augmentation | Santa Cruz WWTF | Advanced Treatment | Loch Lomond Reservoir |
| **6** | Streamflow Augmentation | Santa Cruz WWTF | Tertiary or Advanced Treatment | San Lorenzo River |
| **7** | Direct Potable Reuse | Santa Cruz WWTF | Advanced Treatment | City, District and County |

In the meantime, the City is actively pursuing two recycled water projects: 1) a bulk recycled water fill station and pilot City park irrigation project adjacent to the WWTF, and 2) supporting delivery of recycled water from Scotts Valley to the Pasatiempo golf course.

The City Department of Public Works is planning to expand the internal reuse water system at the WWTF to produce Title 22 tertiary treated water and to build a small distribution system for offsite use. The maximum amount of recycled water production from this system would be about 0.25 mgd; about half of which would be used within the plant and the other half potentially available for offsite demand. Current bulk water use in the service area is approximately 4 mgy, which could be reduced partially or wholly

by switching to recycled water. In addition, there is the potential demand at La Barranca Park of about 1 mgy for landscape irrigation.

The Pasatiempo Golf Course is also in the process of finalizing arrangements to receive secondary effluent from the City Scotts Valley. The Scotts Valley Water District has been working on an agreement with the management of the Pasatiempo Golf Club and the City of Scotts Valley to allow the golf course to have a right to receive up to 170,000 gallons per day (up to 35 MGY – equivalent of 206 days per year) of secondary treated water from the City of Scotts Valley. The Golf Club would then treat the water to meet the standard in Title 22 for unrestricted access golf courses. The City of Santa Cruz would continue to supply a portion of the water demand as needed for potable water uses and supplemental water for recycled water irrigation.

The current and projected uses of recycled water for these near-term projects within the City's service area are presented in Table 6-5 below.

**Table 6-5. Current and Projected Recycled Water Direct Beneficial Uses Within Service Area (mgy)**

| ☐ | Recycled water is not used and is not planned for use within the service area of the supplier. The supplier will not complete the table below. |
|---|---|

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Name of Agency Producing (Treating) the Recycled Water: | | | City of Santa Cruz/SVWD/SqCWD | | | | | | |
| Name of Agency Operating the Recycled Water Distribution System: | | | City of Santa Cruz/City of Scotts Valley/SVWD/SqCWD | | | | | | |
| Beneficial Use Type | General Description of 2015 Uses | Level of Treatment | 2015 | 2020 | 2025 | 2030 | 2035 | 2040 (opt) | |
| Agricultural irrigation | | | | | | | | | |
| Landscape irrigation (excludes golf courses) | N/A | Tertiary | N/A | up to 1 | up to 2 | up to 3 | up to 4 | | |
| Golf course irrigation | N/A | Tertiary | N/A | 35 (est) | 35 (est) | 35 (est) | 35 (est) | | |
| Wildlife Habitat Enhancement/Wetland | | | | | | | | | |
| Commercial, Industrial | N/A | Tertiary | N/A | up to 4 | up to 4 | up to 4 | up to 4 | | |
| Groundwater recharge (IPR) | | | | TBD | TBD | TBD | TBD | | |
| Reservoir Augementation | | | | TBD | TBD | TBD | TBD | | |
| Direct potable reuse | | | | TBD | TBD | TBD | TBD | | |
| Other | Type of Use | | | | | | | | |
| | | **Total:** | 0 | 0 | 0 | 0 | 0 | 0 | |

*IPR - Indirect Potable Reuse*

NOTES: Due to the preliminary nature of the proposed recycled water projects, please refer to the narrative for details as these numbers represent potential volumes for planning purposes and are not known quantities suitable for operational purposes. Agencies involved include the City of Santa Cruz, City of Scotts Valley, Scotts Valley Water Distrct (SVWD), and Soquel Creek Water District (SqCWD). For golf course irrigation, the source of water is the City of Scotts Valley wastewater plant treated to secondary level and then treated to a teriary level at the golf course.

### 6.5.4.2 Planned Versus Actual Use of Recycled Water

Recycled water, as defined by the California Department of Water Resources, was not used by the City in 2010 nor projected for use in 2015.

| Table 6-6. 2010 UWMP Recycled Water Use Projection Compared to 2015 Actual | |
|---|---|
| ☑ | Recycled water was not used in 2010 nor projected for use in 2015.<br>The supplier will not complete the table below. |

### 6.5.5 Description of Actions to Encourage and Optimize Future Recycled Water Use

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

Currently, the City is pursuing groundwater storage strategies including projects for in-lieu/passive recharge, and aquifer storage and recovery/active recharge (ASR). In the event these strategies prove insufficient to meet the accepted goals of cost-effectiveness, timeliness, or yield, either advanced treated recycled water or desalinated water would be developed as a supplemental replacement supply. These strategies and the underlying assumptions and goals are discussed further in Chapter 7.

To prevent significant delay in developing an effective supply of reliable water, recycled water is being considered simultaneously with groundwater storage feasibility (in-lieu and ASR). After the initial five-year study phase, strategy options will be selected for buildout beginning in year 2020 to augment the existing supply by 2025.

| Table 6-7. Methods to Expand Future Recycled Water Use | | | |
|---|---|---|---|
| ☐ | Supplier does not plan to expand recycled water use in the future. Supplier will not complete the table below but will provide narrative explanation. | | |
| | Provide page location of narrative in UWMP | | |
| Name of Action | Description | Planned Implementation Year | Expected Increase in Recycled Water Use |
| Recycled Water Facilities Planning Study | Contract with Kennedy/Jenks to research potential uses of recycled water | TBD | TBD |
| | | **Total** | TBD |

## 6.6 Desalinated Water Opportunities

For a decade or more, the City had been pursuing a 2.5 mgd desalination facility as a regional project with Soquel Creek Water District to diversify both agencies' water

supply portfolio. It remains a possible project for the City. In the recently completed Final Report on Agreements and Recommendations (Appendix K), the Water Supply Advisory Committee presented a supply strategy that includes desalinated water, but only as a last resort, and after exhausting several other preferred options (City of Santa Cruz, 2015). Soquel Creek Water District is continuing to consider desalinated water through a Memorandum of Interest with a different regional "Deepwater Desal" project proposed at Moss Landing Harbor.

## 6.7 Exchanges or Transfers

Following years of discussion and coordination on groundwater management, the City and Soquel Creek Water District recently signed a "Cooperative Water Transfer Pilot Project for Groundwater Recharge and Water Resource Management" agreement to transfer a small amount of water to Soquel Creek Water District in the winter months when surface water from the North Coast is available (Appendix Y). This transfer would allow the District to assess the effects of reduced pumping of the basin. The agreement is a first step in the implementation of the Water Supply Augmentation Strategy and serves to further study and determine the potential benefits of local exchanges and transfers as a groundwater management tool and supply reliability strategy.

## 6.8 Future Water Projects

The Final Report on Agreements and Recommendations presented by the Water Supply Advisory Committee includes an implementation strategy and work plan for determining which project to pursue. At this time it is unknown which project(s) will be carried out over the 20-year planning horizon of this Urban Water Management Plan. The Final Report, summarized in Chapter 7, provides the framework for the decision-making for initiating future water projects and describes the need either for substantial additional storage or some other strategy to increase supply reliability. Therefore the City is unable to complete Table 6-8 as some or all of the future water supply projects or programs are not compatible with the table and are described in a narrative format within the Plan.

| Table 6-8. Expected Future Water Supply Projects or Programs | |
|---|---|
| ☑ | Some or all of the supplier's future water supply projects or programs are not compatible with this table and are described in a narrative format. |
| 6-21 & 7-12 to 7-21 | Provide page location of narrative in the UWMP |

## 6.9 Summary of Existing and Planned Sources of Water

### 6.9.1 Existing Sources of Water

The City's existing sources and actual production volumes for 2015 are presented in Table 6-9. The figures represent production volumes experienced under severe drought conditions and with emergency water shortage regulations and restrictions in effect locally between the months of May and October.

**Table 6-9.Water Supplies — Actual**

| Water Supply | Additional Detail on Water Supply | 2015 | | |
|---|---|---|---|---|
| | | Actual Volume | Water Quality | Total Right or Safe Yield *(optional)* |
| Surface water | North Coast | 382 | Raw Water | |
| Surface water | San Lorenzo River | 1,458 | Raw Water | |
| Surface water | Loch Lomond | 495 | Raw Water | |
| Groundwater | Live Oak Wells | 145 | Raw Water | |
| | **Total** | 2,480 | | 0 |

NOTES: Net production figures in million gallons

### 6.9.2 Planned Sources of Water

Table 6-10 provides an estimate of the volume of water, by source, that is reasonably available from 2020 to 2035. These volumes are based on deliveries for average years, projected water demands, and available surface water flows consistent with ecosystem protection goals, according to the City's water supply operations model, Confluence.

The City is currently developing a supply augmentation plan that will include increased production between 2020 and 2035. However these volumes and the prospective sources are not fully understood at this time. A shift in the balance of the supply sources may occur as a component of the supply augmentation strategies shown as potential planned water sources. For instance, the City expects to produce less water from the North Coast sources in the future compared to historic production levels. In total, the expectation is that existing and planned sources of water available to the City over the next twenty years, on average, are estimated to meet the predicted total annual water demand of about 3.2 to 3.3 billion gallons annually.

As part of the augmentation strategy the City recognizes the importance of additional supply storage as a safeguard against future water shortages. Chapter 7 discusses the

challenges to the City's supply system and provides additional narrative that proves useful in understanding the information presented in Table 6-10 below.

**Table 6-10. Water Supplies — Projected**

| Water Supply | Additional Detail on Water Supply | Projected Water Supply (mgy) *Report To the Extent Practicable* | | | | |
|---|---|---|---|---|---|---|
| | | **2020** | **2025** | **2030** | **2035** | **2040** *(opt)* |
| | | Reasonably Available Volume | Reasonably Available Volume | Reasonably Available Volume | Reasonably Available Volume | Reasonably Available Volume |
| Surface water | North Coast Sources | 637 | 642 | 671 | 671 | n/a |
| Surface water | San Lorenzo River | 1,882 | 1,842 | 1,829 | 1,834 | n/a |
| Surface water | Loch Lomond Reservoir | 595 | 551 | 540 | 547 | n/a |
| Groundwater | Live Oak/Beltz Wells | 138 | 129 | 127 | 128 | n/a |
| Transfers | | Near term transfer to SqCWD of up to 100 mgy to assess the effect of reduced pumping on the groundwater basin and explore the opportunity of developing a longer-term agreement for aquifer storage and recovery | | | | |
| Exchanges | | | | | | |
| Recycled Water | | Recycled water feasibility study investigating options including regional partnership opportunities for a recycled water project to provide drought resistant supply and options for groundwater management strategies due to overdraft conditions of local basins | | | | |
| Desalinated Water | | | | Potential project to expand recycled water supply or investigate desalination | | |
| Other | | | | | | |
| **Total** | | 3,252 | 3,164 | 3,167 | 3,180 | 0 |

NOTES: Projected supply volumes shown represent the output values from the City's Confluence (water supply) model. These projections consider the operations of the City's current supply system in response to a projected demand.

## 6.10 Climate Change Impacts to Supply

As the City of Santa Cruz water supply consists of only local sources maintained and recharged by natural processes, the potential weather conditions related to climate change could greatly impact the sources of supply. A widely accepted profile is that climate change may make the future hydrology drier than the historical record maintained in the region (1937 to today). General forecasts describe deviation in the seasonal patterns of rainfall with longer and more severe droughts. Additionally, the annual average temperature in the region may increase leading to variability in the rate of evaporative processes that can greatly impact local sources and watersheds (Stratus Consulting, 2015).

With these potential impacts to the available local supply in mind, the City is exploring projects that not only diversify supply options, but also enhance the reliability of the system. In Chapter 7, the long-term reliability of the system supplies is presented along with an analysis of known constraints on existing sources. Climate change impacts are likely to be a contributor to a less reliable supply and also a driver for strengthening demand management planning as discussed in Chapter 9.

# Chapter 7

# WATER SUPPLY RELIABILITY ASSESSMENT

This chapter of the plan describes the long-term reliability of the City's water supplies including assessment of supply relative to demand and the management strategies being implemented to create a more dependable supply. While this chapter is focused on assessment, Chapter 9 discusses the City's water conservation planning process and demand management measures currently being implemented. Short-term reliability planning that requires immediate action, such as drought or a catastrophic supply interruption, is addressed in Chapter 8, Water Shortage Contingency Planning.

## 7.1 Constraints on Water Sources

The City of Santa Cruz is facing several obstacles in meeting its present and future water supply needs. While each complication presents a unique set of water management challenges, the common theme is the limitation in where, when, and how much water is available to meet the area's water service needs, particularly during years when rainfall is below average. The following sections outline the known constraints on supply and include the management strategies implemented for each.

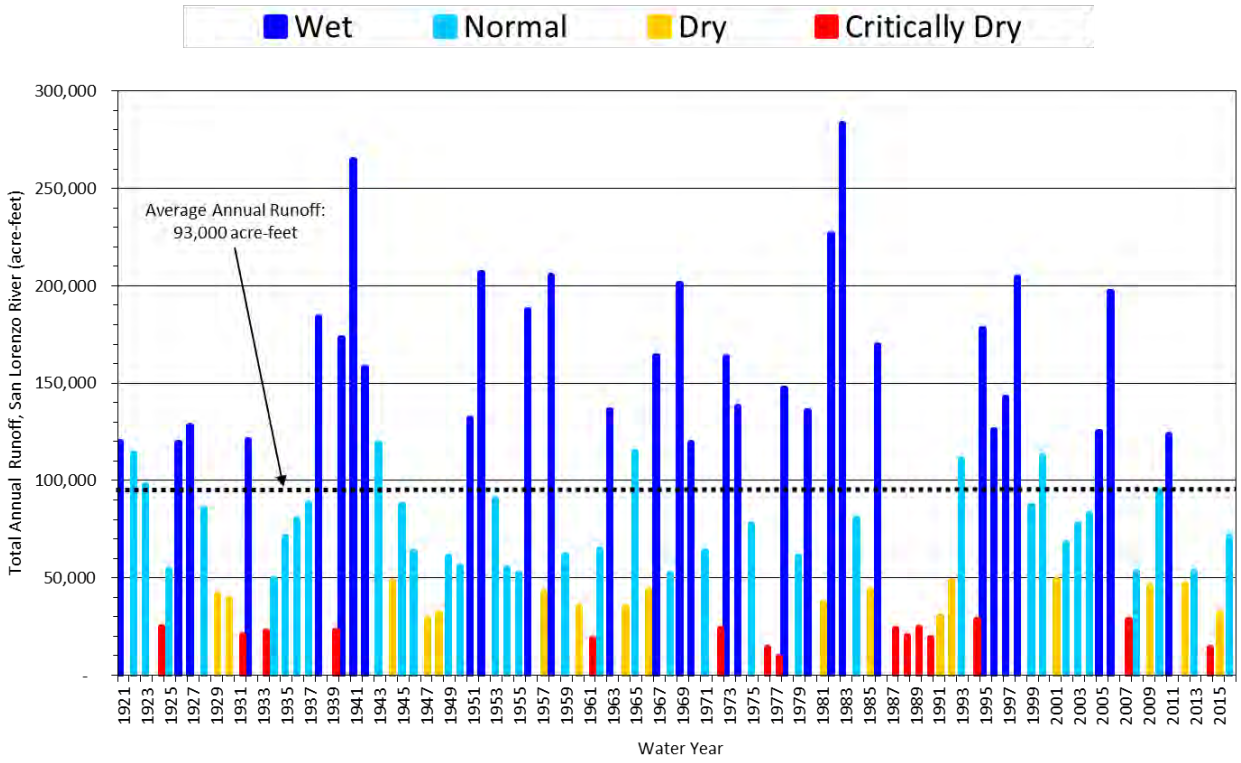
### 7.1.1 Local Supply Variability

As explained in Chapter 3, the City water system draws almost exclusively on local surface water sources, whose yield varies from year to year depending on the amount of rainfall received during the winter season and generated runoff that provides beneficial inflows. This local variation has been a significant constraint in recent years as the Central Coast, and the State of California more generally, were held in the grip of a multi-year drought. Declaration of a local water shortage emergency for the past two years underscores the effect of the drought on the City of Santa Cruz system.

Figure 7-1 below shows the total annual runoff for the San Lorenzo River over the 95-year period from 1921 to 2016 and the classification for each water year. The graph illustrates the dramatic variation in discharge from year to year. This natural variation in the level of runoff available in local streams and rivers, from which the City draws the majority of its supply, is the major factor that results in an inconsistent level of water supply from year to year. Ultimately, the only water available to the City is that which originates from rain that falls on the ocean side of the Santa Cruz Mountains. In normal

and wet years, when rainfall and runoff are abundant, the water system is capable of meeting the community's current total and anticipated annual water requirements.

**Figure7-1. Total Annual Stream Discharge from the San Lorenzo River (Acre feet)**




The system is highly vulnerable to shortage, however, in extended dry periods or critically dry years, when the flow in local streams and river sources runs low. Moreover, like other communities on California's central coast, the Santa Cruz water system is physically and geographically isolated. Limited emergency interconnection capability may be possible due to existing interties with a neighboring water district. The primary function of the interties is to allow for the movement of water to the Soquel Creek Water District that currently relies solely on groundwater from a critically over drafted basin.

Water is currently stored in Loch Lomond Reservoir (impounded by the Newell Creek Dam) to serve peak season demands and is an integral part of the supply system. Some amount of storage is used each year, mainly in the summer and fall months when the flows in the coast and river sources decline and additional supply is needed to meet higher daily water demands than during winter and spring.

During dry years, the system relies more heavily on water stored in Loch Lomond to satisfy demand, which draws down the reservoir level lower than usual and depletes

available storage. In multi-year or critical drought conditions, the combination of very low surface flows in the coast and river sources and depleted storage in Loch Lomond reservoir reduces available supply to a level which cannot support average dry season demands. Compounding the situation is the need to retain a certain amount of water in the reservoir if drought conditions continue into the following year. The existing system is not able to provide a reliable supply during multi-year droughts or prolonged periods of drier than normal hydrologic conditions within the source watersheds.

### 7.1.2 Ecosystem Restoration and Protected Species

Since 2002, the City of Santa Cruz has been working toward the development of a Habitat Conservation Plan (HCP) that covers operation and maintenance activities at the North Coast streams and San Lorenzo River diversions as well as other activities which may result in "take" of threatened and/or endangered species. An HCP is an operational avoidance and minimization and mitigation plan prepared under Section 10 of the Federal Endangered Species Act (FESA) and Section 2081 of the California Endangered Species Act (CESA) by nonfederal parties seeking to obtain a permit for incidental take of federally or state-listed threatened and endangered species.

The City initiated the HCP process because the streams from which the City diverts water currently support steelhead trout and the San Lorenzo River and Laguna Creek support coho salmon. Within the Central California Coast Region, steelhead (*Oncorhynchus mykiss*) is currently listed as "threatened" and Coho salmon *(Oncorhynchus kisutch*) is listed as "endangered" on the ESA federal list and Coho salmon are also listed as "threatened" under CESA.

Numerous studies undertaken in support of the HCP have evaluated what limiting factors may be affecting fish in these streams. Among other things, this includes evaluation of instream flow needs during all freshwater life phases (migration, spawning, incubation and rearing) over a range of hydrologic year types. Because these studies indicated that habitat conditions in these streams could be improved with increased instream flows, the City began voluntarily diverting less flow in 2007 on an interim basis in connection with the pursuit of the HCP.

Although the HCP negotiations are ongoing, the City is forecasting that ultimate compliance with the state and federal Endangered Species Acts will result in less water being available from the City's flowing sources for supply in future years compared to the past. This, in turn, will place greater reliance on water stored in Loch Lomond Reservoir to meet the community's annual water needs and exacerbate the aforementioned vulnerability to shortage.

### 7.1.3 Source Water Quality and Treatment Capacity



The City's Graham Hill Water Treatment Plant (GHWTP) currently complies with all drinking water standards set by the US Environmental Protection Agency (EPA) and the State Water Resources Control Board Division of Drinking Water (DDW). These regulations require monitoring of water sources, watershed protection, treatment techniques, and extensive monitoring of treated water quality throughout the distribution system.

The primary issues with respect to water quality are the treatment challenges posed by future changes in our source water mix driven in part by ecosystem protection requirements. The GHWTP is a conventional surface water treatment plant that was commissioned in 1960 as a 12 mgd plant and has undergone an expansion and a number of improvements over the last 50 years. Except for groundwater from the Live Oak wells, all water delivered through the City system is treated at this plant. In other words, it must operate properly 100 percent of the time to maintain water service throughout the entire system.

Following the last major expansion the plant can process up to 16 mgd and year-round average production is 10 mgd. The City has been evaluating improvements to accommodate a variety of changing conditions such as potential higher daily plant output in the winter, evolving water quality regulations, and future changes in the source water mix. As information has become available from the various studies such as the Initial Distribution System Evaluation—conducted as part of preparing to comply with the State 2 Disinfectant and Disinfection Byproducts Rule, and work toward the HCP, the focus has narrowed to strategies to reduce the formation of disinfection byproducts and the treatment of more turbid source water with greater natural organic matter.

The City plans to continue investment in the plant by taking on projects that upgrade the existing facility to enhance water quality and respond to detection of contaminants of emerging concern (CECs) including pharmaceuticals and personal care products (PPCPs). As water quality and treatment regulations change these investments are

designed to prevent noncompliance with drinking water standards and/or mission-critical values of supplying adequate, safe, and reliable water for the City's customers.

### 7.1.4 The Water Rights Conformance Project for Water Rights and Entitlements

In 2008, the City developed and submitted filings to the SWRCB to address a historical oversight in the language of the City's water rights documents for Newell Creek and the San Lorenzo River at Felton (Felton Diversion) and to request a time extension for the full development of the 3,000 ac-ft permit to divert water from the San Lorenzo River at Felton.

The Newell Creek and San Lorenzo River permits to divert at Felton were originally granted as "diversion to storage," rather than as "direct diversion" rights. A diversion to storage is used when the water diverted is put into storage and is retained in storage for some time prior to being used. Current State Water Resources Control Board practice, however, requires rights of "direct diversion" as well as diversion to storage for the same operations as the City originally proposed and has historically undertaken.

The City's interest in initiating the Water Rights Conformance Project is to eliminate technical constraints for the operations of its water supply resources. While the water rights granted pursuant to the original filings were thought to be adequate at the time, it is now necessary to add the right of direct diversion to the rights to divert to storage. If this is not rectified, the Newell Creek inflow could be considered unavailable as a source for City use during times when, for example, the reservoir is receiving more inflow from Newell Creek than is being released downstream (Gary Fiske & Associates, 2003).

The City's permits to divert water at Felton for storage in Loch Lomond Reservoir (as amended by earlier requests for time extensions in the mid-1980s and again in the mid-1990s) required the City to put all of its approximately 980 mgy entitlement to full beneficial use by December 2006. While the City has been diligently using water from the Felton Diversion for beneficial use over the years, to date the City has used just over half the permitted amount on an annual basis. In the future, the City expects to need the full 980 mgy and, therefore, filed timely petitions (in 2008) with the SWRCB to extend the time allowed for putting the full 980 mgy to beneficial use. The need for such time extensions is typical for municipal water rights, the use of which increases over time.

Recently completed water supply planning work done by the Water Supply Advisory Committee identified water from the Felton Permits as being critical to meeting the City's projected future demand. In particular, the winter water harvest strategy is highly likely to result in greater use of water from Felton during the coming decade. In addition, water from the Felton diversion is an important asset during operational outages, changes in

operations in response to environmental concerns, and as a significant component of the City's response to dry year conditions. The City mid-1990s extension required reaching an agreement with California Department of Fish and Wildlife (DFW) and execution of a Memorandum of Agreement that modified the manner in which the City operated the Felton Diversion facility to enhance fish passage.

Like the petitions to add direct diversion to the Newell Creek and Felton Diversion permits, the time extension petition are currently pending while the City works with the DFW and the National Marine Fisheries Service to complete a Habitat Conservation Plan and a federal Endangered Species Act Section 10 permit and a 2081 state permit that will address the impacts of the water system on threatened steelhead trout and endangered Coho salmon.

The Water Supply Advisory Committee's priority water supply augmentation strategy recommended developing and implementing conjunctive use of surface and groundwater resources in mid and northern Santa Cruz County. A significant barrier to proceeding to implement more conjunctive use of the City's San Lorenzo sources of supply is constraints on the Place of Use language included in the water rights documents for these sources. In particular, the Soquel Creek and Central Water Districts are not included in the Place of Use for any of the San Lorenzo water rights, which include rights related to Newell Creek, Felton Diversion and Tait Street Diversion. In addition, while Scotts Valley and the San Lorenzo Valley Water Districts are covered in the Place of Use descriptions for the Newell Creek and Felton Diversion water rights, they are not included in the Place of Use language of the Tait Street water right.

To address these Place of Use issues the City will be folding into the Water Rights Conformance Project a request to modify the Place of Use for the City's San Lorenzo River water rights and permits.

## 7.2 Reliability by Type of Year

For the purposes of assessing reliability, DWR uses the following definitions for determining year type:

**Average/Normal Year**: a year, or averaged range of years, that most closely represents the average water supply available to the agency.

**Single-dry Year**: a year that represents the lowest water supply available to the agency.

**Multiple-dry Year**: a period that represents the lowest average water supply available to the agency for a consecutive multiple year period of three years or more.

| Table 7-1. Basis of Water Year Data | | | |
|---|---|---|---|
| Year Type | Base Year | Available Supplies if Year Type Repeats (mgy) | |
| | | Agency may provide volume only, percent only, or both | |
| | | Volume Available | % of Average Supply |
| Average Year | | 3,251 | 100% |
| Single-Dry Year | 2014 | 2,692 | 83% |
| Multiple-Dry Years 1st Year | 1976 | 2,430 | 75% |
| Multiple-Dry Years 2nd Year | 1977 | 1,969 | 61% |
| Multiple-Dry Years 3rd Year | 1977 | 1,597 | 49% |
| NOTES: Quantity volume of available water represents the maximum over time by year type. Projected volumes of available water produced by the Confluence model take into account demand assumptions. | | | |

For this assessment the normal or average water supply available to the City was developed using the long-term average over the 78-year period of record (1936-2014). This record does include all water year types from critically dry to extremely wet and therefore represents a historical hydrologic average base year type.

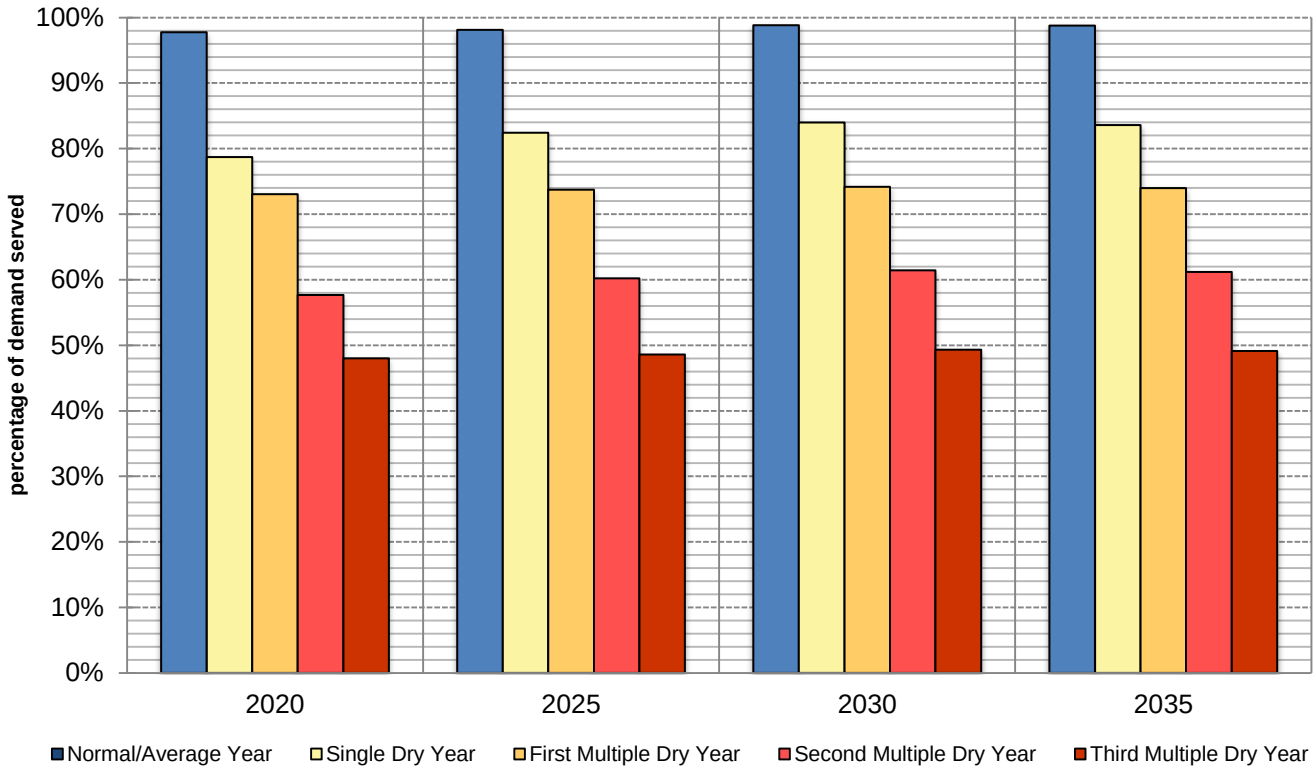
The City chose water year 2014 to represent the lowest water supply available to the agency for a single-dry year. Although 2014 was part of a larger drought sequence, the City was able to isolate the conditions for that single year. In terms of local source assessment, water year 2014 was representative of critically dry conditions for the City.

Consistent with previous plans and assessments, the City chose water years 1976-1977 as representing the most critical drought on record for a consecutive multiple-year period. A second 1977 year type was appended to the sequence to create the required third year for the assessment exercise. This sequence was used in the recent supply planning work completed in 2015 (see Section 7.4) and is consistent with the stated goal to create a reasonable worst-case scenario in a multi-year drought.

Each of the volumes included in the chart are the maximum available volumes by base year type as projected at the five-year intervals from 2020 to 2035. As such the percentage of average supply shown is the highest relative to average supply for all the base year types modelled.

To demonstrate the slight variability over time for each base year type modelled, Figure 7-2 shows the projected supply available relative to demand. Although the City chose the maximum value for comparison in Table 7-1, use of an average supply volume or a minimum supply volume would not substantially alter the presentation of the projections.

**Figure 7-2. Projected Supply Availability as Demand Served**




As will be expanded on in the following section, operationally the City has sufficient water supply available in normal years to meet demand even though a slight deficit seems to exist in the modelled projections. In single dry years, supplies are slightly inadequate to meet expected demands by 2020 and beyond. In multiple dry years, available supplies fall substantially short of system demands. The one variable that represents the biggest unknown at this time is the amount of water that will be required for ecosystem protection purposes. Should the City agree to release more water than is assumed in the operations model utilized for this analysis, these conclusions could change and shortages could be even greater than the estimated available supply presented.

## 7.3 Supply and Demand Assessment

The City of Santa Cruz utilizes the Confluence model to analyze the variability of water supplies to determine potential water supply shortages. The City has been utilizing the

Confluence model to support water supply planning activities since 2003 and this model was used to generate the results for the 2010 UWMP (City of Santa Cruz, 2011). The model takes into account the variation in demand both within and between years, the availability of water from various sources, and the capacity of infrastructure to pump and treat the water. The results presented in this section provide perspective on the City's water supply reliability based on accepted assumptions and projected conditions in the water system.

Water suppliers are required to characterize water supply reliability in a manner prescribed by law. In the analysis that follows, estimates of supply are given by both individual source and for the total available supply. The analysis assumes that future diversions, beginning sometime within the next five years will be limited due to the constraints of the specific factors described above. Although the constraints may ultimately be modified, the City is presenting the proposed forecasts as a composite of what total supply is likely to be, based on what is known at this time.

### 7.3.1 Normal/Average Water Year

After developing the normal year from the 78-year period of record, average conditions were projected for the future 5-year intervals. The summary results of this assessment are presented in Table 7-2 below. Notice the maximum availability of water for this base year type occurs in 2020; however reliability improves over time due to projected demand reduction in the future (M.Cubed, 2015).

**Table 7-2. Normal Year Supply and Demand Comparison (mgy)**

| | 2020 | 2025 | 2030 | 2035 |
|---|---|---|---|---|
| North Coast Sources | 637 | 642 | 671 | 671 |
| San Lorenzo River | 1882 | 1842 | 1829 | 1834 |
| Loch Lomond Reservoir | 595 | 551 | 540 | 547 |
| Groundwater | 138 | 129 | 127 | 128 |
| Supply totals | 3,252 | 3,164 | 3,167 | 3,180 |
| Demand totals | 3,327 | 3,225 | 3,205 | 3,220 |
| Difference (mg) | (75) | (61) | (38) | (40) |
| Demand served % | 97% | 97% | 98% | 98% |

In order to understand the source balance behind the numbers in Table 7-2, the City chose to provide the projected supply volumes by source to illustrate how the system provides water during these years. Of note, production from the North Coast sources is shown at a much lower diversion rate (637-671) than was projected in the 2010 UWMP (860 mgy). However, the modeling to support these new projections includes approval of an HCP with significant bypass flow requirements prior to the first five-year forecast year. This reduction is partly compensated for in normal water years by increased diversion from the San Lorenzo River and greater withdrawals from Loch Lomond Reservoir. Additionally, the expected future demand has reduced considerably since the 2010 Plan due to significant conservation and water efficiency programs.

Although the City has not previously seen shortages in normal water years, by adding the ecosystem protection conditions (HCP) likely to begin prior to 2020 a small shortage (1-3%) can be reasonably expected. Historically in normal water years, the City experienced a slight surplus of supply and this trend can be expected to continue until the HCP agreement is approved and higher instream flows are maintained. As the City chose to create a representative average year by using the historic record, the inclusion of the dry years and critically dry years within the average may explain the predicted small deficit. It is important to note that the City predicts the supply and demand volumes to be in balance for 90% of all normal water years for 2020-2035.

### 7.3.2 Single Dry Water Year

This assessment presents water supply available to the City as reflecting conditions comparable to water year 2014, which was a recent critically dry year. As shown in Table 7-3, water supply during a single dry year is not sufficient to meet the demand in the near term although the shortage experienced is projected to decrease over time. During a single dry year annual shortages of 16-21% are projected given the modelled supply and demand figures developed for planning and reliability purposes.

Due to the local conditions of the water supply sources and the tourist economy of the City, water shortages are typically concentrated into a “peak season” with much greater gaps between demand and supply of available water. The greatest demand for water occurs in the summer months when less water is available from surface water sources. Therefore the model predicts greater dependence on groundwater supply in dry years by increasing the volume by 25-35% more than during normal years. Evidence of this shift is shown in the groundwater supply volumes for Table 7-2 and 7-3.

| Table 7-3 Retail: Single Dry Year Supply and Demand Comparison (mgy) | | | | |
|---|---|---|---|---|
| | 2020 | 2025 | 2030 | 2035 |
| North Coast | 429 | 432 | 452 | 452 |
| San Lorenzo River | 1300 | 1275 | 1268 | 1271 |
| Newell Creek | 716 | 780 | 802 | 798 |
| Groundwater | 174 | 171 | 170 | 171 |
| Supply totals | 2619 | 2658 | 2692 | 2692 |
| Demand totals | 3,327 | 3,225 | 3,205 | 3,220 |
| Difference (mg) | (708) | (567) | (513) | (528) |
| Demand served % | 79% | 82% | 84% | 84% |
| NOTES: | | | | |

Of interest when discussing a single dry year, the model makes assumptions about management of the reserve supply to be maintained in storage at Loch Lomond. The City may choose to draw more water from storage to meet customer demand in a dry year during the peak season than the model predicts (shown in Table 7-3) as operations are not always consistent with modeling assumptions. This decision is commonly applied when the storage level of the reservoir is reasonably expected to return to capacity during the following winter.

### 7.3.3 Multiple Dry Water Year Period

The City chose to present the estimated water supply available during the multiple dry water year period of a three-year drought sequence using hydrology from 1976, 1977, and a second 1977 year. The results of the multiple dry year supply and demand comparison are provided as totals and overall differences in Table 7-4. A breakdown of supply by source is not provided for this sequence in an effort to simplify the table for easy navigation and comparison between years and over time.

In an extreme multi-year drought similar to the 1976-77 event, the estimated water supply available to the City in the first year of that event, according to model, ranges between 2,430 and 2,377 or an average of 25% less water on an annual basis than is available in a normal water year. During the second year the average shortage over time increases to 39% and in the third year modeled, the average reduction compared

to a normal year is over 50%. Fortunately, growth in water demand is not anticipated to be a contributing factor to shortage as the City is projecting a small decrease in overall demand between 2020 and 2035.

**Table 7-4. Multiple Dry Years Supply and Demand Comparison (mgy)**

| | | 2020 | 2025 | 2030 | 2035 |
|---|---|---|---|---|---|
| First year | Supply totals | 2,430 | 2,377 | 2,377 | 2,381 |
| | Demand totals | 3,327 | 3,225 | 3,205 | 3,220 |
| | Difference | (897) | (848) | (828) | (839) |
| Second year | Supply totals | 1,918 | 1,942 | 1,968 | 1,969 |
| | Demand totals | 3,327 | 3,225 | 3,205 | 3,220 |
| | Difference | (1,409) | (1,283) | (1,237) | (1,251) |
| Third year | Supply totals | 1,597 | 1,567 | 1,580 | 1,581 |
| | Demand totals | 3,327 | 3,225 | 3,205 | 3,220 |
| | Difference | (1,730) | (1,658) | (1,625) | (1,639) |

The deficit calculated for Table 7-4 is expressed as annual average deficits. However, as discussed in the single dry year analysis, supplies available to meet demand are reduced mainly during the peak season period between April and October, the actual shortage is likely to be experienced at a much greater percentage over a reduced number of months.

The annual shortages associated with the multiple dry year sequence range from 25%-52% and the peak season could experience a shortage greater than 60% at least once during a multiple year drought. The magnitude of a shortage volume of 60% is roughly equivalent to the total water usage for all residential customers in the service area during the year of 2014. As the likelihood of a recurring multiple dry year sequence is strong, the City is seeking a solution to this dilemma through an increase in storage of 3.0 billion gallons and/or a project to increase the reliability of peak season supply.

## 7.4 Water Supply Reliability Management Strategies

The City follows a variety of policies, procedures, and legal restrictions in operating the water supply system. As indicated in the foregoing sections, there are many complex

challenges and uncertainties that the City faces in its effort to maintain a safe, adequate, and reliable water supply. These include hydrologic, environmental, water quality, and legal factors. The City is pursuing a balanced approach to meet these challenges that includes both demand reduction and a phased, flexible augmentation strategy to diversify the City's and the region's existing water supply sources.

Over the past several decades the City has been studying ways to improve the reliability of its water supply; the problem has been defined in a variety of reports, plans, and projects that speak to the relative importance of the issues faced at the time. Participation by the community has been a significant element in the planning process for previous Integrated Water, Water Shortage Contingency, and Water Conservation Master Plans in addition to the review process for potential supply projects.

The most recent shift toward a new water supply vision occurred in late 2013 following expressed interest from the community to enhance public engagement on the subject of water supply planning. In response to this interest, the City developed a framework for moving forward in order to:

- greatly expand opportunities for community engagement;
- improve our water conservation efforts; and,
- help set a course for the future approach to improving the reliability of the City's water supply.

In early 2014, City Council appointed members to the Water Supply Advisory Committee (WSAC). The aim of the WSAC process was to 1) explore the City's water profile, including supply, demand and future risks; 2) analyze potential solutions to deliver a safe, adequate, reliable, affordable and environmentally sustainable water supply; and 3) develop recommendations for City Council consideration.

The backbone of the WSAC work is the problem statement developed for use by the City when addressing the assessment of supply reliability.

**Committee Agreement on Problem Statement**

On September 11, 2015, the Committee Agreed to the following problem statement:

*Santa Cruz's water supply reliability issue is the result of having only a marginally adequate amount of storage to serve demand during dry and critically dry years when the system's reservoir doesn't fill completely. Both expected requirements for fish flow releases and anticipated impacts of climate change will turn a marginally adequate situation into a seriously inadequate one in the coming years.*

*Santa Cruz's lack of storage makes it particularly vulnerable to multi-year droughts. The key management strategy currently available for dealing with this vulnerability is to very conservatively manage available storage. This strategy typically results in regular calls for annual curtailments of demand that may lead to modest, significant, or even critical requirements for reduction. In addition,*

*the Santa Cruz supply lacks diversity, thereby further increasing the system's vulnerability to drought conditions and other risks.*

*The projected worst-year gap between peak-season available supply and demand during an extended drought is about 1.2 billion gallons. While aggressive implementation of conservation programs will help reduce this gap, conservation alone cannot close this gap. The Committee's goal is to establish a reasonable level of reliability for Santa Cruz water customers by substantially decreasing this worst-year gap while also reducing the frequency of shortages in less extreme years.*

City of Santa Cruz, 2015

One of the primary objectives in creating the WSAC was to allow for broad representation of community interests by bringing together individuals with a diverse set of perspectives and viewpoints. The WSAC began and concluded the process with fourteen appointed members:

**Water Supply Advisory Committee Members**

| | |
|---|---|
| **David Green Baskin**, Santa Cruz Water Commission | **Sarah Mansergh**, Surfrider Foundation |
| **Peter Beckman**, Think Local First | **Mark Mesiti-Miller**, Santa Cruz Chamber of Commerce |
| **Doug Engfer**, City Resident | **Greg Pepping**, Coastal Watershed Council |
| **Suzanne Holt**, Outside-City Water Customer | **Mike Rotkin**, Sustainable Water Coalition |
| **Dana Jacobson**, City Resident | **Sid Slatter**, Santa Cruz County Business Council |
| **Charlie Keutmann**, City Resident | **Erica Stanojevic**, Sierra Club |
| **Rick Longinotti**, Santa Cruz Desalination Alternatives | **David Stearns**, Santa Cruz Water Commission |

The overarching goal of the WSAC process that concluded in October 2015 was "to provide significant improvement to the sufficiency and reliability of the Santa Cruz water supply by 2025." While this planning horizon is a decade shorter than the required UWMP 20-year outlook, it presents a strategy that can be built upon based on the analysis and progress during the first 10-12 years. The WSAC process recognized that "like all long range planning, water supply planning must deal with the realities of an uncertain future" and further that a final strategy requires the ability "to respond to the new information that will emerge and the potential changes in our understanding of circumstances that will occur over time." (City of Santa Cruz, 2015)

### 7.4.1 Water Supply Advisory Committee Final Report

In late 2015, consensus was achieved among WSAC members for how best to address an agreed-upon worst year gap of 1.2 billion gallons between water supply and water demand during times of extended drought.

A report was created to conclude the WSAC process and was presented to City Council, as a Final Report on Agreements and Recommendations in November 2015. The Final Report was accepted by the City Council and staff was directed to integrate the water supply portfolio strategy (including the entirety of the agreements and recommendations) into the Urban Water Management Plan update to be submitted to DWR in 2016. The guiding recommendations are provided below and further reference material for the underlying agreement details can be found in the full report provided as Appendix K (City of Santa Cruz, 2015).

> ***Article IV. Recommendations***
>
> ***Section 4.01 The Water Supply Augmentation Plan***
>
> *The Committee has worked on developing a Plan that would eliminate future water shortages by 2025, give or take two years, while allowing for robust stream flows to support and enhance fish habitat.*
>
> *The agreed-upon **Water Supply Augmentation Plan** (Plan) includes:*
>
> 1. *A **specific goal for Yield**, as well as the assumptions underlying this goal;*
> 2. *A **Timeframe** for improving the reliability of the Santa Cruz Water Supply;*
> 3. *The **Water Supply Augmentation Plan Elements**;*
> 4. *An **Adaptive Pathway** to provide a structure within which work on the Elements can be pursued and evaluated; and*
> 5. *A **Change Management Strategy** to guide adjustments and adaptations within the Plan, as described below.*
>
> ***Section 4.02 Yield Goal***
>
> *The Committee recommends the City implement additional demand management and supply augmentation programs and projects and address key infrastructure and operating constraints to reliably make available an additional 1.2 bgy during modeled worst-year conditions.*

## *Section 4.03 Timeframe for Improvement*

*The Committee recommends that the City adopt a goal of completing the improvements to Santa Cruz's water supply necessary to meet the specified yield goal by the end of 2025;*

## *Section 4.04 Water Supply Augmentation Plan Portfolio Elements*

*The Water Supply Advisory Committee recommends that the City Council adopt a portfolio of measures for improving the reliability of the water supply. The recommended package includes the following Elements:*

- ***Element 0:*** *Additional water conservation with a goal of achieving an additional 200 to 250 million gallons of demand reduction by 2035 by expanding water conservation programs;*
- ***Element 1:*** *Passive recharge of regional aquifers by working to develop agreements for delivering surface water as an in lieu supply to the Soquel Creek Water District and/or the Scotts Valley Water Districts so they can rest their wells, help the aquifers recover, and effectively store water for use by Santa Cruz Water Department in drought years;*
- ***Element 2:*** *Active recharge of regional aquifers by using existing infrastructure (wells, pipelines, and treatment capacity) and potential new infrastructure (wells, pipelines and treatment capacity) in the regionally shared Purisima aquifer in the Soquel-Aptos basin and/or in the Santa Margarita/Lompico/Butano aquifers in the Scotts Valley area to store water that can be available for use by Santa Cruz in drought years;*
- ***Element 3:*** *A potable water supply using advanced treated recycled water as its source, as a supplemental or replacement supply in the event the groundwater storage strategies described above prove insufficient to meet the Plan's goals of cost effectiveness, timeliness or yield. In the event advanced treated recycled water does not meet the needs, desalination would then become Element 3.*

## *Section 4.05 WSAC Value Statement on Implementing Plan Elements*

*The recommended Water Supply Augmentation Plan reflects the Committee's preference for pursuing a groundwater storage and retrieval strategy provided the yield goal can be achieved in a cost-effective and timely manner. Before making a choice to move away from groundwater storage, the Committee recommends that the City diligently pursue all reasonable measures to make the groundwater strategies work.*

*Recognizing the cost differential between some of the strategies the Committee considered in developing its recommendations, the WSAC agreed to express its preference for the Strategy One, groundwater storage and retrieval, over Strategy Two, and has agreed that as long as the annualized cost per million*

*gallons of average year yield (ACAYY) for implementing Strategy One is not more than 130% of the ACAYY for Strategy Two, while still meeting other metrics, Strategy One should be pursued.*

## *Section 4.06 Adaptive Pathway Implementation Strategy*

*The Committee recommends that the Council adopt a staggered Adaptive Pathway to guide implementation of the Plan and that decision-making at the various decision-nodes identified in this Adaptive Pathway be guided by the provisions of the Change Management Strategy.*

## *Section 4.07 Change Management Strategy*

*The Committee recommends that the Council adopt the Change Management Strategy described in Section 3.24 (City of Santa Cruz, 2015).*

## *Section 4.08 Additional Recommendations Related to Infrastructure and Operating Constraints*

### *(a) Infrastructure Constraints*

*The Committee also supports the Water Department's plans to address certain key infrastructure constraints that are keeping the City from fully utilizing available water, especially during the high flow season. These include, but are not limited to:*

- *Rehabilitation of the pipeline between the Felton Diversion and Loch Lomond that would allow the City to increase diversions to Loch Lomond during the high flow season;*
- *Evaluation of additional pumping capacity at Felton to push more water to Loch Lomond through the replacement pipeline; and*
- *If proven cost-effective, and needed for the implementation of Strategy One, complete improvements that will allow the Department to treat water with turbidities that are higher than can be effectively treated by the current Graham Hill Water Treatment Plant facilities and processes. The specific method for how to address the water treatment constraint should include evaluating a range of potential options, including, but not limited to Ranney Collectors or satellite treatment plants, and choosing the most cost-effective approach.*

### *(b) Operating Constraints*

*Another focus of the Committee's review relates to some system operational constraints. Operating constraints typically include both daily parameters for drawing water from the City's sources and operating constraint parameters that are used in modeling system performance.*

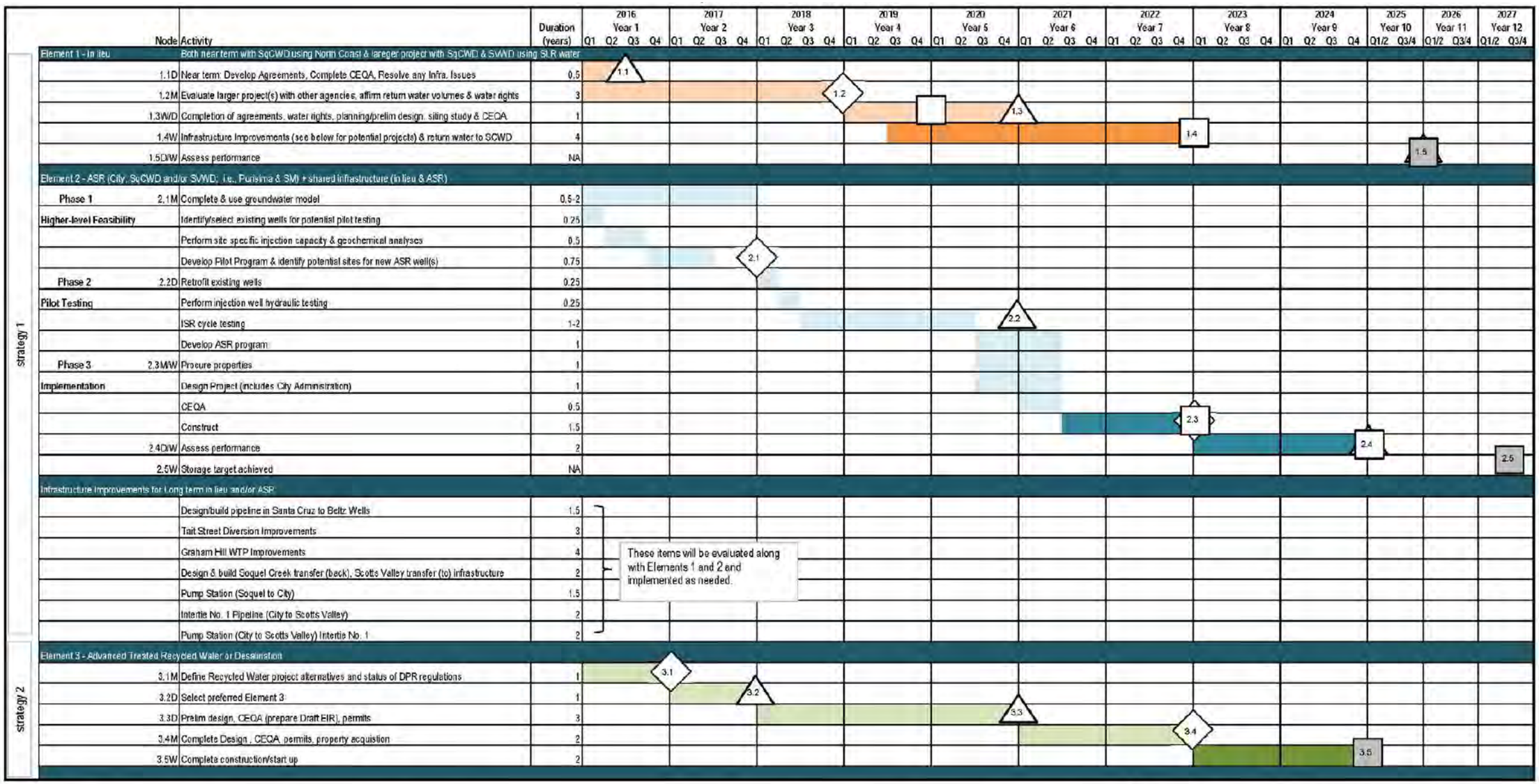
*The Committee recommends that the Water Department identify and regularly evaluate operating constraints to determine whether those constraints continue to be justified as necessary to protect the system and finished water quality and to support efficient and cost-effective operations. Early focus should be given to issues related to Loch Lomond year-end carry over storage requirements, particularly if/when in lieu and/or ASR have provided a sufficient drought supply, and to the "first flush" constraint impacting the City's ability to pump water from Felton to Loch Lomond under critically dry year conditions.*

### *Section 4.09 Implementation Plan and Timeline*

*As part of the process for developing the WSAC Agreement, City Staff and the technical team developed a Gantt chart shown in Figure 12. This Gantt chart, together with the Decision Node Table (Table 16) and the Staggered Adaptive Pathways Map (Figure 11) comprise the Implementation Plan and Timeline.*

On the following page, Figure 7-3 is a reproduction of the Gantt chart originally included as Figure 12 in the Final Report and referenced in Article IV. Recommendations provided above. This Strategy Implementation Plan and Timeline was developed by City Staff and the technical team as a tool to move the City into the work plan phase.

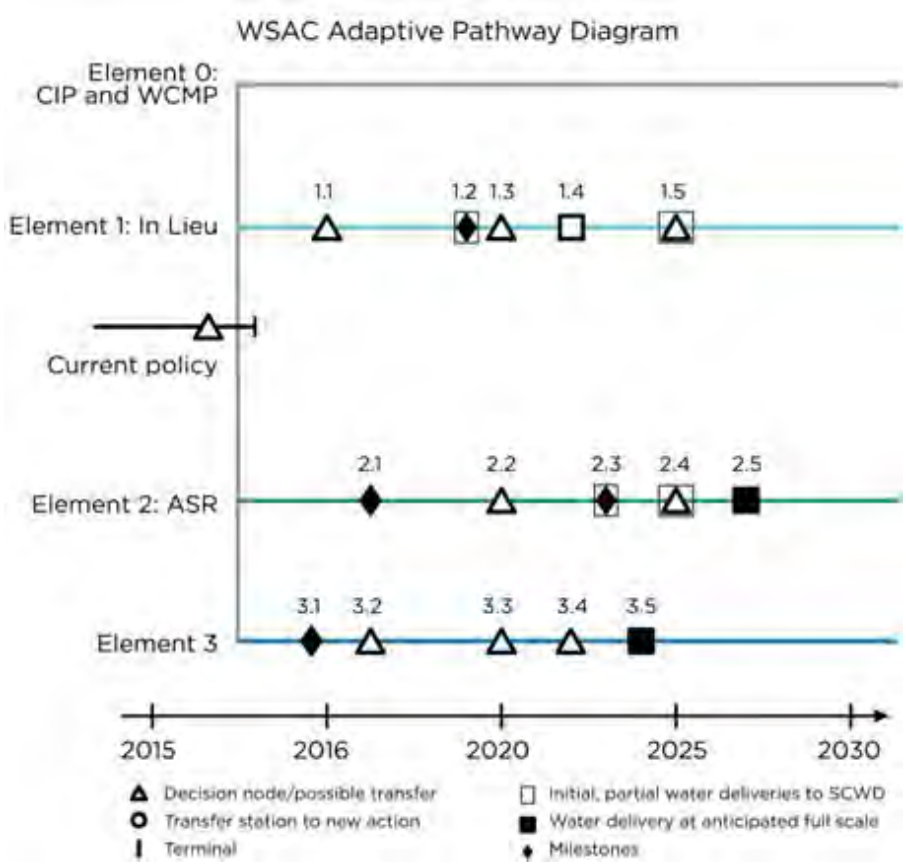
**Figure 7-3. Water Supply Strategy Implementation Plan and Timeline, Water Supply Advisory Committee. Final Report, 2015**



Upon acceptance of the Report by City Council, development began on the supply augmentation strategy work plan that further defines the components of the implementation plan and timeline included in the WSAC Final Report. The initial phase of the strategy involves enhancement of the existing conservation programs as well as significant exploration of feasibility and potential alternatives for future supply projects focused on solving the 1.2 billion gallon supply gap.

As shown in Figure 7-4 below and discussed as the "Staggered Adaptive Pathway" in the recommendations, the City will use the WSAC change management strategy to determine when and why adjustment of the progressing elements will occur. This movement will occur between the component elements of Strategies 1 and 2 while the tasks within the Capital Improvement Plan (CIP) and the Water Conservation Master Plan (WCMP) shown as Element 0 will continue along a consistent trajectory.

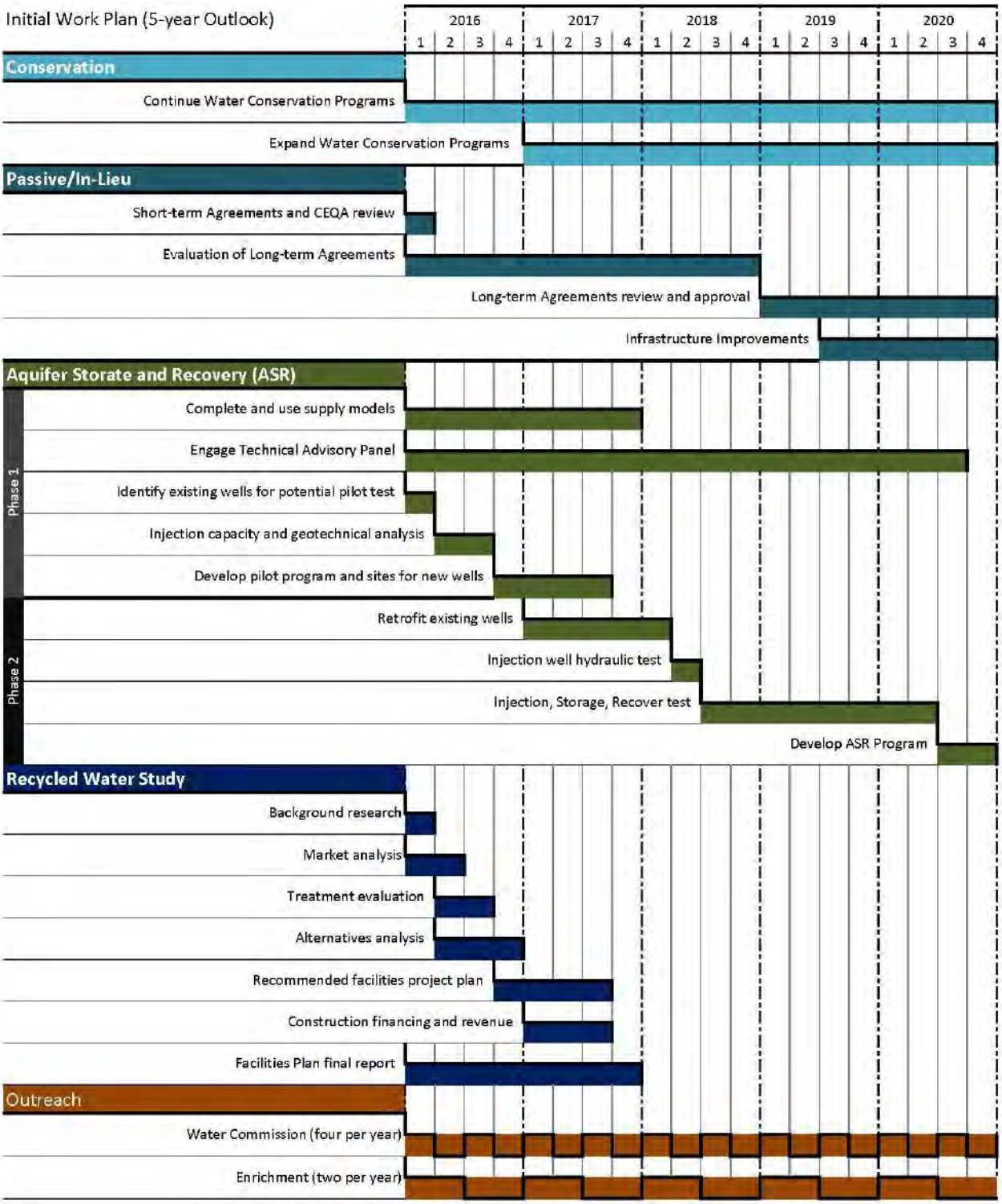
**Figure 7-4. Change Management Strategy**




The final components of the supply augmentation portfolio are not yet fully defined and will not be known prior to the adoption of this Plan. Therefore, the City provided projections on the long-term reliability of demand relative to supply based solely on the

information available at this time. Development of the work plan to support the progress of the Elements began in Spring 2016 with a snapshot of the current associated tasks and timelines provided in Figure 7-5 below.

**Figure 7-5. Water Supply Augmentation Strategy, Implementation Timeline**



The City intends to implement the recommendations developed through the WSAC process as accepted by City Council in the Final Report. Adopting this update to the UWMP signifies adoption of the recommendations as the City's water supply strategy and the new course to overcome known supply reliability constraints and challenges.

## 7.5 Regional Supply Reliability

> ***CWC 10620***
>
> ***(f)*** *An urban water supplier shall describe in the plan water management tools and options used by that entity that will maximize resources and minimize the need to import water from other regions.*

The City of Santa Cruz continues to focus supply planning and reliability efforts on programs and projects that emphasize the maximization of available resources. To date, the City has avoided supply planning that included importing water from outside the Central Coast hydrologic region by concentrating on options within Santa Cruz County.

Currently, all of the City's water resources are obtained from local sources. In order to build drought supply reliability, the City continually works to develop partnerships within the region that promote responsible and sustainable water resource management. A known constraint on the regional supply are the over drafted, threatened, and recovering aquifers. The City's future supply vision includes projects serving to benefit regional aquifer recovery and increased reliability of groundwater sources. Recognizing the path toward regional reliability requires a comprehensive framework that supports dependability of all recognized supplies within the region, the types of tools being proposed and evaluated at present seek to benefit multiple stakeholders.

At this point in time, the City is participating in two recognized regional teams formed to increase coordination of activities among resource agencies. The first is the Santa Cruz Integrated Regional Water Management Group (IRWM) made up of nine local agencies. Several of the City's augmentation plan elements may benefit from the ability to work collaboratively with the partners and stakeholders that include government and non-government resource management agencies. Additionally, the City is one of four members of the Mid-County Groundwater Agency (MGA). As discussed in Chapter 6, the MGA was only formally established in May 2016 and the City has participated in several partnership groups with the mission to promote responsible management of the Soquel-Aptos Basin over the past several decades. Coordination and collaboration is expected to increase even further within Santa Cruz County in the coming decades with the potential for similar programs throughout the Central Coast Region.

# Chapter 8

# WATER SHORTAGE CONTINGENCY PLANNING

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

## 8.1 Background

In 2009, the City of Santa Cruz completed a comprehensive update of its Water Shortage Contingency Plan. This project was an outgrowth of a previous Urban Water Management Plan, which recognized the many changes in regional conditions and local water supply planning that had taken place over the previous decade and identified a need to better prepare for the possibility of future water shortages in advance of the next major drought. Since then, the City has had to declare a water shortage in five of the past seven years, including a Stage 3 Water Shortage Emergency in both 2014 and 2015.

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

The overarching goals of this plan are as follows:

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

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

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

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

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

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

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

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

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

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

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

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

The final Water Shortage Contingency Plan was adopted by resolution of the City Council of the City of Santa Cruz in March 2009 as an amendment to the City's Urban Water Management Plan (Appendix L) and is adopted herein by reference. Subsequently, the City Council adopted an ordinance implementing the water shortage regulations and restrictions contained in the plan (Santa Cruz Municipal Code Chapter 16.01, Appendix M). The water shortage regulations and restrictions were updated in early 2015 to integrate some changes recognized as being needed during implementation of rationing in 2014.

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

## 8.2 Stages of Action

The updated Water Shortage Contingency Plan uses a staged approach that classifies a shortage event into one of five levels spanning a range from less than 5 percent up to 50 percent (Table 8-1).

**Table 8-1. Stages of Water Shortage Contingency Plan**

| Stage | Percent Supply Reduction[1] *Numerical value as a percent* | Water Supply Condition |
|---|---|---|
| **1** | 0-5% | Water Shortage Alert |
| **2** | 5-15% | Water Shortage Warning |
| **3** | 15-25% | Water Shortage Emergency |
| **4** | 25-35% | Severe Water Shortage Emergency |
| **5** | 35-50% | Critical Water Shortage Emergency |

*[1] One stage in the Water Shortage Contingency Plan must address a water shortage of 50%.*

NOTES:

The overall concept is that water shortages of different magnitudes require different measures to overcome the deficiency. Because there is so little the City can do in the short run to increase the supply of water, the focus of this plan is primarily on measures that reduce demand. Each stage includes a set of demand reduction measures that

become progressively more stringent as the shortage condition escalates. When a demand reduction is necessary, typically one of these five stages would be put into effect by a resolution of the Santa Cruz City Council at the recommendation of the Water Director in the spring and remain in force for the entire dry season.

### 8.2.1 Assessing Water Supply and Demand

There is no one single criterion, trigger, or definition that is used to determine if a water shortage exists. The determination of a shortfall involves consideration of multiple indicators of water supply, as well as expected system demand.

Rainfall, runoff, reservoir storage, and water year classification are the key hydrologic indicators used by the City to evaluate water conditions. The plan describes these factors affecting the City's water supply and discusses the forecasting process and management considerations used in dry years to determine whether a water shortage is expected for the year ahead and how much water use must be cut back system-wide in response. In recent years, the City has also considered statewide drought intensity, long-range weather predictions, and local instream flow requirements in its analysis.

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

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

October. A hypothetical situation is provided in the full plan to illustrate this decision-making process.

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

### 8.2.2 Timeline for Declaring Water Shortage

The timeline showing when the City evaluates water supply conditions and, if necessary, declares a water shortage is presented in Table 8-2 below.

**Table 8-2. Calendar for Declaring Water Shortage**

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

### 8.2.3 Process for Declaring Water Shortage

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

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

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

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

## 8.3 Demand Reduction Strategy

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

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

These four components are summarized below.

### 8.3.1 Allocation System

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

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

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

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

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

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

Because both total and categorical water demand has undergone a significant decline in the intervening time since this allocation was initially developed in 2009, it is recommended that this schedule and the monthly rationing allotments be revised once demand stabilizes again following the 2014-2015 implementation of residential/irrigation water rationing.

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

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

### 8.3.2 Demand Reduction Measures

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

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

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

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

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

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

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

### 8.3.3 Publicity and Communications

Effective communication is essential to the success of any water shortage contingency plan in achieving the desired water use reductions. All customers need to be adequately

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

### 8.3.4 Operating Actions

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

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

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

**Table 8-5. Summary of Demand Reduction Actions and Measures**

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

## 8.4 Prohibitions on End Uses

As identified above, the City's water shortage regulations and restrictions include a variety of temporary prohibitions on various end uses of water, which vary according to the stage of shortage. These prohibitions fall into four main categories:

- Landscape irrigation
- Washing of outdoor surfaces, structures, and vehicles
- Commercial end uses
- Swimming pools, spas and water features

These restriction and prohibitions are summarized in Table 8-6 below:

**Table 8-6. Restrictions and Prohibitions on End Uses (continues on next page)**

| Stage | Restrictions and Prohibitions on End Uses | Additional Explanation or Reference | Penalty, Charge, or Other Enforcement? |
|---|---|---|---|
| 1-3 | Landscape - Limit landscape irrigation to specific times | | Yes |
| 1-3 | Landscape - Restrict or prohibit runoff from landscape irrigation | | Yes |
| 2,3 | Landscape - Limit landscape irrigation to specific days | 1-2 days per week | Yes |
| 2-4 | Landscape - Other landscape restriction or prohibition | Limit on duration of watering with automatic irrigation systems | Yes |
| 4 | Landscape - Prohibit certain types of landscape irrigation | | Yes |
| 5 | Landscape - Prohibit all landscape irrigation | | Yes |
| 3 | Landscape - Other landscape restriction or prohibition | within 48 hours of measureable rainfall | |
| 2-4 | Landscape - Other landscape restriction or prohibition | Require large landscapes to adhere to water budgets | Yes |
| 4,5 | Landscape - Other landscape restriction or prohibition | Prohibit installation in new development | Yes |
| 1-5 | CII - Lodging establishment must offer opt out of linen service | | Yes |
| 1-5 | CII - Restaurants may only serve water upon request | | Yes |

| Stage | Restrictions and Prohibitions on End Uses | Additional Explanation or Reference | Penalty, Charge, or Other Enforcement? |
|---|---|---|---|
| 2-5 | CII - Other CII restriction or prohibition | Mandatory water conservation plans for large businesses | |
| 3-5 | CII - Other CII restriction or prohibition | Business water conservation plans required | Yes |
| 3-5 | CII - Other CII restriction or prohibition | Mandatory water waste signage for all business establishments | Yes |
| 1-2 | Other water feature or swimming pool restriction | Prohibit initial filling or draining and refilling of residential swimming pools | Yes |
| 2-5 | Water Features - Restrict water use for decorative water features, such as fountains | | Yes |
| 3 | Other water feature or swimming pool restriction | Prohibit initial filling or draining and refilling of all swimming pools | Yes |
| 4-5 | Other water feature or swimming pool restriction | Prohibit filling or topping off swimming pools and outdoor spas | Yes |
| 1-5 | Other - Customers must repair leaks, breaks, and malfunctions in a timely manner | | Yes |
| 1-5 | Other - Require automatic shut of hoses | | Yes |
| 4-5 | Other - Prohibit use of potable water for construction and dust control | | Yes |
| 4,5 | Other | Prohibit vehicle washing, except at commercial car washes that use recycled water | Yes |

## 8.5 Penalties, Charges, Other Enforcement of Prohibitions

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

Administrative Penalties These penalties are for failure to comply with water waste prohibitions and mandatory water use restrictions and are applied to the customer's

next utility bill. The object of imposing increasingly significant penalties is to assure compliance by creating a meaningful disincentive to commit future code violations. When a violation occurs, the Water Department first provides a written notice and gives the customer an opportunity to correct the situation. Additional violations are penalized as follows:

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

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

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

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

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

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

In 2014 and 2015, the City created and administered a "Water School" to provide one-time relief from excessive use penalties in exchange for customers attending a 2-hour evening class about the drought and ways to save water. More than 1,200 penalties totaling over $800,000 were waived through Water School during this time.

## 8.6 Consumption Reduction Methods

Refer to Section 8.3.2 and Table 8.5 above for a discussion and summary of the primary consumption reduction methods used by the City at various stages of water shortage. The City also implements measures listed in Table 8-7 below:

**Table 8-7. Stages of Water Shortage Contingency Plan - Consumption Reduction Methods**

| Stage | Consumption Reduction Methods by Water Supplier | Additional Explanation or Reference *(optional)* |
|---|---|---|
| 1-5 | Expand Public Information Campaign | |
| 3 | Increase Frequency of Meter Reading | The City permanently changed to monthly meter reading in 2014 to facilitate water rationing |
| 1-5 | Provide Rebates on Plumbing Fixtures and Devices | Increased marketing of ongoing programs |
| 1-5 | Provide Rebates for Landscape Irrigation Efficiency | Increased marketing of ongoing programs |
| 1-5 | Provide Rebates for Turf Replacement | Increased marketing of ongoing programs |
| 1-5 | Decrease Line Flushing | |
| 1-5 | Increase Water Waste Patrols | |
| 5-Mar | Implement or Modify Drought Rate Structure or Surcharge | |
| NOTES: | | |

## 8.7 Determining Water Shortage Reductions

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

During a water shortage, a monthly production forecast and budget are developed for each source of supply. Actual production and the lake level are closely monitored on a daily and weekly basis to verify that the budgeted goals are being met. Consumption by large users is monitored and reported on a frequent basis. In severe stages of a water shortage, production and consumption data would be evaluated daily and the status reported to the Water Director's office. If the trend in consumption is such that the rate of drawdown at Loch Lomond is greater than anticipated, the City Manager and Council

are notified so that corrective action (such as increased publicity and enforcement or consideration of declaring the next higher stage) can be taken.

Beginning in August 2014, the Water Department began reporting its monthly water production on a statewide database used to keep track of urban water use in response to emergency water conservation regulations. These reports include the amount of potable water produced in the preceding month, an estimate of the gallons of water used per person per day by its residential customers, and various enforcement statistics. This reporting is expected to become a permanent requirement in 2016.

The University of California, the City's largest customer, closely tracks its consumption on campus and meets regularly with the City to ensure it is meeting its reduction target.

Figures 8-1 and 8-2 below show two examples of charts used by the Water Department to track production and water savings goals in the 2014 and 2015 drought and to publicize the community's success in meeting water reduction goals.

**Figure 8-1. 2015 Water Production Goals (mgd)**

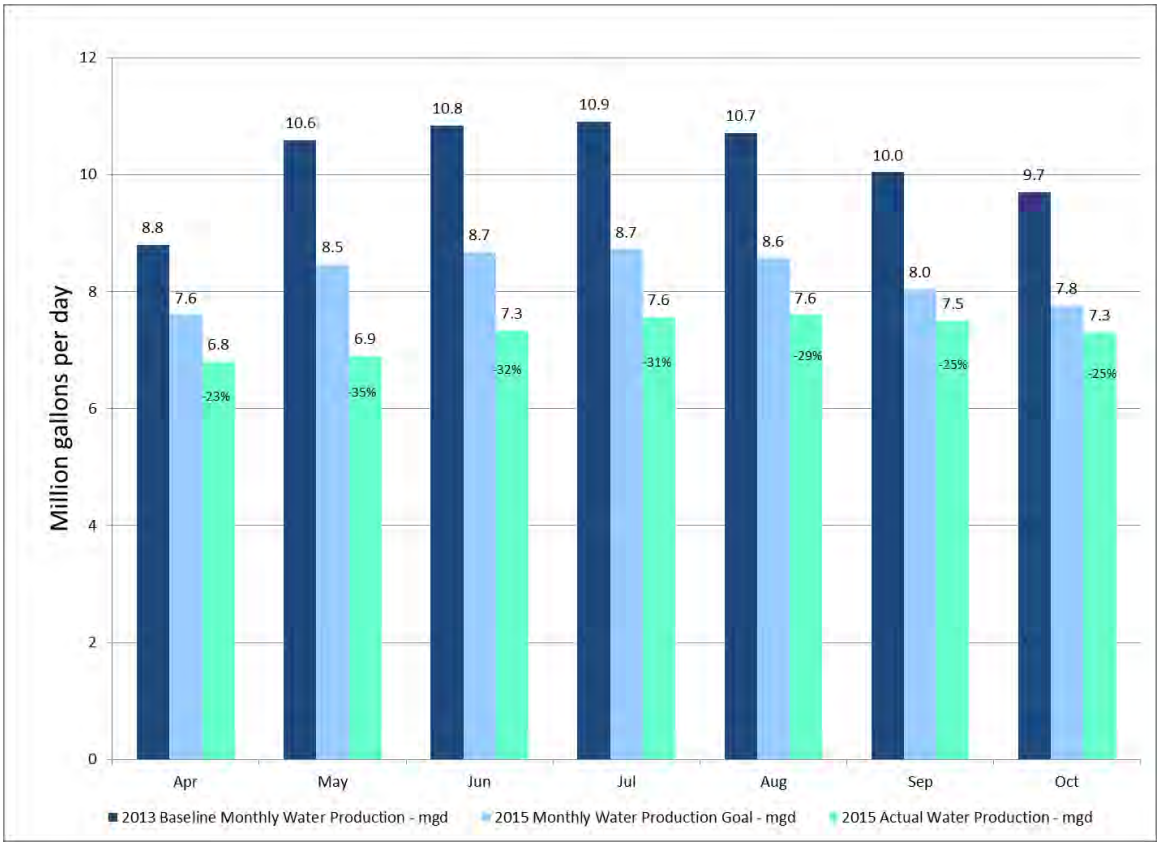
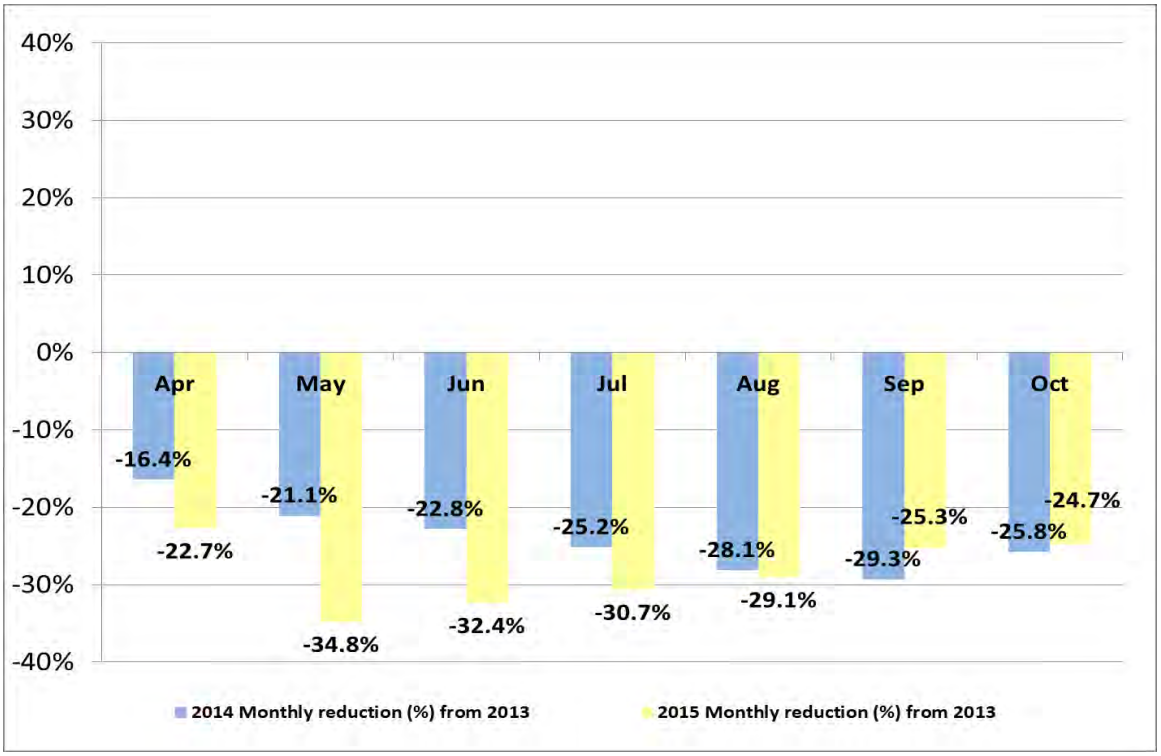


**Figure 2. Monthly Water Savings Compared to 2013 (%)**




## 8.8 Revenue and Expenditure Impacts

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

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

The analysis shows revenue losses ranging from just under $0.6 million in a 5 percent water shortage situation to almost $5.8 million in a critical 50 percent water shortage. These estimates of losses were considered ballpark figures only and probably underestimate the problem. Actual revenue losses would be different for the following reasons:

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

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

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

On the other hand, the time of year in which regulations would take effect is spread over two fiscal years, so the full effect of revenue losses of a single year drought would not impact the Department's annual budget to such a large degree. In addition, there would be relatively minor cost savings associated with reduced power and chemical usage at the Graham Hill water treatment plant, ranging from <$0.1 million in Stage 1 to about $0.4 million in Stage 5. Finally, some of the revenue loss would be offset by penalty and/or excess use fees. On the expenditure side, the major expense of implementing the water shortage plan identified was for added personnel costs for temporary field and office positions, which were estimated to range from approximately $100,000 in Stage 1 to $600,000 in Stage 5, and power cost for pumping water from Felton to Loch Lomond.

The Water Department's total annual revenue has increased somewhat since the Water Shortage Contingency Plan was prepared in 2009, but the actual revenue impact of the recent drought was fairly close to the $2.9 million projected annual loss estimated for Stage 3.

To address this problem, the City in 2014 instituted a new Drought Cost Recovery Fee, which is a surcharge that is automatically triggered by City Council action declaring a water shortage and continues through the end of the fiscal year following the shortage (Appendix N). The fee is a fixed monthly amount that varies by meter size and stage of shortage. It is designed to mitigate the risk of revenue shortfalls associated with usage curtailment events. The maximum targeted cost recovery amount ranges from $1.0 million in Stage 1 to $7.5 million in Stage 5. Table 9-4 below shows the Drought Cost Recovery fees in effect in 2015 and 2016.

| Table 8-8. Drought Cost Recovery Fee Rate (2015) | |
|---|---|
| Meter Size | Inside & Outside City (monthly) |
| 5/8 & 3/4'' | $7.37 |
| 1'' | $18.43 |
| 1.5'' | $36.85 |
| 2'' | $58.96 |
| 3'' | $110.55 |
| 4'' | $184.25 |
| 6'' | $368.50 |
| 8'' | $847.55 |
| 10'' | $1,046.54 |

## 8.9 Resolution or Ordinance

The City's water shortage regulations and restrictions were adopted as an ordinance and codified as Santa Cruz Municipal Code Chapter 16.01 (Appendix M). The water shortage regulations and restrictions were last updated in early 2015.

## 8.10 Plan Evaluation

In 2009, after a year's experience implementing a Stage 2 Water Shortage Warning, Water Department staff prepared a report to document the response and compile records for future reference. This report, entitled: The 2009 Water Shortage: An Evaluation of Water Management Strategies, Actions, and Results evaluates which aspects of the plan succeeded and which didn't, and why, and makes recommendations and refinements to the plan for the next time a water shortage occurs. Much progress was made with putting enforcement systems, procedures, and tools in place that were not in place prior to 2009 and will help in future events. Even so, there were numerous lessons learned from this experience and several areas where improvements could be made to better manage water shortages in the future.

It is recommended that the Water Department conduct a similar review and prepare an "After Action" report based on the lessons learned during the recent 2014/15 Stage 3 Water Shortage Emergency.

## 8.11 Catastrophic Supply Interruption

***CWC 10632***

***(a)(3)*** *Actions to be undertaken by the urban water supplier to prepare for, and implement during, a catastrophic interruption of water supplies including, but not limited to, a regional power outage, an earthquake, or other disaster.*

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

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

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

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

The plan outlines the roles and responsibilities of key Departmental personnel during an emergency at both the City Emergency Operations Center and Water Department

Operations Center. It also describes general actions to be taken to 1) assess situation status and extent of damage to the water system, 2) prevent contamination and loss of water, and 3) restore water service in response to the following types of emergencies:

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

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

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

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

The restrictions that would be instituted in a serious or critical shortage are summarized in Table 8-9.

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

| Table 8-9. Emergency Water Rationing Plan | |
|---|---|
| **Serious Shortage** | |
| *Prohibited Uses:* | *Permitted Uses:* |
| 1. Watering lawns, gardens or landscaping<br>2. Washing cars, boats, building exteriors<br>3. Washing sidewalks, driveways, or any exterior surfaces<br>4. No outdoor use for any reason<br>5. Car washes closed<br>6. Watering plants at nurseries, garden centers<br>7. Filling of swimming pools, hot tubs, decorative pools, or fountains (must be turned off)<br>8. Public showers closed | 1. Normal domestic uses: drinking, cooking (paper plates and plastic utensils requested)<br>2. Toilet flushing, only when necessary<br>3. Limit showers to three minutes<br>4. Bathing only if absolutely necessary (no more than half full)<br>5. Minimize clothes and dish washing |
| **Critical Shortage** | |
| *Prohibited Uses:* | *Permitted Uses:* |
| 1. Outdoor water use for any reason (garden, landscape, car washing, cleaning, maintenance)<br>2. Clothes washing and commercial laundering, except for health reasons<br>3. Janitorial cleaning<br>4. Businesses and institutions that use water in their operations may be forced to close or restrict operations:<br>- Restaurants, bars, and coffee shops<br>- Laundromats<br>- Public and Private Schools<br>- Manufacturing<br>- Gyms and health spas<br>- Beauty salons and barber shops<br>5. No water for construction<br>6. No water for crop irrigation | 1. Water limited to health and safety only: drinking and cooking (paper plates and plastic utensils required)<br>2. Toilet flushing for solid waste only<br>3. Shower/bathing should be limited to every other day<br>4. Use water only when absolutely necessary |

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

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

## 8.12 Minimum Supply Next Three Years

> ***CWC 10632***
>
> ***(a)(2)*** *An estimate of the minimum water supply available during each of the next three water years based on the driest three-year historic sequence for the agency's water supply.*

For this exercise, it is assumed that the next three water years spans the period 2016-2018. For water year 2016, more than half the year has already passed and conditions are fairly well known. The reservoir is currently at full capacity and the water year is classified as Normal. Accordingly, no water shortage is expected for the remainder of the 2016. It is assumed that the supply available under this circumstance is the same as in an Average year as listed in Table 7-1. But because system water demand continues to be low, the total annual supply available, 3.2 billion gallons, likely overstates actual production the City expects to see through the remainder of 2016.

For 2017 and 2018, water conditions are assumed to be as dry as they were in 1976 and 1977, corresponding with the first two years of the 3-year, multiple dry year sequence listed in Table 7-1. The supply available for those two years is substantially lower, and would likely require significant cutbacks to balance supply and demand, especially in 2018. For 2017, a production level of 2.4 billion gallons is close to what the City actually experienced in 2015 with a declared Stage 3 Water Shortage Emergency in place. For 2018, an annual production level of 1.9 billion gallons would represent a critical water shortage emergency and require a tough decision about whether to tap the 1.0 billion gallon reserve in Loch Lomond Reservoir to meet essential public health needs.

**Table 8-10. Minimum Supply Next Three Years (mg)**

| | 2016 | 2017 | 2018 |
|---|---|---|---|
| Available Water Supply | 3,252 | 2,430 | 1,969 |
| NOTES: Reference Table 7-1. | | | |

# Chapter 9

# DEMAND MANAGEMENT MEASURES

The City of Santa Cruz has long recognized the importance of conserving water as a responsible demand management strategy to help protect the area's natural resources, to stretch existing water supplies, to help downsize and/or delay the need for costly additional water supply, treatment, and distribution upgrades, and to fulfill the City's overall goal of ensuring a safe, reliable, and adequate water supply. This section describes the water demand management measures (DMMs) currently being implemented by the City and discusses the City's water conservation planning process that will guide water conservation activities over the next decade and beyond.

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

## 9.1 Demand Management Measures for Wholesale Agencies

The City of Santa Cruz currently is not a wholesale water supplier nor does it receive water from a wholesale agency. This requirement does not apply to the City.

## 9.2 Demand Management Measures for Retail Agencies

### 9.2.1 Water Waste Prevention Ordinances

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

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

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

Provisions of the ordinance regulating new development include prohibitions on:

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

The ordinance is in effect at all times and is upheld mainly through communication with the responsible customer. However, during mandatory water restrictions, violations of the water waste ordinance are enforced first by a warning and then by progressive series of fines ranging from $100 up to $500 and levied on the utility bill. Under a declared water shortage, field staff actively patrols the water service area to enforce restrictions, including water waste violations, seven days per week.

The public is also encouraged to report water waste, either by calling the Water Conservation Office's designated "leak line" (831 420-LEAK) or reporting water waste through the City website. When water waste is observed, site visits, in-person customer contact, phone, and/or mail correspondence is used to resolve the issue. Field staff will increase drive-by checks of sites receiving water waste complaints to help ensure the issue was resolved. New software was acquired in 2009 to help document, track and manage water waste complaints, including the photo evidence of water waste incidents. Since then, the City documented and addressed over 6,000 cases with this software.

Water waste prevention is also implemented through the City's Landscape Water Conservation Ordinance (Santa Cruz Municipal Code Chapter 16.16) to ensure

landscapes and irrigation systems in new and renovated development are designed to avoid runoff, overspray, low-head drainage and other similar conditions where water flows off site onto adjacent property.

### 9.2.2 Metering

All of the City's 24,534 water connections are fully metered with most using Automated Meter Reading (AMR) technology. Approximately 15 percent of all City water meters are now connected with Advanced Metering Infrastructure (AMI) technology, allowing access to hourly meter reads. Water meters are required for all new service connections. In addition, a separate, dedicated irrigation meter is required for all new and renovated multi-family and commercial landscape projects with over 5,000 square feet of landscaped area.

All meters are read and billed monthly according to the volume of water consumed. Monthly billing was first instituted inside the City in 2005 mainly to facilitate rising rates for all City utilities, but it also served in aiding in leak detection and allowing for more accurate monitoring of individual account usage and categorical water consumption. Outside City customers were later transitioned to monthly billing in April 2014 to facilitate water rationing.

As a member of the CUWCC, the City undertook two actions required under BMP 1.3 regarding metering. First, the Water Department in 2010 adopted a new Meter Testing, Repair, and Replacement Policy that accelerated large meter replacement and should help improve overall meter accuracy. In 2013, the Water Conservation Office completed a feasibility study to assess the merits of a program to switch mixed-use commercial accounts that have substantial irrigation demands by installing a dedicated landscape meter. Of the almost 1,900 commercial properties analyzed, only nine sites, mostly schools, were identified as potential commercial candidates meriting retrofitting or future sub-metering.

### 9.2.3 Conservation Pricing

The Customer Service section, also referred to as "Santa Cruz Municipal Utilities," provides customer service and handles utility billing for water, sewer, refuse, and recycling services to the residents and businesses of the City of Santa Cruz, and services for water only to the unincorporated surrounding areas and part of the City of Capitola.

The water portion of the City's utility bill consists of three components: 1) a fixed, monthly "Readiness-to-serve" charge, 2) a volumetric charge, and 3) for customers residing in elevated pressure zones, an elevation charge applies.

The current Readiness-to-serve charge varies by meter size and location (Table 9-1).

**Table 9-1. Readiness to Serve Charges (2015)**

| Meter Size | Inside City (monthly) | Outside City (monthly) |
|---|---|---|
| 5/8 and 3/4" | $21.08 | $26.87 |
| 1" | $52.67 | $67.16 |
| 1.5" | $105.34 | $134.29 |
| 2" | $168.52 | $214.86 |
| 3" | $315.99 | $402.88 |
| 4" | $526.65 | $671.47 |
| 6" | $1,053.27 | $1,342.91 |
| 8" | $2,422.49 | $3,089.55 |
| 10" | $2,991.23 | $3,813.84 |

For the volumetric charges, the City has had a multi-block, inclining rate structure in place for single family residential customers since 1995. In 2004, following a comprehensive water rate study, a five-tier rate structure was adopted that applies to residential accounts with either one or two dwelling units. The current rates are listed in Table 9-2. For all other customers, including multi-family (3 or more dwelling units), business, industrial, municipal, and irrigation customers, water is billed at a uniform rate corresponding with Block 2.

**Table 9-2. Single Family and Two-Unit Residential Water Rate Structure (2015)**

| Block | Category | Inside City (monthly) | | Outside City (monthly) | |
|---|---|---|---|---|---|
| | | Units | Rate | Units | Rate |
| 1 | Essential needs | 1-4 ccf | $1.91 | 1-4 ccf | $2.42 |
| 2 | Average indoor needs | 5-9 ccf | $4.84 | 5-9 ccf | $6.18 |
| 3 | Average outdoor needs | 10-14 ccf | $6.23 | 10-14 ccf | $7.94 |
| 4 | High use | 15-18 ccf | $8.54. | 15-18 ccf | $10.87 |
| 5 | Inefficient or excessive use | >18 ccf | $10.64 | >18 ccf | $13.58 |

Customers in elevated pressure zones also pay an elevation surcharge of $0.20/CCF for the cost of being served by an elevated storage reservoir.

In August 2014, the Santa Cruz City Council adopted an annual 10 percent water rate increase over the next five years to complete several critical infrastructure projects. These projects included: Phase 3 of the North Coast System pipeline ($10 mil), rehabilitating and replacing six filter basins at the Graham Hill Treatment Plant ($6 mil), converting the Bay Street Reservoir to two modern, 6-million gallon tanks ($25 mil), annually replacing 2-4 miles of aging main, and rehabilitated storage tanks, pumps, and completing the Beltz 12 well project. All utility rates and rate change proposals are established by resolution of the City Council. See Appendix P for the 2014 Notice of Proposed Rate Changes.

The City of Santa Cruz is currently in the process of developing a long-range, 10-year financial plan and undertaking a new, 5-year rate study to support the Department's ongoing operations and planned capital improvement programs (Appendix Q). Capital projects during the first five years will be focused on system rehabilitation and replacement projects. Major investments to implement the Water Supply Augmentation Strategy are anticipated to occur in the second five years of the financial planning horizon. The new rate study is expected to be completed in fall 2016. Table 9-3 shows the recommended rate design proposed to meet both conservation pricing and other pricing objectives.

**Table 9-3. Recommended Basic Rate Structures for Customer Classes**

| Customer Category | Basic Rate Structure |
|---|---|
| Single Family Residential | Keep inclining rates but reduce both tier width and number of tiers |
| Multi-Family Residential | Change from uniform to tiered rates based on number of dwelling units |
| Commercial/Municipal/UCSC | Maintain uniform rate structure |
| Landscape Irrigation | Transition all irrigation accounts to a simple water budget-based rate |
| North Coast Agriculture | Maintain uniform rate structure |

The rate structure being recommended will move from one that collects about 65 percent of revenue in volume charges (based on the amount of water used) to one that collects about 90 percent of revenues from volume charges. Other planned changes include:

- Establishing an Infrastructure Reinvestment Fee that will collect the funding needed to support pay-as-you-go capital and debt service costs. The fee would be collected as a separate charge based on water use.

- Establishing a $1.00/CCF surcharge on water use beginning in July 2017 to increase the Department's Rate Stabilization Fund. This fund would be used to mitigate the potential revenue instability associated with the recommended rate structure, and augment revenues in normal years should consumption fall below a level of 2.5 billion gallons per year.

- Retaining the existing Drought Cost Recovery Fees that are triggered by a City Council declared water shortage and would be collected as a fixed charge for the full fiscal year.

The financial plan and recommended rates are needed to ensure the long-term financial health of the utility, and enable the Water Department to support ongoing operations and maintenance of the water system and make the capital investments required to comply with regulations, rehabilitate and replace aging infrastructure. The notice of proposed new rates that would go into effect starting in October 2016 is included as Appendix R.

### 9.2.4 Public Education and Outreach

The City of Santa Cruz Water Department actively values and promotes public awareness and education about the City's water resources and the importance of water conservation. The City of Santa Cruz disseminates information to the general public in different forms including: 1) media, 2) workshops and community events, 3) billing and customer service, and 4) school education programs.

The City uses media coverage in order to broadly share information and updates on events, programs, and news to the public in the following ways:

- "SCMU Review", utility newsletter which includes news and information on water conservation topics;
- City of Santa Cruz Water Conservation website;
- Water Supply Advisory Committee website;
- Formal water supply outlook published three times a year sharing the water conditions/ supply availability;
- Weekly water conditions webpage;

- Paid advertising in local newspapers;
- Opinion page coverage;
- Marketing and advertising of EPA's "Fix a Leak Week"; and
- Television and radio news interviews and community television programs.

In addition, the City uses workshops and community events to engage and interact with the public by the following:

- Public meetings and speaking events to community organizations, industry and homeowners associations, and service groups;
- Tabling at local fairs, farmers markets, and events;
- Participation in regional water forums;
- Participation with other local water agencies in local events and sponsorships of water conservation-related activities;
- Free workshops on irrigation efficiency, new irrigation technologies, and water conservation strategies for the landscape; and
- Financial support to the Green Gardener Program, California Water Awareness Campaign, Water-Smart Gardening Faire, Green Business Program, and the Water Education Foundation.

The City of Santa Cruz also uses a personable approach to public education and outreach through billing and customer service, which includes the following:

- Marketing and distribution of free water conservation devices and literature;
- Marketing of rebates and distribution of rebate applications;
- Bill inserts;
- Field representatives showing customers how to read their meter and check for leaks at their properties;
- Partnership with the Monterey Bay Area Green Business Program;
- Messages and information on customer's bills showing daily consumption and a graph charting monthly consumption for the entire year; and
- Water supply tours.

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

- Field trips and ranger presentations at Loch Lomond Reservoir and San Lorenzo River;
- Loch Lomond Trout in the Classroom fish release field trip;
- Distribution of age and grade level appropriate curriculum and educational materials, including a water education booklet specially developed for Santa Cruz County students;
- Classroom presentations; and
- High School Watershed Academy program.

#### 9.2.4.1 Water School

In summer 2014, the City of Santa Cruz Water Department started hosting Water School as a result of rationing and curtailment during a declared water shortage. Residential customers were required to stay within their assigned allotment or pay an excessive use penalty for each additional unit of water used over their allotment. Water School served as a one-time opportunity for customers who exceeded their monthly allotment to dismiss their penalty by attending a two-hour class session held at the local community center. The session was followed by a short quiz and a survey for feedback and additional questions. The class curriculum consisted of an overview of the City water system, statewide and local drought conditions, Santa Cruz Municipal Utility (SCMU) services, water use regulations and restrictions, and water conservation strategies to practice at home and outside. The purpose of water school was to educate customers about the water shortage and local impacts, show customers support, empower customers to conserve and think critically about their own usage, and prevent customers from exceeding their allotment in the future. The City's Water School curriculum was used as a model in the CUWCC's Water Shortage Toolkit for other water agencies starting their own water schools. In 2014, the city held 27 classes for 702 customers, which collectively waived $462,050 in penalties. In 2015, there were 14 classes for 461 customers, which dismissed $266,760.

The City of Santa Cruz also offered a separate Water School for large landscape account that exceeded their water budget created from landscape water budget software, Waterfluence. The landscape water school shared some elements with the residential water school curriculum and included tips on how to use Waterfluence effectively and communicate with different staff or stakeholders. In 2014, 28 irrigation customers attended and dismissed $40,375. In 2015, a pre-rationing water efficient workshop was offered to prepare irrigation accounts for rationing where 19 customers attended. The 2015 landscape water school consisted of 20 customers and dismissed $34,850 in excessive use penalties.

#### 9.2.4.2 Water Supply Advisory Committee

In 2015, City Council created the Water Supply Advisory Committee to engage the community in an examination of water supply issues. The Committee consisted of 14 members of the community who represented various interests including the environment, business, education, and the Water Commission. The Water Supply Advisory Committee offered meetings, forums, and other opportunities for the public to learn, engage, and share their opinions about the future of Santa Cruz's water supply. In addition, the City invited the public to attend a series of Enrichment Session installments with different topics including climate change, groundwater, water reuse and more. The goal for these forums and workshops was to bring transparency and collaboration to the community regarding decision-making of water supply alternatives for the City of Santa Cruz.

### 9.2.5 Programs to Assess and Manage Distribution System Losses

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

Water audit results indicate average system water loss from 1997 to 2014 is approximately 7.5 percent of total treated water production or 266 mgy. Of this amount, it is estimated that 5 to 6 percent (198 mgy) is lost due to physical leakage in the distribution system, also referred to as "real" losses, including leaking service lines, valves, fittings, and water mains. It is estimated that another 1 to 2 percent (68 mgy) is not physically lost but goes unreported on the billing system primarily due to sales meter inaccuracies, billing and accounting errors, and other factors. This second category of losses, labeled "apparent" losses, has a negative impact on both utility revenue and on consumption data accuracy.

In 2015, the City contracted with Water Systems Optimization, Inc. (WSO) to examine the City's water system and operations practices, validate where losses are occurring, evaluate options, and set forth a formal strategy to improve water accountability and reduce lost water. WSO's proposed scope of work is organized into three tasks, involving the following elements:

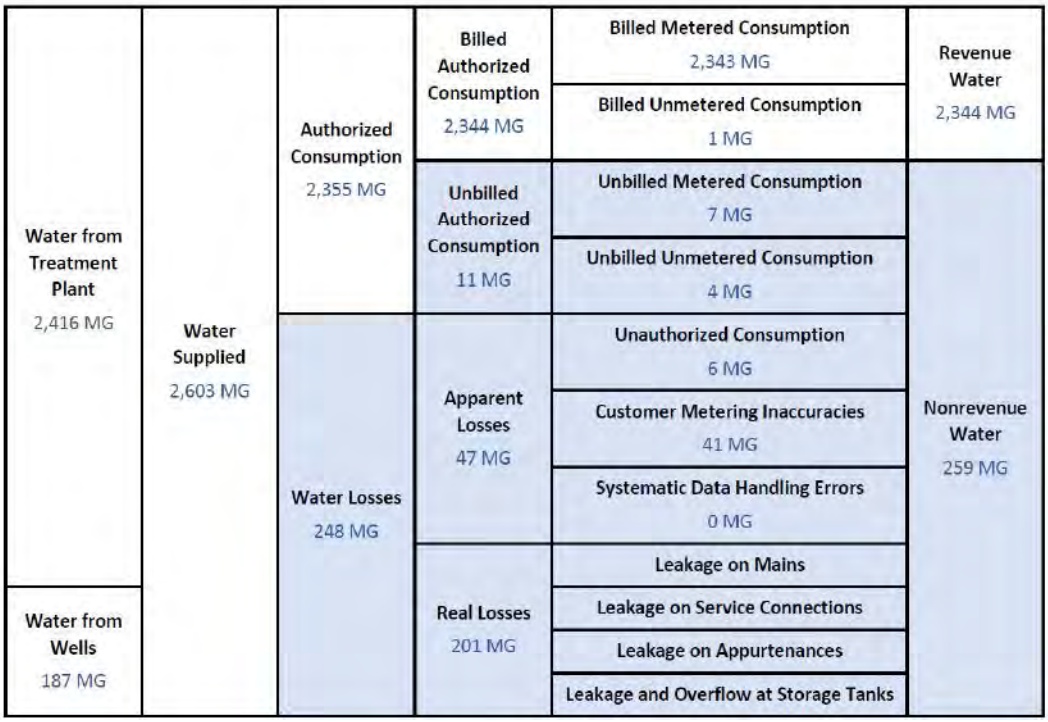
1. Water audit validation, to assess the accuracy of the system input meters and data transfer systems, and to perform a business process review of meter testing, reading, and billing activities;

2. Component analysis of real losses, to quantify the volume of different types of leaks and determine the economic level of leakage – the balance between the value of the water that is lost through leakage and the cost of finding and fixing leakage or reducing leakage through pressure management; and

3. Water loss control program design, to outline the most cost-effective strategies for reducing both real and apparent losses over time.

Results of the 2014 water audit that was validated as part of the project are summarized in Figure 9-1.

**Figure 9-1. 2014 Water Balance**




The recommendations produced from this year-long study will be used to guide development of a robust water loss control strategy and will serve as a foundation for completing and reporting future annual water audits to the state beginning in 2017 under the requirements of SB 555 of 2015.

Currently, the Water Department addresses physical leakage by expediting leak repairs on service connections and mains, and by performing service line and water main replacements on an ongoing basis. The Water Department budgets a total of about $1.25 million annually in its capital improvement program for water main replacement projects. Although a formal leak detection program is currently not in place, the Water Department uses sonic leak detection equipment to locate and repair leaks in the water system. In addition, the Department monitors for leaks on the customer's side of the meter by reviewing exception reports for high meter readings. Customers are notified so they can take appropriate action to repair leaks, even before they receive their water bills.

### 9.2.6 Water Conservation Program Coordination and Staffing Support

The Water Conservation section is responsible for promoting efficient water use and implementing management practices that reduce customer demand for water. This section consists of the Water Conservation Manager, one Water Conservation Analyst, and two Water Conservation Representatives. The Water Conservation Manager is responsible for planning, organizing, and directing the operations of the Water Conservation section and for reporting on BMP implementation. The Water Conservation Manager meets regularly with the Water Director and senior managers to coordinate conservation activities with the administration, engineering, production, distribution, and customer service sections. The Water Conservation Analyst and Water Conservation Representatives are responsible for operating existing programs and assisting with new program development.

#### 9.2.6.1 Water Conservation Program Responsibilities and Activities

The responsibilities and major activities fall into the following four general categories:

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

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

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

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

Between 2012 and 2015, drought management became the section's primary function, which dramatically accelerated public education and outreach activities as well as public interest and participation in long-term conservation programs.

#### 9.2.6.2 Program Funding

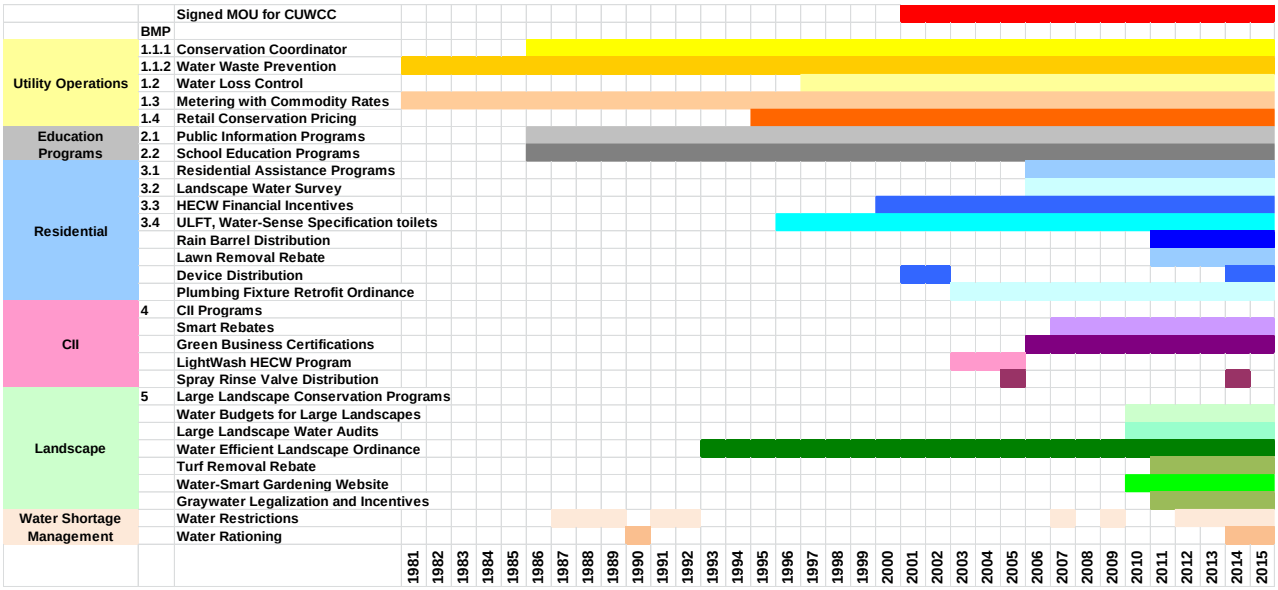
The City's water conservation program is funded by a combination of water rates, system development charges, and miscellaneous service fees. With regard to water conservation, revenues from system development charges are used primarily for various rebate programs, including residential and commercial toilets, urinals, clothes washers, Smart Rebates, and more recently, lawn removal rebates, which account for the majority of long-term water savings generated each year. The total amount resources budgeted for the Water Conservation Section in FY 2017 is $1.1 million.

### 9.2.7 Other Demand Management Practices

As a member of the California Urban Water Conservation Council, the City of Santa Cruz is implementing all the CUWCC's Best Management Practices. These demand management measures apply to all customer types including residential, business, and landscape accounts. Figure 9-2 below provides a summary and timeline of past and current water conservation activities, organized in accordance with the MOU.

The nature and extent of these measures are described below.

**Figure 9-2. Timeline of Past and Current Water Conservation Activities**




### 9.2.7.1 Demand Management Measures for Residential Customers

Residential water use constitutes almost two thirds of system consumption and therefore is a main focal point of the City's water conservation efforts. The residential water conservation programs consist of the following: 1) Home Water Survey Program, 2) High Efficiency Clothes Washer Rebate Program, 3) Toilet Rebate Program, 4) Laundry to Landscape Rebate Programs, 5) Rain Barrel Program and 6) Plumbing Fixture Retrofit Ordinance.

The Home Water Survey program is a free service offered to single and multi- family residences and consists of reviewing billing and consumption information, showing how to read a meter and detect leaks, inspecting home plumbing fixtures and offering free showerheads, faucet aerators, and rebate forms. The survey also assesses outdoor water use and needs by checking the irrigation system and timer, and evaluating the landscape area, design, and plants. Although home water surveys are not in high demand – only 124 were performed in the last five years - they play an important role in providing education and customer service.

The High Efficiency Clothes Washer Rebate program offers $100 for the purchase and installation of an Energy Star clothes washer to single and multi-family (non-communal laundry) residences. The City will soon be modifying the rebate program to offer an additional $100 for Energy Star Most Efficient models. The Energy Star Most Efficient

models have the lowest water factor and energy factor of all clothes washers. In addition, only these models qualify for a rebate through PG&E. By increasing the rebate amount for these specific models, the City is hoping to encourage customers to use clothes washers that have the lowest water factors. Between 2011 and 2015, the City approved rebates for about 3,000 water efficient clothes washers saving an estimated 25 million gallons per year.

The City has operated a rebate program to promote the installation of ultra-low-flush or high efficiency toilets in residential accounts since 1995. The program originally featured a $75 rebate as a financial incentive for customers to remove their higher-volume toilets and replace them with 1.6 gallon ultra-low-flush toilets. This $75 rebate was discontinued in 2010. The City's current toilet rebate program offers $150 rebate for toilets meeting Water Sense criteria of 1.28 gallon per flush maximum. Eligibility requirements depend on the flush volume of the toilet that customer is replacing. Older, higher usage toilets of 3.5+ gallons per flush are eligible with the replacement of a high efficiency toilet of 1.28 gpf or lower. Customers who have toilets less than 3.5 gallons per flush must install ultra-high efficiency toilets of 1.0 gallons per flush or less to be eligible. In the last five years, 2,257 water efficient toilets were installed under the program saving approximately 14.7 million gallons of water annually.

The City also offers a Laundry to Landscape rebate of $150 to customers who install a laundry to landscape greywater system and attend a workshop offered by Central Coast Grey Water Alliance. The requirement to attend a workshop is intended to ensure systems are installed in accordance with guidelines listed in the CA plumbing code. The program has attracted only very sporadic participation though.

The Rain Barrel Program currently offers a 50-gallon rain barrel catchment system at a subsidized rate of $50 per barrel. Customers are able to order online during the rainy season from Rainwater Solutions to reserve rain barrels for the upcoming distribution event. Several distribution events are held during the rain barrel sale for customers to pick up their orders at the City's corporation yard. At the beginning of the program in 2010, rain barrels were delivered to customers' homes, but this has since changed due to increased customer interest. A total of more than 4,000 rain barrels have been sold since then saving about 0.8 mgy.

In 2003, the City adopted a plumbing fixture retrofit ordinance, codified as Santa Cruz Municipal Code Chapter 16.03. This regulation requires that all residential, commercial, and industrial properties be retrofitted with low consumption showerheads, toilets, and urinals when real estate is sold. As part of the initial program implementation, the City worked closely with the County of Santa Cruz and the City of Capitola to have similar

ordinances passed in these other jurisdictions. Under the law, the seller of the property is responsible for retrofitting any older toilets, urinals, and showerheads on the property with low consumption fixtures, and for obtaining a water conservation certificate from the Water Department. There is an option in the ordinance that allows the responsibility for retrofitting to be transferred from the seller to the buyer, if both parties agree. In either case, the City tracks real estate sales and requires every property to be inspected to verify that the plumbing fixtures on the property being sold meet the low consumption standards, with the exception of already existing 1.6 gallon per flush toilets. A custom database program was developed by a consultant to manage property sales data on local properties and retrofitting records, as well as follow-up enforcement of the ordinance. In the last five years, 2,359 properties have been certified under the program, saving about 12.5 million gallons per year.

#### 9.2.7.2 Demand Management Measures for Commercial Customers

The City provides water to about 1,900 commercial and industrial accounts within the service area, which together represents about 26 percent of total system water use. The City offers several programs to encourage commercial customers to become more water efficient by using water-saving technology. These include: 1) Smart Business Rebate Program and 2) The Monterey Bay Green Business Program.

The Smart Business Rebate Program was offered as a result of the conclusion of the statewide Smart Rebate program in 2013. The City's Smart Business Rebate Program mirrors the old statewide program by offering businesses rebates for installing water efficient fixtures including:

- High Efficiency (1.28 gpf) or Ultra High Efficiency (1.0 gpf) toilets- $200
- High Efficiency Urinals (0.125 gpf)- $300
- High Efficiency Clothes Washer- $400

The eligibility requirements for these rebates are the same for the other programs. Clothes washers must be Energy Star certified and inspected if five or more are installed. Toilet rebate eligibility depends on what is currently being replaced, like the residential program. In the last five years, 46 businesses have taken advantage of the program, saving an estimated 10.2 million gallons per year.

The Monterey Bay Area Green Business program is a partnership of environmental agencies, utilities, and nonprofit organizations that assist, recognize and promote businesses that volunteer to operate sustainably. To be certified "green," participants

must be in compliance with all regulations and program standards for conserving water and energy, preventing pollution, and minimizing waste. The City became a participant in the program in 2006, which is coordinated through the Public Works Department.

Businesses must meet a set of indoor and outdoor water conservation standards as part of achieving their Green Business Certification. All businesses are required to meet basic, mandatory measures and a minimum number of elective requirements from several categories. Customers are also required to meet additional measures specific to their type of business (e.g. low flow spray rinse valves for restaurants). In order to certify a business, a water conservation representative meets with the applicants and inspects the site, checks for leaks and interviews the applicants.

The City has also distributed water conservation materials to all local hotels, and drinking water upon request table tents to all local restaurants, and continues to make them available upon request.

#### 9.2.7.3 Demand Management Measures for Landscapes

The City of Santa Cruz also offers rebates and programs for outdoor water use and landscapes which include: 1) Lawn Removal Rebate Program, 2) Large Landscape Water Budgets, and 3) Water Efficient Landscape Ordinance.

The Lawn Removal Rebate Program currently offers $.50 per square foot of lawn removed for single family, multi-family, and commercial customers. Single family residences are eligible to receive up to $500 (1,000 square feet) and multi-family or commercial are eligible for up to $2,500 (5,000 square feet). The general requirements are the following:

- Lawn that is maintained or previously maintained prior to drought,
- Lawn must be watered by an in-ground irrigation system,
- Removal or capping of the overhead spray system in the area to be converted,
- Replacement of lawn with very low or low water use plants and mulch (with or without low volume drip irrigation) or install no water use permeable hardscape options,
- Agreement to pre- and post- inspections to take measurements and ensure eligibility requirements have been met,
- Completion of landscape conversion within a year, and
- One rebate per customer per year.

The City plans on increasing the rebate to $1.00 per square foot removed with the same limitations of rebating up to 1,000 square feet for single family residences and 5,000 square feet for multi-family and commercial. The City hopes to encourage more lawn conversions by offering a higher rebate. Over the last five years, this program has resulted in a total of over 395,000 square feet (9.0 acres) of turf to be removed, saving an estimated 7.5 million gallons of water per year.

In July, 2010, the City launched a new program for customers with large landscapes and dedicated irrigation accounts. After converting all dedicated irrigation accounts to monthly meter reading, the City contracted with a consultant, Waterfluence LLC, to map landscape areas using aerial imagery, to develop irrigation budgets for the City's 110 largest irrigation customers, and to distribute the information through monthly Landscape Water Use Reports. Since then the program has expanded its participation to 230 sites representing 426 acres or 18.5 million square feet of irrigated area and over 250 million gallons per year of water. For each site, Waterfluence provides a site-specific irrigation budget based on landscape size and plantings, type of irrigation, and real-time local weather conditions that is obtained from the CIMIS station located at the DeLaveaga golf course. Customers receive monthly reports via mail or email comparing their actual consumption to the irrigation budget over a 1-3 year long period. A 2013 program assessment showed annual savings equal to about 15 million gallons per year. With these accounts being rationed the last two years, however, water use at large landscape sites was temporarily reduced by more than 130 million gallons in 2015. Further evaluation is needed in the future to better quantify long-term program impact.

In addition to receiving monthly reports, participants in the program are also eligible for a professional irrigation audit performed by Waterfluence. The audits include an assessment of irrigation efficiency, notation of irrigation issues (scheduling, tilted nozzles, leaks, breaks, pressure, overspray etc.), and a confirmation of the landscape area measurements. Customers receive a detailed report with site photos noting irrigation problems, a sprinkler condition analysis, cost-effective recommendations, scheduling suggestions, and a list of water management essentials.

The City is currently enrolling more participants into the program in order to continue adding customers that have recent history of high usage or water waste of over 100 CCF per year. Large landscape and irrigation account customers that used between 10-100 CCF per year are being mapped for potential enrollment in the future. Irrigation customers that used under 10 CCF were simply noted. The City is measuring all landscape irrigation accounts using over 10 CCF in anticipation of changing over to a simple water budget-based rate structure.

The City's Water Efficient Landscape Ordinance was first adopted to establish landscape water conservation regulations for major development projects situated in the City's service area in 1993 (Santa Cruz Municipal Code Chapter 16.16). Since then it has been rewritten and revised in 2001 and 2010. It is in the process of being updated again in response to 2015 emergency conservation regulations. The overall purpose of the ordinance is to ensure that the City's limited water supply is used efficiently and effectively in new landscapes within the City's water service area and to avoid certain landscape and irrigation design aspects that have the potential to result in water waste.

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

- Dedicated irrigation meters for new landscapes or expansion of existing landscapes over 5,000 square feet in area;
- Landscape water budget based on 55 % (residential) and 45% (non-residential) of reference evapotranspiration;
- Turf is limited to 25% on residential projects (turf not permitted for non-residential);
- Requiring very low to moderate water using plant materials, grouping plants with similar water needs;
- Irrigation design to avoid conditions that lead to runoff and overspray;
- Appropriate irrigation equipment, including requiring weather-based irrigation controllers and flow sensors to maximize water efficiency and detect leaks;
- Soil preparation and mulching;
- Storm water management; and
- Alternative water sources.

A complete landscape plan must be submitted and found to satisfy the standards before a building permit can be issued. Water Conservation staff reviews the landscape plans for compliance with the ordinance, coordinates plan review with Water Engineering and other City Departments and jurisdictions, and once installed, performs final inspections of the completed landscape.

## 9.3 Implementation over the Past Five Years

All of the water conservation programs described above in Section 9. 2 and illustrated in Figure 9-1 have been actively implemented over the past 5 years. Since 2011, however, most activity has been devoted to addressing four consecutive years of water shortage. In particular, emergency water shortages in both 2014 and 2015 saw a dramatic increase in the level of public information and outreach, water waste enforcement, conservation program and staffing support, short-term changes in pricing, and huge increases in participation in the City's turf removal, rain barrel, and conservation device distribution programs, as well as a repurposing of the landscape water budget program from an informational aid to a water rationing tool. A second round of a pre-rinse spray nozzle replacement program was completed in 2014, and the new water loss control study was begun. On top of all that, the City continued working on its long-term Water Conservation Master Plan, which is described further below.

## 9.4 Planned Implementation to Achieve Water Use Targets

In 2013, the City contracted with Maddaus Water Management, Inc. (MWM) to develop an updated Water Conservation Master Plan. The goal of the updated plan is to define the next generation of water conservation activities and serve as a roadmap to help the community achieve maximum, practical water use efficiency. Strengthening water conservation efforts has been identified as a top priority by the City Council, the City's Water Commission, and more recently by the City's Water Supply Advisory Committee in its effort aimed at delivering a safe, adequate, affordable, and environmentally sustainable water supply.

The process used to develop the plan included analyzing conservation measures and programs using the consultant's Least Cost Planning Water Demand Management Decision Support System Model (DSS Model). Work was divided into two phases separated by a year of in-depth review of the work by the City's Water Supply Advisory Committee. The Recommended Plan, which covers the same 2035 planning horizon as this Urban Water Management Plan, matches the recommended measures list published in the Final Report on Agreements and Recommendations (Appendix K). The WSAC's involvement helped shape the plan in two important ways: 1) it shifted conservation program emphasis to the peak season period (April – October) to better address the City's supply-demand gap, and 2) it produced recommendations leading to several additional conservation measures.

The plan includes a total of 35 measures for implementation between now and 2021 (Figure 9-3). Many are already underway. The City Council accepted the plan in concept as a Technical Memorandum in April 2016 (Appendix S), and the final report is almost complete. The goal is to include and adopt the Water Conservation Master Plan in its entirety as an element of this 2015 Urban Water Management Plan.

**Figure 9-3. Recommended Program Implementation Schedule**

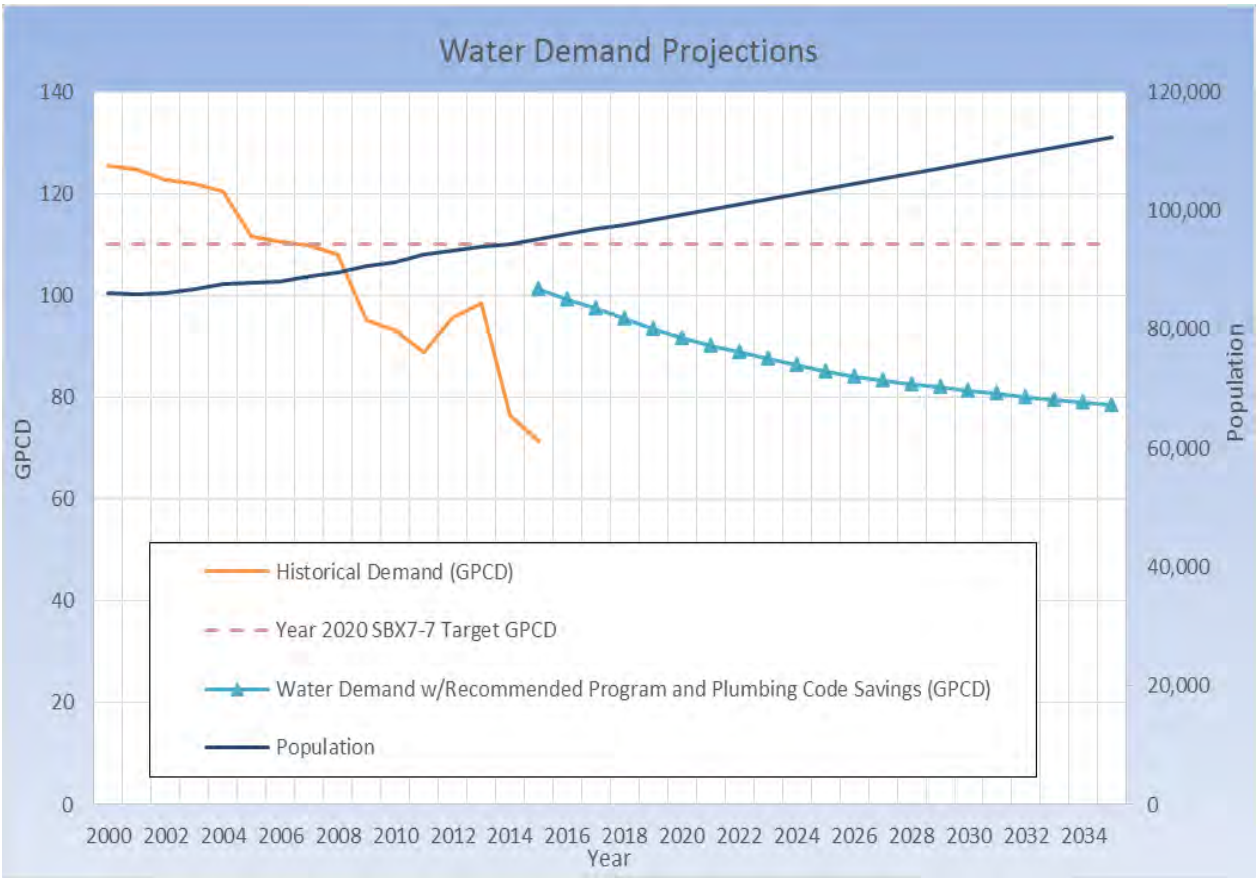
| No. | Measure | Time Period | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 | 2035 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | System Water Loss Reduction | 2015 - 2035 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 2 | Advanced Metering Infrastructure | 2021 - 2035 | | | | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 3 | Large Landscape Budget-Based Water Rates | 2018 - 2020 | | | | ■ | ■ | ■ | | | | | | | | | | | | | | | |
| 4 | General Public Information | 2015 - 2035 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 5 | Public Information (Home Water Use Report) | 2018 - 2035 | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 6 | Residential Leak Assistance | 2018 - 2035 | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 7 | Single Family Residential Surveys | 2015 - 2035 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 8 | Plumbing Fixture Giveaway/Opt | 2015 - 2017 | ■ | ■ | ■ | | | | | | | | | | | | | | | | | | |
| 9 | Residential Ultra High Efficiency Toilet Rebates | 2015 - 2020 | ■ | ■ | ■ | ■ | ■ | ■ | | | | | | | | | | | | | | | |
| 10 | High Efficiency Clothes Washer Rebates | 2015 - 2026 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | | | | | | | | |
| 11 | High Efficiency Clothes Washer - New Development | 2021 - 2035 | | | | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 12 | Hot Water On Demand - New Development | 2021 - 2035 | | | | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 13 | Toilet Retrofit at Time of Sale | 2015 - 2019 | ■ | ■ | ■ | ■ | ■ | | | | | | | | | | | | | | | | |
| 14 | CII MF Common Laundry Room High Efficiency Clothes Washer | 2015 - 2024 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | | | | | | | | | | |
| 15 | CII Incentives | 2021 - 2026 | | | | | | | ■ | ■ | ■ | ■ | ■ | ■ | | | | | | | | | |
| 16 | Pre-Rinse Spray Nozzle Installation | 2015 - 2016 | ■ | ■ | | | | | | | | | | | | | | | | | | | |
| 17 | CII Surveys | 2021 - 2026 | | | | | | | ■ | ■ | ■ | ■ | ■ | ■ | | | | | | | | | |
| 18 | High Efficiency Urinal Program | 2015 - 2018 | ■ | ■ | ■ | ■ | | | | | | | | | | | | | | | | | |
| 19 | Public Restroom Faucet Retrofit - MUN | 2021 - 2023 | | | | | | | ■ | ■ | ■ | | | | | | | | | | | | |
| 20 | Public Restroom Faucet Retrofit - COM | 2021 - 2030 | | | | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | | | | |
| 21 | School Retrofit | 2021 - 2030 | | | | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | | | | |
| 22 | Water Efficient Landscape Ordinance | 2015 - 2035 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 23 | Single Family Residential Turf Removal | 2015 - 2035 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 24 | Multifamily Residential/CII Turf Removal | 2015 - 2035 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 25 | Expand Large Landscape Survey/Water Budgets | 2018 - 2035 | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 26 | Sprinkler Nozzle Rebates | 2018 - 2035 | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 27 | Gray Water Retrofit | 2015 - 2035 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 28 | Residential Rain Barrels | 2015 - 2035 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 29 | Climate Appropriate Landscaping and Rainwater Infiltration | 2015 - 2035 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 30SF | SF Conservation Pricing - Water and Sewer | 2018 - 2035 | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 30MF | MF Conservation Pricing - Water and Sewer | 2018 - 2035 | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 30COM | COM Conservation Pricing - Water and Sewer | 2018 - 2035 | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 31 | Single Family Multifamily Dishwasher Rebates | 2018 - 2022 | | | | ■ | ■ | ■ | ■ | ■ | | | | | | | | | | | | | |
| 32 | Hot Water Recirculation Systems | 2018 - 2022 | | | | ■ | ■ | ■ | ■ | ■ | | | | | | | | | | | | | |
| 33 | Rewarding Businesses For Adopting Best Practices | 2020 - 2035 | | | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 34 | Additional Building Code Requirements for New Development | 2018 - 2035 | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 35 | Innovation Incubator Program | 2021 - 2035 | | | | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |

Table 9-5 presents the projected water savings in 5-year increments, broken down into two components: the passive plumbing codes savings referenced in Chapter 4, and active water savings associated with the Recommended Program, expressed in millions of gallons per year.

| Table 9-5. Long-Term Conservation Program Savings (mgy) | | | | |
|---|---|---|---|---|
| Conservation Program | 2020 | 2025 | 2030 | 2035 |
| Plumbing Code | 96 | 179 | 269 | 329 |
| Recommended Program | 137 | 232 | 269 | 291 |
| Recommended Program with Plumbing Code Savings | 233 | 411 | 538 | 620 |
| NOTES: Maddaus Water Management, Inc., 2016 | | | | |

Figure 9-4 shows the projected per capita water use in gallons per person per day (GPCD) in 5-year increments for the projected demand with the recommended program implementation and plumbing code savings. The model indicates that the City's GPCD in 2020 will decline to about 92 gallons per person per day, far below the City's 2020 target of 110 GPCD under SB X7-7, and continuing to decline to a level of about 78 GPCD by 2035.

**Figure 9-4. Water Conservation Program Savings, GPCD**



## 9.5 Members of the California Urban Water Conservation Council

CUWCC members have the option of submitting their 2013–2014 Best Management Practice (BMP) annual reports in lieu of, or in addition to, describing the DMMs in their UWMP. The City is including its 2013 and 2014 BMP reports for additional informational purposes in Appendix T. In 2013 and 2014, the City was considered to be "On Track" by the California Urban Water Conservation Council in all areas with the following exceptions:

BMP 1.2 Water Loss Control:

- Completed training in component analysis process? No (Since completed in 2016)
- Component Analysis? No (Since completed in 2016)

BMP 1.4 Retail Conservation Pricing:

- Conservation pricing for sewer service: For water agencies that provide retail sewer service, rates that charge customers a fixed amount per billing cycle for sewer service regardless of the units of service consumed do not satisfy the CUWCC's definition of conservation pricing of sewer service. This applies to City's single family and multifamily sewer charges, which are charged a flat monthly rate for sewer service[1].

The Water Department has raised this matter previously and will continue to discuss sewer rates and conservation pricing as a matter of policy within the City organization.

[1]Low water users who meet an average winter use criteria of 2.25 CCF/month or less qualify for a reduced sewer rate.

# Chapter 10

# PLAN ADOPTION, SUBMITTAL, AND IMPLEMENTATION

The City of Santa Cruz began the process of developing the 2015 Urban Water Management Plan after participating in a webinar and workshop sponsored by DWR in late 2015. While Chapter 2 describes the process of preparing the plan, this chapter summarizes the process of plan adoption, submittal, and implementation including the steps for amendment if it becomes necessary.

## 10.1 Inclusion of all 2015 Data

As mentioned in Section 2.3, the City is reporting on a calendar year basis. The plan was prepared in 2016 and accordingly includes water use and planning data for the entire calendar year of 2015, except where noted.

## 10.2 Notice of Public Hearing

Water suppliers must hold a public hearing before adopting an Urban Water Management Plan. The public hearing provides an opportunity for the public to provide input before it is adopted by City Council.

Prior to the public hearing, the draft plan was made available for public inspection, review, and comment on the City's web site, at the Water Department office, and at the City's Central Library beginning in late July 2016.

In addition, the City Water Commission reviewed the draft plan and provided comments at its August 1, 2016 meeting. Water Commission meetings serve to encourage active involvement and participation of diverse groups and individuals, in accordance with section 10642 of the Act. In the process of reviewing the plan, the Water Commission recommended several changes and additions for the final plan, including the following:

- Updating Table 6-10 regarding volume of water transferred to Soquel Creek, and include recent interagency agreement,
- Updating language about water rights (flexibility, place of use) needed to support regional solutions,
- Correcting statement of storage amount needed to overcome supply/demand gap,
- Better characterizing the distinctions between inside and outside customers, and
- Miscellaneous editorial clarifications and corrections

The Water Commission's full written comments, and all other written comments received from the public are included as Appendix W.

The draft plan was also circulated in July 2016, along with notice of the time and place of the public hearing, to the County of Santa Cruz and the City of Capitola as required by law. Notification letters included the location where the 2015 UWMP could be viewed, the hearing schedule, and contact information of the preparer for the City. Copies of these letters are provided in Appendix U.

Table 10-1 below lists all the cities and counties that receive water service from the City of Santa Cruz and that were sent a notice of the public hearing. As mentioned in Section 2.4, these jurisdictions were previously sent written notice regarding the plan review and update process well in advance of 60 days before the public hearing (Appendix D), in accordance with the Section 10621(b) of the Act.

**Table 10-1 Retail: Notification to Cities and Counties**

| City Name | 60 Day Notice | Notice of Public Hearing |
|---|---|---|
| City of Capitola | ☑ | ☑ |
| City of Santa Cruz | ☑ | ☑ |
| **County Name** | **60 Day Notice** | **Notice of Public Hearing** |
| Santa Cruz County | ☑ | ☑ |

In addition to these jurisdictions, the City provided the notice of the public hearing to the Association of Monterey Bay Area Governments, local elected officials, the Santa Cruz Local Agency Formation Commission, and to all major public water utilities in Santa Cruz County, including the following:

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

The public hearing was noticed to the public in the local newspaper as prescribed in Government Code 6066. The notice included the time and place of the hearing, as well as the various locations where the plan was made available for public review. A copy of the notice of the public hearing published in the newspaper is provided as Appendix V.

## 10.3 Public Hearing and Adoption

The City Council held the public hearing on the plan in accordance with CWC section 10642 on August 9, 2016. At the public hearing, City Council directed that the final plan be brought back for adoption at its August 23, 2016 meeting. Copies of all written comments received during the public review process and at the public hearing are included in Appendix W. The official minutes of the public hearing are included with the Notice of Public Hearing in Appendix V.

City Council adopted the plan, as modified by input from the Water Commission, on August 23 2016. The official resolution adopting the plan is provided as Appendix X.

In accordance with the City Council resolution adopting the plan, the Water Supply Advisory Committee's Final Report on Agreements and Recommendations, the Water Shortage Contingency Plan, and the City's final Water Conservation Master Plan are adopted by reference in their entirety as elements of the City's 2015 Urban Water Management Plan.

## 10.4 Plan Submittal

The final plan was then submitted electronically to DWR and the California State Library within 30 days of its adoption, and transmitted to all jurisdictions receiving water service from the City of Santa Cruz within 60 days of its submission to DWR, in accordance with CWC sections 10644(a) and 10635(b). Additionally, the final data tables were submitted using the WUE data tool available online through the DWR Urban Water Management webpage.

## 10.5 Public Availability

The final, adopted plan was also made available to the public in accordance with section 10645 of the Act by posting it on the City's web site.

## 10.6 Amending an Adopted UWMP

If the City of Santa Cruz chooses or needs to amend the adopted 2015 plan, proper notification including copies of the amendments will be provided in accordance with sections 10644(a) and 10621 in a manner set forth for the notification, public hearing, adoption and submittal.

# References


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27 M.Cubed, 2015. Santa Cruz Water Department's 2015 Econometric Analysis of Demand and Forecast.

28 American Water Works Association (AWWA), 2011. M60: Drought Preparedness and Response, First Edition.

# List of Appendices


A Urban Water Management Planning Act (Water Code 10610-10656)

B Water Conservation Act of 2009 (SBx 7-7, Water Code 10608)

C Changes to the Water Code Since 2010

D Notice to City of Capitola, County of Santa Cruz

E City General Plan 2030 Policies Regarding Water Service

F City of Santa Cruz Water Demand Forecast

G Effect of Temperature on City of Santa Cruz Water Demands

H Water Conservation Baseline and Targets Development Process

I Joint Powers Agreement – Mid-County Groundwater Agency

J Recycled Water Facilities Planning Study - Scope of Work

K Water Supply Advisory Committee – Final Report on Agreements and Recommendations

L City of Santa Cruz Water Shortage Contingency Plan

M Santa Cruz Municipal Code Chapter 16.01 – Water Shortage regulations and Restrictions

N City Council Resolution – Drought Cost Recovery Fee

O Santa Cruz Municipal Code Chapter 16.02 – Water Conservation

P 2014 Notice of Proposed Water Rate Changes

Q City of Santa Cruz Water Department – Long Range Financial Plan

R 2016 Notice of Proposed Water Rate Changes

S Water Conservation Master Plan Final Technical Memorandum

T Santa Cruz BMP Coverage Report, 2013 and 2014

U Notice of Public Hearing to County of Santa Cruz and City of Capitola

V Notice of Public Hearing and Meeting Minutes

W Written Comments Received From Public

X City Council Resolution Adopting 2015 Urban Water Management Plan

Y Cooperative Water Transfer Pilot Project for Groundwater Recharge and Water Resource Management

**California Water Code Division 6, Part 2.6.**

**Chapter 1. General Declaration and Policy** §10610-10610.4
**Chapter 2. Definitions** §10611-10617
**Chapter 3. Urban Water Management Plans**
Article 1. General Provisions §10620-10621
Article 2. Contents of Plans §10630-10634
Article 2.5. Water Service Reliability §10635
Article 3. Adoption And Implementation of Plans §10640-10645
**Chapter 4. Miscellaneous Provisions** §10650-10656

# Chapter 1. General Declaration and Policy

SECTION 10610-10610.4

10610. This part shall be known and may be cited as the "Urban Water Management Planning Act."

10610.2. (a) The Legislature finds and declares all of the following:

(1) The waters of the state are a limited and renewable resource subject to ever-increasing demands.

(2) The conservation and efficient use of urban water supplies are of statewide concern; however, the planning for that use and the implementation of those plans can best be accomplished at the local level.

(3) A long-term, reliable supply of water is essential to protect the productivity of California's businesses and economic climate.

(4) As part of its long-range planning activities, every urban water supplier should make every effort to ensure the appropriate level of reliability in its water service sufficient to meet the needs of its various categories of customers during normal, dry, and multiple dry water years.

(5) Public health issues have been raised over a number of contaminants that have been identified in certain local and imported water supplies.

(6) Implementing effective water management strategies, including groundwater storage projects and recycled water projects, may require specific water quality and salinity targets for meeting groundwater basins water quality objectives and promoting beneficial use of recycled water.

(7) Water quality regulations are becoming an increasingly important factor in water agencies' selection of raw water sources, treatment alternatives, and modifications to existing treatment facilities.

(8) Changes in drinking water quality standards may also impact the usefulness of water supplies and may ultimately impact supply reliability.

(9) The quality of source supplies can have a significant impact on water management strategies and supply reliability.

(b) This part is intended to provide assistance to water agencies in carrying out their long-term resource planning responsibilities to ensure adequate water supplies to meet existing and future demands for water.

10610.4. The Legislature finds and declares that it is the policy of the state as follows:

(a) The management of urban water demands and efficient use of water shall be actively pursued to protect both the people of the state and their water resources.

(b) The management of urban water demands and efficient use of urban water supplies shall be a guiding criterion in public decisions.

(c) Urban water suppliers shall be required to develop water management plans to actively pursue the efficient use of available supplies.

## Chapter 2. Definitions

SECTION 10611-10617

10611. Unless the context otherwise requires, the definitions of this chapter govern the construction of this part.

10611.5. “Demand management" means those water conservation measures, programs, and incentives that prevent the waste of water and promote the reasonable and efficient use and reuse of available supplies.

10612. "Customer" means a purchaser of water from a water supplier who uses the water for municipal purposes, including residential, commercial, governmental, and industrial uses.

10613. "Efficient use" means those management measures that result in the most effective use of water so as to prevent its waste or unreasonable use or unreasonable method of use.

10614. "Person" means any individual, firm, association, organization, partnership, business, trust, corporation, company, public agency, or any agency of such an entity.

10615. "Plan" means an urban water management plan prepared pursuant to this part. A plan shall describe and evaluate sources of supply, reasonable and practical efficient uses,

reclamation and demand management activities. The components of the plan may vary according to an individual community or area's characteristics and its capabilities to efficiently use and conserve water. The plan shall address measures for residential, commercial, governmental, and industrial water demand management as set forth in Article 2 (commencing with Section 10630) of Chapter 3. In addition, a strategy and time schedule for implementation shall be included in the plan.

10616. "Public agency" means any board, commission, county, city and county, city, regional agency, district, or other public entity.

10616.5. "Recycled water" means the reclamation and reuse of wastewater for beneficial use.

10617. "Urban water supplier" means a supplier, either publicly or privately owned, providing water for municipal purposes either directly or indirectly to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually. An urban water supplier includes a supplier or contractor for water, regardless of the basis of right, which distributes or sells for ultimate resale to customers. This part applies only to water supplied from public water systems subject to Chapter 4 (commencing with Section 116275) of Part 12 of Division 104 of the Health and Safety Code.

## Chapter 3. Urban Water Management Plans

**Article 1. General Provisions**

SECTION 10620-10621

10620. (a) Every urban water supplier shall prepare and adopt an urban water management plan in the manner set forth in Article 3 (commencing with Section 10640).

(b) Every person that becomes an urban water supplier shall adopt an urban water management plan within one year after it has become an urban water supplier.

(c) An urban water supplier indirectly providing water shall not include planning elements in its water management plan as provided in Article 2 (commencing with Section 10630) that would be applicable to urban water suppliers or public agencies directly providing water, or to their customers, without the consent of those suppliers or public agencies.

(d) (1) An urban water supplier may satisfy the requirements of this part by participation in areawide, regional, watershed, or basinwide urban water management planning where those plans will reduce preparation costs and contribute to the achievement of conservation and efficient water use.

(2) Each urban water supplier shall coordinate the preparation of its plan with other appropriate agencies in the area, including other water suppliers that

share a common source, water management agencies, and relevant public agencies, to the extent practicable.

(e) The urban water supplier may prepare the plan with its own staff, by contract, or in cooperation with other governmental agencies.

(f) An urban water supplier shall describe in the plan water management tools and options used by that entity that will maximize resources and minimize the need to import water from other regions.

10621. (a) Each urban water supplier shall update its plan at least once every five years on or before December 31, in years ending in five and zero, except as provided in subdivision (d).

(b) Every urban water supplier required to prepare a plan pursuant to this part shall, at least 60 days before the public hearing on the plan required by Section 10642, notify any city or county within which the supplier provides water supplies that the urban water supplier will be reviewing the plan and considering amendments or changes to the plan. The urban water supplier may consult with, and obtain comments from, any city or county that receives notice pursuant to this subdivision.

(c) The amendments to, or changes in, the plan shall be adopted and filed in the manner set forth in Article 3 (commencing with Section 10640).

(d) Each urban water supplier shall update and submit its 2015 plan to the department by July 1, 2016.

**Article 2. Contents of Plan**

SECTION 10630-10634

10630. It is the intention of the Legislature, in enacting this part, to permit levels of water management planning commensurate with the numbers of customers served and the volume of water supplied.

10631. A plan shall be adopted in accordance with this chapter that shall do all of the following:

(a) Describe the service area of the supplier, including current and projected population, climate, and other demographic factors affecting the supplier's water management planning. The projected population estimates shall be based upon data from the state, regional, or local service agency population projections within the service area of the urban water supplier and shall be in five-year increments to 20 years or as far as data is available.

(b) Identify and quantify, to the extent practicable, the existing and planned sources of water available to the supplier over the same five-year increments described in subdivision (a). If groundwater is identified as an existing or planned source of

water available to the supplier, all of the following information shall be included in the plan:

(1) A copy of any groundwater management plan adopted by the urban water supplier, including plans adopted pursuant to Part 2.75 (commencing with Section 10750), or any other specific authorization for groundwater management.

(2) A description of any groundwater basin or basins from which the urban water supplier pumps groundwater. For basins that a court or the board has adjudicated the rights to pump groundwater, a copy of the order or decree adopted by the court or the board and a description of the amount of groundwater the urban water supplier has the legal right to pump under the order or decree. For basins that have not been adjudicated, information as to whether the department has identified the basin or basins as overdrafted or has projected that the basin will become overdrafted if present management conditions continue, in the most current official departmental bulletin that characterizes the condition of the groundwater basin, and a detailed description of the efforts being undertaken by the urban water supplier to eliminate the long-term overdraft condition.

(3) A detailed description and analysis of the location, amount, and sufficiency of groundwater pumped by the urban water supplier for the past five years. The description and analysis shall be based on information that is reasonably available, including, but not limited to, historic use records.

(4) A detailed description and analysis of the amount and location of groundwater that is projected to be pumped by the urban water supplier. The description and analysis shall be based on information that is reasonably available, including, but not limited to, historic use records.

(c) (1) Describe the reliability of the water supply and vulnerability to seasonal or climatic shortage, to the extent practicable, and provide data for each of the following:

(A) An average water year.

(B) A single-dry water year.

(C) Multiple-dry water years.

(2) For any water source that may not be available at a consistent level of use, given specific legal, environmental, water quality, or climatic factors, describe plans to supplement or replace that source with alternative sources or water demand management measures, to the extent practicable.

(d) Describe the opportunities for exchanges or transfers of water on a short-term or long-term basis.

(e) (1) Quantify, to the extent records are available, past and current water use, over the same five-year increments described in subdivision (a), and projected water use, identifying the uses among water use sectors, including, but not necessarily limited to, all of the following uses:

(A) Single-family residential.

(B) Multifamily.

(C) Commercial.

(D) Industrial.

(E) Institutional and governmental.

(F) Landscape.

(G) Sales to other agencies.

(H) Saline water intrusion barriers, groundwater recharge, or conjunctive use, or any combination thereof.

(I) Agricultural.

(J) Distribution system water loss.

(2) The water use projections shall be in the same five-year increments described in subdivision (a).

(3) (A) For the 2015 urban water management plan update, the distribution system water loss shall be quantified for the most recent 12-month period available. For all subsequent updates, the distribution system water loss shall be quantified for each of the five years preceding the plan update.

(B) The distribution system water loss quantification shall be reported in accordance with a worksheet approved or developed by the department through a public process. The water loss quantification worksheet shall be based on the water system balance methodology developed by the American Water Works Association.

(4) (A) If available and applicable to an urban water supplier, water use projections may display and account for the water savings estimated to result from adopted codes, standards, ordinances, or transportation and land use plans identified by the urban water supplier, as applicable to the service area.

(B) To the extent that an urban water supplier reports the information described in subparagraph (A), an urban water supplier shall do both of the following:

(i) Provide citations of the various codes, standards, ordinances, or transportation and land use plans utilized in making the projections.

(ii) Indicate the extent that the water use projections consider savings from codes, standards, ordinances, or transportation and land use plans. Water use projections that do not account for these water savings shall be noted of that fact.

(f) Provide a description of the supplier's water demand management measures. This description shall include all of the following:

(1) (A) For an urban retail water supplier, as defined in Section 10608.12, a narrative description that addresses the nature and extent of each water demand management measure implemented over the past five years. The narrative shall describe the water demand management measures that the supplier plans to implement to achieve its water use targets pursuant to Section 10608.20.

(B) The narrative pursuant to this paragraph shall include descriptions of the following water demand management measures:

(i) Water waste prevention ordinances.

(ii) Metering.

(iii) Conservation pricing.

(iv) Public education and outreach.

(v) Programs to assess and manage distribution system real loss.

(vi) Water conservation program coordination and staffing support.

(vii) Other demand management measures that have a significant impact on water use as measured in gallons per capita per day, including innovative measures, if implemented.

(2) For an urban wholesale water supplier, as defined in Section 10608.12, a narrative description of the items in clauses (ii), (iv), (vi), and (vii) of subparagraph (B) of paragraph (1), and a narrative description of its distribution system asset management and wholesale supplier assistance programs.

(g) Include a description of all water supply projects and water supply programs that may be undertaken by the urban water supplier to meet the total projected water

use, as established pursuant to subdivision (a) of Section 10635. The urban water supplier shall include a detailed description of expected future projects and programs that the urban water supplier may implement to increase the amount of the water supply available to the urban water supplier in average, single-dry, and multiple-dry water years. The description shall identify specific projects and include a description of the increase in water supply that is expected to be available from each project. The description shall include an estimate with regard to the implementation timeline for each project or program.

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

(i) For purposes of this part, urban water suppliers that are members of the California Urban Water Conservation Council shall be deemed in compliance with the requirements of subdivision (f) by complying with all the provisions of the "Memorandum of Understanding Regarding Urban Water Conservation in California," dated December 10, 2008, as it may be amended, and by submitting the annual reports required by Section 6.2 of that memorandum.

(j) An urban water supplier that relies upon a wholesale agency for a source of water shall provide the wholesale agency with water use projections from that agency for that source of water in five-year increments to 20 years or as far as data is available. The wholesale agency shall provide information to the urban water supplier for inclusion in the urban water supplier's plan that identifies and quantifies, to the extent practicable, the existing and planned sources of water as required by subdivision (b), available from the wholesale agency to the urban water supplier over the same five-year increments, and during various water-year types in accordance with subdivision (c). An urban water supplier may rely upon water supply information provided by the wholesale agency in fulfilling the plan informational requirements of subdivisions (b) and (c).

10631.1. (a) The water use projections required by Section 10631 shall include projected water use for single-family and multifamily residential housing needed for lower income households, as defined in Section 50079.5 of the Health and Safety Code, as identified in the housing element of any city, county, or city and county in the service area of the supplier.

(b) It is the intent of the Legislature that the identification of projected water use for single-family and multifamily residential housing for lower income households will assist a supplier in complying with the requirement under Section 65589.7 of the Government Code to grant a priority for the provision of service to housing units affordable to lower income households.

10631.2. (a) In addition to the requirements of Section 10631, an urban water management plan may, but is not required to, include any of the following information:

(1) An estimate of the amount of energy used to extract or divert water supplies.

(2) An estimate of the amount of energy used to convey water supplies to the water treatment plants or distribution systems.

(3) An estimate of the amount of energy used to treat water supplies.

(4) An estimate of the amount of energy used to distribute water supplies through its distribution systems.

(5) An estimate of the amount of energy used for treated water supplies in comparison to the amount used for nontreated water supplies.

(6) An estimate of the amount of energy used to place water into or withdraw from storage.

(7) Any other energy-related information the urban water supplier deems appropriate.

(b) The department shall include in its guidance for the preparation of urban water management plans a methodology for the voluntary calculation or estimation of the energy intensity of urban water systems. The department may consider studies and calculations conducted by the Public Utilities Commission in developing the methodology.

10631.5. (a) (1) Beginning January 1, 2009, the terms of, and eligibility for, a water management grant or loan made to an urban water supplier and awarded or administered by the department, state board, or California Bay-Delta Authority or its successor agency shall be conditioned on the implementation of the water demand management measures described in Section 10631, as determined by the department pursuant to subdivision (b).

(2) For the purposes of this section, water management grants and loans include funding for programs and projects for surface water or groundwater storage, recycling, desalination, water conservation, water supply reliability, and water supply augmentation. This section does not apply to water management projects funded by the federal American Recovery and Reinvestment Act of 2009 (Public Law 111-5).

(3) Notwithstanding paragraph (1), the department shall determine that an urban water supplier is eligible for a water management grant or loan even though the supplier is not implementing all of the water demand management measures described in Section 10631, if the urban water supplier has

submitted to the department for approval a schedule, financing plan, and budget, to be included in the grant or loan agreement, for implementation of the water demand management measures. The supplier may request grant or loan funds to implement the water demand management measures to the extent the request is consistent with the eligibility requirements applicable to the water management funds.

(4) (A) Notwithstanding paragraph (1), the department shall determine that an urban water supplier is eligible for a water management grant or loan even though the supplier is not implementing all of the water demand management measures described in Section 10631, if an urban water supplier submits to the department for approval documentation demonstrating that a water demand management measure is not locally cost effective. If the department determines that the documentation submitted by the urban water supplier fails to demonstrate that a water demand management measure is not locally cost effective, the department shall notify the urban water supplier and the agency administering the grant or loan program within 120 days that the documentation does not satisfy the requirements for an exemption, and include in that notification a detailed statement to support the determination.

(B) For purposes of this paragraph, "not locally cost effective" means that the present value of the local benefits of implementing a water demand management measure is less than the present value of the local costs of implementing that measure.

(b) (1) The department, in consultation with the state board and the California Bay-Delta Authority or its successor agency, and after soliciting public comment regarding eligibility requirements, shall develop eligibility requirements to implement the requirement of paragraph (1) of subdivision (a). In establishing these eligibility requirements, the department shall do both of the following:

(A) Consider the conservation measures described in the Memorandum of Understanding Regarding Urban Water Conservation in California, and alternative conservation approaches that provide equal or greater water savings.

(B) Recognize the different legal, technical, fiscal, and practical roles and responsibilities of wholesale water suppliers and retail water suppliers.

(2) (A) For the purposes of this section, the department shall determine whether an urban water supplier is implementing all of the water demand management measures described in Section 10631 based on either, or a combination, of the following:

(i) Compliance on an individual basis.

(ii) Compliance on a regional basis. Regional compliance shall require participation in a regional conservation program consisting of two or more urban water suppliers that achieves the level of conservation or water efficiency savings equivalent to the amount of conservation or savings achieved if each of the participating urban water suppliers implemented the water demand management measures. The urban water supplier administering the regional program shall provide participating urban water suppliers and the department with data to demonstrate that the regional program is consistent with this clause. The department shall review the data to determine whether the urban water suppliers in the regional program are meeting the eligibility requirements.

(B) The department may require additional information for any determination pursuant to this section.

(3) The department shall not deny eligibility to an urban water supplier in compliance with the requirements of this section that is participating in a multiagency water project, or an integrated regional water management plan, developed pursuant to Section 75026 of the Public Resources Code, solely on the basis that one or more of the agencies participating in the project or plan is not implementing all of the water demand management measures described in Section 10631.

(c) In establishing guidelines pursuant to the specific funding authorization for any water management grant or loan program subject to this section, the agency administering the grant or loan program shall include in the guidelines the eligibility requirements developed by the department pursuant to subdivision (b).

(d) Upon receipt of a water management grant or loan application by an agency administering a grant and loan program subject to this section, the agency shall request an eligibility determination from the department with respect to the requirements of this section. The department shall respond to the request within 60 days of the request.

(e) The urban water supplier may submit to the department copies of its annual reports and other relevant documents to assist the department in determining whether the urban water supplier is implementing or scheduling the implementation of water demand management activities. In addition, for urban water suppliers that are signatories to the Memorandum of Understanding Regarding Urban Water Conservation in California and submit biennial reports to the California Urban Water Conservation Council in accordance with the memorandum, the department may use these reports to assist in tracking the implementation of water demand management measures.

(f) This section shall remain in effect only until July 1, 2016, and as of that date is repealed, unless a later enacted statute, that is enacted before July 1, 2016, deletes or extends that date.

10631.7. The department, in consultation with the California Urban Water Conservation Council, shall convene an independent technical panel to provide information and recommendations to the department and the Legislature on new demand management measures, technologies, and approaches. The panel shall consist of no more than seven members, who shall be selected by the department to reflect a balanced representation of experts. The panel shall have at least one, but no more than two, representatives from each of the following: retail water suppliers, environmental organizations, the business community, wholesale water suppliers, and academia. The panel shall be convened by January 1, 2009, and shall report to the Legislature no later than January 1, 2010, and every five years thereafter. The department shall review the panel report and include in the final report to the Legislature the department's recommendations and comments regarding the panel process and the panel's recommendations.

10632. (a) The plan shall provide an urban water shortage contingency analysis that includes each of the following elements that are within the authority of the urban water supplier:

(1) Stages of action to be undertaken by the urban water supplier in response to water supply shortages, including up to a 50 percent reduction in water supply, and an outline of specific water supply conditions that are applicable to each stage.

(2) An estimate of the minimum water supply available during each of the next three water years based on the driest three-year historic sequence for the agency's water supply.

(3) Actions to be undertaken by the urban water supplier to prepare for, and implement during, a catastrophic interruption of water supplies including, but not limited to, a regional power outage, an earthquake, or other disaster.

(4) Additional, mandatory prohibitions against specific water use practices during water shortages, including, but not limited to, prohibiting the use of potable water for street cleaning.

(5) Consumption reduction methods in the most restrictive stages. Each urban water supplier may use any type of consumption reduction methods in its water shortage contingency analysis that would reduce water use, are

appropriate for its area, and have the ability to achieve a water use reduction consistent with up to a 50 percent reduction in water supply.

(6) Penalties or charges for excessive use, where applicable.

(7) An analysis of the impacts of each of the actions and conditions described in paragraphs (1) to (6), inclusive, on the revenues and expenditures of the urban water supplier, and proposed measures to overcome those impacts, such as the development of reserves and rate adjustments.

(8) A draft water shortage contingency resolution or ordinance.

(9) A mechanism for determining actual reductions in water use pursuant to the urban water shortage contingency analysis.

(b) Commencing with the urban water management plan update due July 1, 2016, for purposes of developing the water shortage contingency analysis pursuant to subdivision (a), the urban water supplier shall analyze and define water features that are artificially supplied with water, including ponds, lakes, waterfalls, and fountains, separately from swimming pools and spas, as defined in subdivision (a) of Section 115921 of the Health and Safety Code.

10633. The plan shall provide, to the extent available, information on recycled water and its potential for use as a water source in the service area of the urban water supplier. The preparation of the plan shall be coordinated with local water, wastewater, groundwater, and planning agencies that operate within the supplier's service area, and shall include all of the following:

(a) A description of the wastewater collection and treatment systems in the supplier's service area, including a quantification of the amount of wastewater collected and treated and the methods of wastewater disposal.

(b) A description of the quantity of treated wastewater that meets recycled water standards, is being discharged, and is otherwise available for use in a recycled water project.

(c) A description of the recycled water currently being used in the supplier's service area, including, but not limited to, the type, place, and quantity of use.

(d) A description and quantification of the potential uses of recycled water, including, but not limited to, agricultural irrigation, landscape irrigation, wildlife habitat enhancement, wetlands, industrial reuse, groundwater recharge, indirect potable reuse, and other appropriate uses, and a determination with regard to the technical and economic feasibility of serving those uses.

(e) The projected use of recycled water within the supplier's service area at the end of 5, 10, 15, and 20 years, and a description of the actual use of recycled water in comparison to uses previously projected pursuant to this subdivision.

(f) A description of actions, including financial incentives, which may be taken to encourage the use of recycled water, and the projected results of these actions in terms of acre-feet of recycled water used per year.

(g) A plan for optimizing the use of recycled water in the supplier's service area, including actions to facilitate the installation of dual distribution systems, to promote recirculating uses, to facilitate the increased use of treated wastewater that meets recycled water standards, and to overcome any obstacles to achieving that increased use.

10634. The plan shall include information, to the extent practicable, relating to the quality of existing sources of water available to the supplier over the same five-year increments as described in subdivision (a) of Section 10631, and the manner in which water quality affects water management strategies and supply reliability.

**Article 2.5. Water Service Reliability**

SECTION 10635

10635. (a) Every urban water supplier shall include, as part of its urban water management plan, an assessment of the reliability of its water service to its customers during normal, dry, and multiple dry water years. This water supply and demand assessment shall compare the total water supply sources available to the water supplier with the total projected water use over the next 20 years, in five-year increments, for a normal water year, a single dry water year, and multiple dry water years. The water service reliability assessment shall be based upon the information compiled pursuant to Section 10631, including available data from state, regional, or local agency population projections within the service area of the urban water supplier.

(b) The urban water supplier shall provide that portion of its urban water management plan prepared pursuant to this article to any city or county within which it provides water supplies no later than 60 days after the submission of its urban water management plan.

(c) Nothing in this article is intended to create a right or entitlement to water service or any specific level of water service.

(d) Nothing in this article is intended to change existing law concerning an urban water supplier's obligation to provide water service to its existing customers or to any potential future customers.

**Article 3. Adoption and Implementation of Plans**

SECTION 10640-10645

10640. Every urban water supplier required to prepare a plan pursuant to this part shall prepare its plan pursuant to Article 2 (commencing with Section 10630). The supplier shall likewise periodically review the plan as required by Section 10621, and any amendments or changes required as a result of that review shall be adopted pursuant to this article.

10641. An urban water supplier required to prepare a plan may consult with, and obtain comments from, any public agency or state agency or any person who has special expertise with respect to water demand management methods and techniques.

10642. Each urban water supplier shall encourage the active involvement of diverse social, cultural, and economic elements of the population within the service area prior to and during the preparation of the plan. Prior to adopting a plan, the urban water supplier shall make the plan available for public inspection and shall hold a public hearing thereon. Prior to the hearing, notice of the time and place of hearing shall be published within the jurisdiction of the publicly owned water supplier pursuant to Section 6066 of the Government Code. The urban water supplier shall provide notice of the time and place of hearing to any city or county within which the supplier provides water supplies. A privately owned water supplier shall provide an equivalent notice within its service area.

After the hearing, the plan shall be adopted as prepared or as modified after the hearing.

10643. An urban water supplier shall implement its plan adopted pursuant to this chapter in accordance with the schedule set forth in its plan.

10644. (a) (1) An urban water supplier shall submit to the department, the California State Library, and any city or county within which the supplier provides water supplies a copy of its plan no later than 30 days after adoption. Copies of amendments or changes to the plans shall be submitted to the department, the California State Library, and any city or county within which the supplier provides water supplies within 30 days after adoption.

(2) The plan, or amendments to the plan, submitted to the department pursuant to paragraph (1) shall be submitted electronically and shall include any standardized forms, tables, or displays specified by the department.

(b) (1) Notwithstanding Section 10231.5 of the Government Code, the department shall prepare and submit to the Legislature, on or before December 31, in the years ending in six and one, a report summarizing the status of the plans adopted pursuant to this part.

The report prepared by the department shall identify the exemplary elements of the individual plans. The department shall provide a copy of the report to each urban water supplier that has submitted its plan to the department. The department shall also prepare reports and provide data for any legislative hearings designed to consider the effectiveness of plans submitted pursuant to this part.

(2) A report to be submitted pursuant to paragraph (1) shall be submitted in compliance with Section 9795 of the Government Code.

(c) (1) For the purpose of identifying the exemplary elements of the individual plans, the department shall identify in the report water demand management measures adopted and implemented by specific urban water suppliers, and identified pursuant to Section 10631, that achieve water savings significantly above the levels established by the department to meet the requirements of Section 10631.5.

(2) The department shall distribute to the panel convened pursuant to Section 10631.7 the results achieved by the implementation of those water demand management measures described in paragraph (1).

(3) The department shall make available to the public the standard the department will use to identify exemplary water demand management measures.

10645. Not later than 30 days after filing a copy of its plan with the department, the urban water supplier and the department shall make the plan available for public review during normal business hours.

## Chapter 4. Miscellaneous Provisions

### SECTION 10650-10656

10650. Any actions or proceedings to attack, review, set aside, void, or annul the acts or decisions of an urban water supplier on the grounds of noncompliance with this part shall be commenced as follows:

(a) An action or proceeding alleging failure to adopt a plan shall be commenced within 18 months after that adoption is required by this part.

(b) Any action or proceeding alleging that a plan, or action taken pursuant to the plan, does not comply with this part shall be commenced within 90 days after filing of the plan or amendment thereto pursuant to Section 10644 or the taking of that action.

10651. In any action or proceeding to attack, review, set aside, void, or annul a plan, or an action taken pursuant to the plan by an urban water supplier on the grounds of noncompliance with this part, the inquiry shall extend only to whether there was a prejudicial abuse of discretion. Abuse of discretion is established if the supplier has not proceeded in a manner required by law or if the action by the water supplier is not supported by substantial evidence.

10652. The California Environmental Quality Act (Division 13 (commencing with Section 21000) of the Public Resources Code) does not apply to the preparation and adoption of plans pursuant to this part or to the implementation of actions taken pursuant to Section 10632. Nothing in this part shall be interpreted as exempting from the California Environmental Quality Act any project that would significantly affect water supplies for fish and wildlife, or any project for implementation of the plan, other than projects implementing Section 10632, or any project for expanded or additional water supplies.

10653. The adoption of a plan shall satisfy any requirements of state law, regulation, or order, including those of the State Water Resources Control Board and the Public Utilities Commission, for the preparation of water management plans or conservation plans; provided, that if the State Water Resources Control Board or the Public Utilities Commission requires additional information concerning water conservation to implement its existing authority, nothing in this part shall be deemed to limit the board or the commission in obtaining that information. The requirements of this part shall be satisfied by any urban water demand management plan prepared to meet federal laws or regulations after the effective date of this part, and which substantially meets the requirements of this part, or by any existing urban water management plan which includes the contents of a plan required under this part.

10654. An urban water supplier may recover in its rates the costs incurred in preparing its plan and implementing the reasonable water conservation measures included in the plan. Any best water management practice that is included in the plan that is identified in the "Memorandum of Understanding Regarding Urban Water Conservation in California" is deemed to be reasonable for the purposes of this section.

10655. If any provision of this part or the application thereof to any person or circumstances is held invalid, that invalidity shall not affect other provisions or applications of this part which can be given effect without the invalid provision or application thereof, and to this end the provisions of this part are severable.

10656. An urban water supplier that does not prepare, adopt, and submit its urban water management plan to the department in accordance with this part, is ineligible to receive funding pursuant to Division 24 (commencing with Section 78500) or Division 26

(commencing with Section 79000), or receive drought assistance from the state until the urban water management plan is submitted pursuant to this article.

# Appendix B
# California Water Code
# Sustainable Water Use and Demand Reduction

**California Water Code Division 6, Part 2.55.**


**Chapter 1. General Declarations and Policy** §10608-10608.8
**Chapter 2. Definitions** §10608.12
**Chapter 3. Urban Retail Water Suppliers** §10608.16-10608.44
**Chapter 4. Agricultural Water Suppliers** §10608.48
**Chapter 5. Sustainable Water Management** §10608.50
**Chapter 6 Standardized Data Collection** §10608.52
**Chapter 7 Funding Provisions** §10608.56-10608.60
**Chapter 8 Quantifying Agricultural Water Use Efficiency** §10608.64


## Chapter 1. General Declarations and Policy

SECTION 10608-10608.8

10608. The Legislature finds and declares all of the following:

(a) Water is a public resource that the California Constitution protects against waste and unreasonable use.

(b) Growing population, climate change, and the need to protect and grow California's economy while protecting and restoring our fish and wildlife habitats make it essential that the state manage its water resources as efficiently as possible.

(c) Diverse regional water supply portfolios will increase water supply reliability and reduce dependence on the Delta.

(d) Reduced water use through conservation provides significant energy and environmental benefits, and can help protect water quality, improve streamflows, and reduce greenhouse gas emissions.

(e) The success of state and local water conservation programs to increase efficiency of water use is best determined on the basis of measurable outcomes related to water use or efficiency.

(f) Improvements in technology and management practices offer the potential for increasing water efficiency in California over time, providing an essential water management tool to meet the need for water for urban, agricultural, and environmental uses.

(g) The Governor has called for a 20 percent per capita reduction in urban water use statewide by 2020.

(h) The factors used to formulate water use efficiency targets can vary significantly from location to location based on factors including weather, patterns of urban and suburban development, and past efforts to enhance water use efficiency.

(i) Per capita water use is a valid measure of a water provider's efforts to reduce urban water use within its service area. However, per capita water use is less useful for measuring relative water use efficiency between different water providers. Differences in weather, historical patterns of urban and suburban development, and density of housing in a particular location need to be considered when assessing per capita water use as a measure of efficiency.

10608.4. It is the intent of the Legislature, by the enactment of this part, to do all of the following:

(a) Require all water suppliers to increase the efficiency of use of this essential resource.

(b) Establish a framework to meet the state targets for urban water conservation identified in this part and called for by the Governor.

(c) Measure increased efficiency of urban water use on a per capita basis.

(d) Establish a method or methods for urban retail water suppliers to determine targets for achieving increased water use efficiency by the year 2020, in accordance with the Governor's goal of a 20-percent reduction.

(e) Establish consistent water use efficiency planning and implementation standards for urban water suppliers and agricultural water suppliers.

(f) Promote urban water conservation standards that are consistent with the California Urban Water Conservation Council's adopted best management practices and the requirements for demand management in Section 10631.

(g) Establish standards that recognize and provide credit to water suppliers that made substantial capital investments in urban water conservation since the drought of the early 1990s.

(h) Recognize and account for the investment of urban retail water suppliers in providing recycled water for beneficial uses.

(i) Require implementation of specified efficient water management practices for agricultural water suppliers.

(j) Support the economic productivity of California's agricultural, commercial, and industrial sectors.

(k) Advance regional water resources management.

10608.8. (a) (1) Water use efficiency measures adopted and implemented pursuant to this part or Part 2.8 (commencing with Section 10800) are water conservation measures subject to the protections provided under Section 1011.

(2) Because an urban agency is not required to meet its urban water use target until 2020 pursuant to subdivision (b) of Section 10608.24, an urban retail water supplier's failure to meet those targets shall not establish a violation of law for purposes of any state administrative or judicial proceeding prior to January 1, 2021. Nothing in this paragraph limits the use of data reported to the department or the board in litigation or an administrative proceeding. This paragraph shall become inoperative on January 1, 2021.

(3) To the extent feasible, the department and the board shall provide for the use of water conservation reports required under this part to meet the requirements of Section 1011 for water conservation reporting.

(b) This part does not limit or otherwise affect the application of Chapter 3.5 (commencing with Section 11340), Chapter 4 (commencing with Section 11370), Chapter 4.5 (commencing with Section 11400), and Chapter 5 (commencing with Section 11500) of Part 1 of Division 3 of Title 2 of the Government Code.

(c) This part does not require a reduction in the total water used in the agricultural or urban sectors, because other factors, including, but not limited to, changes in agricultural economics or population growth may have greater effects on water use. This part does not limit the economic productivity of California's agricultural, commercial, or industrial sectors.

(d) The requirements of this part do not apply to an agricultural water supplier that is a party to the Quantification Settlement Agreement, as defined in subdivision (a) of Section 1 of Chapter 617 of the Statutes of 2002, during the period within which the Quantification Settlement Agreement remains in effect. After the expiration of the Quantification Settlement Agreement, to the extent conservation water projects implemented as part of the Quantification Settlement Agreement remain in effect, the conserved water created as part of those projects shall be credited against the obligations of the agricultural water supplier pursuant to this part.

## Chapter 2 Definitions

SECTION 10608.12

10608.12. Unless the context otherwise requires, the following definitions govern the construction of this part:

(a) "Agricultural water supplier" means a water supplier, either publicly or privately owned, providing water to 10,000 or more irrigated acres, excluding recycled water. "Agricultural water supplier" includes a supplier or contractor for water, regardless of the basis of right, that distributes or sells water for ultimate resale to customers. "Agricultural water supplier" does not include the department.

(b) "Base daily per capita water use" means any of the following:

(1) The urban retail water supplier's estimate of its average gross water use, reported in gallons per capita per day and calculated over a continuous 10-year period ending no earlier than December 31, 2004, and no later than December 31, 2010.

(2) For an urban retail water supplier that meets at least 10 percent of its 2008 measured retail water demand through recycled water that is delivered within the service area of an urban retailwater supplier or its urban wholesale water supplier, the urban retail water supplier may extend the calculation described in paragraph (1) up to an additional five years to a maximum of a continuous 15-year period ending no earlier than December 31, 2004, and no later than December 31, 2010.

(3) For the purposes of Section 10608.22, the urban retail water supplier's estimate of its average gross water use, reported in gallons per capita per day and calculated over a continuous five-year period ending no earlier than December 31, 2007, and no later than December 31, 2010.

(c) "Baseline commercial, industrial, and institutional water use" means an urban retail water supplier's base daily per capita water use for commercial, industrial, and institutional users.

(d) "Commercial water user" means a water user that provides or distributes a product or service.

(e) "Compliance daily per capita water use" means the gross water use during the final year of the reporting period, reported in gallons per capita per day.

(f) "Disadvantaged community" means a community with an annual median household income that is less than 80 percent of the statewide annual median household income.

(g) "Gross water use" means the total volume of water, whether treated or untreated, entering the distribution system of an urban retail water supplier, excluding all of the following:

(1) Recycled water that is delivered within the service area of an urban retail water supplier or its urban wholesale water supplier.

(2) The net volume of water that the urban retail water supplier places into long-term storage.

(3) The volume of water the urban retail water supplier conveys for use by another urban water supplier.

(4) The volume of water delivered for agricultural use, except as otherwise provided in subdivision (f) of Section 10608.24.

(h) "Industrial water user" means a water user that is primarily a manufacturer or processor of materials as defined by the North American Industry Classification

System code sectors 31 to 33, inclusive, or an entity that is a water user primarily engaged in research and development.

(i) "Institutional water user" means a water user dedicated to public service. This type of user includes, among other users, higher education institutions, schools, courts, churches, hospitals, government facilities, and nonprofit research institutions.

(j) "Interim urban water use target" means the midpoint between the urban retail water supplier's base daily per capita water use and the urban retail water supplier's urban water use target for 2020.

(k) "Locally cost effective" means that the present value of the local benefits of implementing an agricultural efficiency water management practice is greater than or equal to the present value of the local cost of implementing that measure.

(l) "Process water" means water used for producing a product or product content or water used for research and development, including, but not limited to, continuous manufacturing processes, water used for testing and maintaining equipment used in producing a product or product content, and water used in combined heat and power facilities used in producing a product or product content. Process water does not mean incidental water uses not related to the production of a product or product content, including, but not limited to, water used for restrooms, landscaping, air conditioning, heating, kitchens, and laundry.

(m) "Recycled water" means recycled water, as defined in subdivision (n) of Section 13050, that is used to offset potable demand, including recycled water supplied for direct use and indirect potable reuse, that meets the following requirements, where applicable:

(1) For groundwater recharge, including recharge through spreading basins, water supplies that are all of the following:

(A) Metered.

(B) Developed through planned investment by the urban water supplier or a wastewater treatment agency.

(C) Treated to a minimum tertiary level.

(D) Delivered within the service area of an urban retail water supplier or its urban wholesale water supplier that helps an urban retail water supplier meet its urban water use target.

(2) For reservoir augmentation, water supplies that meet the criteria of paragraph (1) and are conveyed through a distribution system constructed specifically for recycled water.

(n) "Regional water resources management" means sources of supply resulting from watershed-based planning for sustainable local water reliability or any of the following alternative sources of water:

(1) The capture and reuse of stormwater or rainwater.

(2) The use of recycled water.

(3) The desalination of brackish groundwater.

(4) The conjunctive use of surface water and groundwater in a manner that is consistent with the safe yield of the groundwater basin.

(o) "Reporting period" means the years for which an urban retail water supplier reports compliance with the urban water use targets.

(p) "Urban retail water supplier" means a water supplier, either publicly or privately owned, that directly provides potable municipal water to more than 3,000 end users or that supplies more than 3,000 acre-feet of potable water annually at retail for municipal purposes.

(q) "Urban water use target" means the urban retail water supplier's targeted future daily per capita water use.

(r) "Urban wholesale water supplier," means a water supplier, either publicly or privately owned, that provides more than 3,000 acre-feet of water annually at wholesale for potable municipal purposes.

## Chapter 3 Urban Retail Water Suppliers

SECTION 10608.16-10608.44

10608.16. (a) The state shall achieve a 20-percent reduction in urban per capita water use in California on or before December 31, 2020.

(b) The state shall make incremental progress towards the state target specified in subdivision (a) by reducing urban per capita water use by at least 10 percent on or before December 31, 2015.

10608.20. (a) (1) Each urban retail water supplier shall develop urban water use targets and an interim urban water use target by July 1, 2011. Urban retail water suppliers may elect to determine and report progress toward achieving these targets on an individual or regional basis, as provided in subdivision (a) of Section 10608.28, and may determine the targets on a fiscal year or calendar year basis.

(2) It is the intent of the Legislature that the urban water use targets described in paragraph (1) cumulatively result in a 20-percent reduction from the baseline daily per capita water use by December 31, 2020.

(b) An urban retail water supplier shall adopt one of the following methods for determining its urban water use target pursuant to subdivision (a):

(1) Eighty percent of the urban retail water supplier's baseline per capita daily water use.

(2) The per capita daily water use that is estimated using the sum of the following performance standards:

(A) For indoor residential water use, 55 gallons per capita daily water use as a provisional standard. Upon completion of the department's 2016 report to the Legislature pursuant to Section 10608.42, this standard may be adjusted by the Legislature by statute.

(B) For landscape irrigated through dedicated or residential meters or connections, water efficiency equivalent to the standards of the Model Water Efficient Landscape Ordinance set forth in Chapter 2.7 (commencing with Section 490) of Division 2 of Title 23 of the California Code of Regulations, as in effect the later of the year of the landscape's installation or 1992. An urban retail water supplier using the approach specified in this subparagraph shall use satellite imagery, site visits, or other best available technology to develop an accurate estimate of landscaped areas.

(C) For commercial, industrial, and institutional uses, a 10-percent reduction in water use from the baseline commercial, industrial, and institutional water use by 2020.

(3) Ninety-five percent of the applicable state hydrologic region target, as set forth in the state's draft 20x2020 Water Conservation Plan (dated April 30, 2009). If the service area of an urban water supplier includes more than one hydrologic region, the supplier shall apportion its service area to each region based on population or area.

(4) A method that shall be identified and developed by the department, through a public process, and reported to the Legislature no later than December 31, 2010. The method developed by the department shall identify per capita targets that cumulatively result in a statewide 20-percent reduction in urban daily per capita water use by December 31, 2020. In developing urban daily per capita water use targets, the department shall do all of the following:

(A) Consider climatic differences within the state.

(B) Consider population density differences within the state.

(C) Provide flexibility to communities and regions in meeting the targets.

(D) Consider different levels of per capita water use according to plant water needs in different regions.

(E) Consider different levels of commercial, industrial, and institutional water use in different regions of the state.

(F) Avoid placing an undue hardship on communities that have implemented conservation measures or taken actions to keep per capita water use low.

(c) If the department adopts a regulation pursuant to paragraph (4) of subdivision (b) that results in a requirement that an urban retail water supplier achieve a reduction in daily per capita water use that is greater than 20 percent by December 31, 2020, an urban retail water supplier that adopted the method described in paragraph (4) of subdivision (b) may limit its urban water use target to a reduction of not more than 20 percent by December 31, 2020, by adopting the method described in paragraph (1) of subdivision (b).

(d) The department shall update the method described in paragraph (4) of subdivision (b) and report to the Legislature by December 31, 2014. An urban retail water supplier that adopted the method described in paragraph (4) of subdivision (b) may adopt a new urban daily per capita water use target pursuant to this updated method.

(e) An urban retail water supplier shall include in its urban water management plan due in 2010 pursuant to Part 2.6 (commencing with Section 10610) the baseline daily per capita water use, urban water use target, interim urban water use target, and compliance daily per capita water use, along with the bases for determining those estimates, including references to supporting data.

(f) When calculating per capita values for the purposes of this chapter, an urban retail water supplier shall determine population using federal, state, and local population reports and projections.

(g) An urban retail water supplier may update its 2020 urban water use target in its 2015 urban water management plan required pursuant to Part 2.6 (commencing with Section 10610).

(h) (1) The department, through a public process and in consultation with the California Urban Water Conservation Council, shall develop technical methodologies and criteria for the consistent implementation of this part, including, but not limited to, both of the following:

(A) Methodologies for calculating base daily per capita water use, baseline commercial, industrial, and institutional water use, compliance daily per capita water use, gross water use, service area population, indoor residential water use, and landscaped area water use.

(B) Criteria for adjustments pursuant to subdivisions (d) and (e) of Section 10608.24.

(2) The department shall post the methodologies and criteria developed pursuant to this subdivision on its Internet Web site, and make written copies available, by October 1, 2010. An urban retail water supplier shall use the methods developed by the department in compliance with this part.

(i) (1) The department shall adopt regulations for implementation of the provisions relating to process water in accordance with subdivision (l) of Section 10608.12, subdivision (e) of Section 10608.24, and subdivision (d) of Section 10608.26.

(2) The initial adoption of a regulation authorized by this subdivision is deemed to address an emergency, for purposes of Sections 11346.1 and 11349.6 of the Government Code, and the department is hereby exempted for that purpose from the requirements of subdivision (b) of Section 11346.1 of the Government Code. After the initial adoption of an emergency regulation pursuant to this subdivision, the department shall not request approval from the Office of Administrative Law to readopt the regulation as an emergency regulation pursuant to Section 11346.1 of the Government Code.

(j) (1) An urban retail water supplier is granted an extension to July 1, 2011, for adoption of an urban water management plan pursuant to Part 2.6 (commencing with Section 10610) due in 2010 to allow the use of technical methodologies developed by the department pursuant to paragraph (4) of subdivision (b) and subdivision (h). An urban retail water supplier that adopts an urban water management plan due in 2010 that does not use the methodologies developed by the department pursuant to subdivision (h) shall amend the plan by July 1, 2011, to comply with this part.

(2) An urban wholesale water supplier whose urban water management plan prepared pursuant to Part 2.6 (commencing with Section 10610) was due and not submitted in 2010 is granted an extension to July 1, 2011, to permit coordination between an urban wholesale water supplier and urban retail water suppliers.

10608.22. Notwithstanding the method adopted by an urban retail water supplier pursuant to Section 10608.20, an urban retail water supplier's per capita daily water use reduction shall be no less than 5 percent of base daily per capita water use as defined in paragraph(3) of subdivision (b) of Section 10608.12. This section does not apply to an urban retail water supplier with a base daily per capita water use at or below 100 gallons per capita per day.

10608.24. (a) Each urban retail water supplier shall meet its interim urban water use target by December 31, 2015.

(b) Each urban retail water supplier shall meet its urban water use target by December 31, 2020.

(c) An urban retail water supplier's compliance daily per capita water use shall be the measure of progress toward achievement of its urban water use target.

(d) (1) When determining compliance daily per capita water use, an urban retail water supplier may consider the following factors:

(A) Differences in evapotranspiration and rainfall in the baseline period compared to the compliance reporting period.

(B) Substantial changes to commercial or industrial water use resulting from increased business output and economic development that have occurred during the reporting period.

(C) Substantial changes to institutional water use resulting from fire suppression services or other extraordinary events, or from new or expanded operations, that have occurred during the reporting period.

(2) If the urban retail water supplier elects to adjust its estimate of compliance daily per capita water use due to one or more of the factors described in paragraph (1), it shall provide the basis for, and data supporting, the adjustment in the report required by Section 10608.40.

(e) When developing the urban water use target pursuant to Section 10608.20, an urban retail water supplier that has a substantial percentage of industrial water use in its service area may exclude process water from the calculation of gross water use to avoid a disproportionate burden on another customer sector.

(f) (1) An urban retail water supplier that includes agricultural water use in an urban water management plan pursuant to Part 2.6 (commencing with Section 10610) may include the agricultural water use in determining gross water use. An urban retail water supplier that includes agricultural water use in determining gross water use and develops its urban water use target pursuant to paragraph (2) of subdivision (b) of Section 10608.20 shall use a water efficient standard for agricultural irrigation of 100 percent of reference evapotranspiration multiplied by the crop coefficient for irrigated acres.

(2) An urban retail water supplier, that is also an agricultural water supplier, is not subject to the requirements of Chapter 4 (commencing with Section 10608.48), if the agricultural water use is incorporated into its urban water use target pursuant to paragraph (1).

10608.26. (a) In complying with this part, an urban retail water supplier shall conduct at least one public hearing to accomplish all of the following:

(1) Allow community input regarding the urban retail water supplier's implementation plan for complying with this part.

(2) Consider the economic impacts of the urban retail water supplier's implementation plan for complying with this part.

(3) Adopt a method, pursuant to subdivision (b) of Section 10608.20, for determining its urban water use target.

(b) In complying with this part, an urban retail water supplier may meet its urban water use target through efficiency improvements in any combination among its customer sectors. An urban retail water supplier shall avoid placing a disproportionate burden on any customer sector.

(c) For an urban retail water supplier that supplies water to a United States Department of Defense military installation, the urban retail water supplier's

implementation plan for complying with this part shall consider the conservation of that military installation under federal Executive Order 13514.

(d) (1) Any ordinance or resolution adopted by an urban retail water supplier after the effective date of this section shall not require existing customers as of the effective date of this section, to undertake changes in product formulation, operations, or equipment that would reduce process water use, but may provide technical assistance and financial incentives to those customers to implement efficiency measures for process water. This section shall not limit an ordinance or resolution adopted pursuant to a declaration of drought emergency by an urban retail water supplier.

(2) This part shall not be construed or enforced so as to interfere with the requirements of Chapter 4 (commencing with Section 113980) to Chapter 13 (commencing with Section 114380), inclusive, of Part 7 of Division 104 of the Health and Safety Code, or any requirement or standard for the protection of public health, public safety, or worker safety established by federal, state, or local government or recommended by recognized standard setting organizations or trade associations.

10608.28. (a) An urban retail water supplier may meet its urban water use target within its retail service area, or through mutual agreement, by any of the following:

(1) Through an urban wholesale water supplier.

(2) Through a regional agency authorized to plan and implement water conservation, including, but not limited to, an agency established under the Bay Area Water Supply and Conservation Agency Act (Division 31 (commencing with Section 81300)).

(3) Through a regional water management group as defined in Section 10537.

(4) By an integrated regional water management funding area.

(5) By hydrologic region.

(6) Through other appropriate geographic scales for which computation methods have been developed by the department.

(b) A regional water management group, with the written consent of its member agencies, may undertake any or all planning, reporting, and implementation functions under this chapter for the member agencies that consent to those activities. Any data or reports shall provide information both for the regional water management group and separately for each consenting urban retail water supplier and urban wholesale water supplier.

10608.32. All costs incurred pursuant to this part by a water utility regulated by the Public Utilities Commission may be recoverable in rates subject to review and approval by the Public Utilities Commission, and may be recorded in a memorandum account and reviewed for reasonableness by the Public Utilities Commission.

10608.36. Urban wholesale water suppliers shall include in the urban water management plans required pursuant to Part 2.6 (commencing with Section 10610) an assessment of their present and proposed future measures, programs, and policies to help achieve the water use reductions required by this part.

10608.40. Urban water retail suppliers shall report to the department on their progress in meeting their urban water use targets as part of their urban water management plans submitted pursuant to Section 10631. The data shall be reported using a standardized form developed pursuant to Section 10608.52.

10608.42. (a) The department shall review the 2015 urban water management plans and report to the Legislature by July 1, 2017, on progress towards achieving a 20-percent reduction in urban water use by December 31, 2020. The report shall include recommendations on changes to water efficiency standards or urban water use targets to achieve the 20-percent reduction and to reflect updated efficiency information and technology changes.

(b) A report to be submitted pursuant to subdivision (a) shall be submitted in compliance with Section 9795 of the Government Code.

10608.43. The department, in conjunction with the California Urban Water Conservation Council, by April 1, 2010, shall convene a representative task force consisting of academic experts, urban retail water suppliers, environmental organizations, commercial water users, industrial water users, and institutional water users to develop alternative best management practices for commercial, industrial, and institutional users and an assessment of the potential statewide water use efficiency improvement in the commercial, industrial, and institutional sectors that would result from implementation of these best management practices. The taskforce, in conjunction with the department, shall submit a report to the Legislature by April 1, 2012, that shall include a review of multiple sectors within commercial, industrial, and institutional users and that shall recommend water use efficiency standards for commercial, industrial, and institutional users among various sectors of water use. The report shall include, but not be limited to, the following:

(a) Appropriate metrics for evaluating commercial, industrial, and institutional water use.
(b) Evaluation of water demands for manufacturing processes, goods, and cooling.
(c) Evaluation of public infrastructure necessary for delivery of recycled water to the commercial, industrial, and institutional sectors.
(d) Evaluation of institutional and economic barriers to increased recycled water use within the commercial, industrial, and institutional sectors.
(e) Identification of technical feasibility and cost of the best management practices to achieve more efficient water use statewide in the commercial, industrial, and institutional sectors that is consistent with the public interest and reflects past investments in water use efficiency.

10608.44. Each state agency shall reduce water use at facilities it operates to support urban retail water suppliers in meeting the target identified in Section 10608.16.

## Chapter 4 Agricultural Water Suppliers

SECTION 10608.48

10608.48. (a) On or before July 31, 2012, an agricultural water supplier shall implement efficient water management practices pursuant to subdivisions (b) and (c).

(b) Agricultural water suppliers shall implement all of the following critical efficient management practices:

(1) Measure the volume of water delivered to customers with sufficient accuracy to comply with subdivision (a) of Section 531.10 and to implement paragraph (2).

(2) Adopt a pricing structure for water customers based at least in part on quantity delivered.

(c) Agricultural water suppliers shall implement additional efficient management practices, including, but not limited to, practices to accomplish all of the following, if the measures are locally cost effective and technically feasible:

(1) Facilitate alternative land use for lands with exceptionally high water duties or whose irrigation contributes to significant problems, including drainage.

(2) Facilitate use of available recycled water that otherwise would not be used beneficially, meets all health and safety criteria, and does not harm crops or soils.

(3) Facilitate the financing of capital improvements for on-farm irrigation systems.

(4) Implement an incentive pricing structure that promotes one or more of the following goals:

(A) More efficient water use at the farm level.

(B) Conjunctive use of groundwater.

(C) Appropriate increase of groundwater recharge.

(D) Reduction in problem drainage.

(E) Improved management of environmental resources.

(F) Effective management of all water sources throughout the year by adjusting seasonal pricing structures based on current conditions.

(5) Expand line or pipe distribution systems, and construct regulatory reservoirs to increase distribution system flexibility and capacity, decrease maintenance, and reduce seepage.

(6) Increase flexibility in water ordering by, and delivery to, water customers within operational limits.

(7) Construct and operate supplier spill and tailwater recovery systems.

(8) Increase planned conjunctive use of surface water and groundwater within the supplier service area.

(9) Automate canal control structures.

(10) Facilitate or promote customer pump testing and evaluation.

(11) Designate a water conservation coordinator who will develop and implement the water management plan and prepare progress reports.

(12) Provide for the availability of water management services to water users. These services may include, but are not limited to, all of the following:

(A) On-farm irrigation and drainage system evaluations.

(B) Normal year and real-time irrigation scheduling and crop evapotranspiration information.

(C) Surface water, groundwater, and drainage water quantity and quality data.

(D) Agricultural water management educational programs and materials for farmers, staff, and the public.

(13) Evaluate the policies of agencies that provide the supplier with water to identify the potential for institutional changes to allow more flexible water deliveries and storage.

(14) Evaluate and improve the efficiencies of the supplier's pumps.

(d) Agricultural water suppliers shall include in the agricultural water management plans required pursuant to Part 2.8 (commencing with Section 10800) a report on which efficient water management practices have been implemented and are planned to be implemented, an estimate of the water use efficiency improvements that have occurred since the last report, and an estimate of the water use efficiency improvements estimated to occur five and 10 years in the future. If an agricultural water supplier determines that an efficient water management practice is not locally cost effective or technically feasible, the supplier shall submit information documenting that determination.

(e) The data shall be reported using a standardized form developed pursuant to Section 10608.52.

(f) An agricultural water supplier may meet the requirements of subdivisions (d) and (e) by submitting to the department a water conservation plan submitted to the United States Bureau of Reclamation that meets the requirements described in Section 10828.

(g) On or before December 31, 2013, December 31, 2016, and December 31, 2021, the department, in consultation with the board, shall submit to the Legislature a report on the agricultural efficient water management practices that have been implemented and are planned to be implemented and an assessment of the manner in which the implementation of those efficient water management practices has affected and will affect agricultural operations, including estimated water use efficiency improvements, if any.

(h) The department may update the efficient water management practices required pursuant to subdivision (c), in consultation with the Agricultural Water Management Council, the United States Bureau of Reclamation, and the board. All efficient water management practices for agricultural water use pursuant to this chapter shall be adopted or revised by the department only after the department conducts public hearings to allow participation of the diverse geographical areas and interests of the state.

(i) (1) The department shall adopt regulations that provide for a range of options that agricultural water suppliers may use or implement to comply with the measurement requirement in paragraph (1) of subdivision (b).

(2) The initial adoption of a regulation authorized by this subdivision is deemed to address an emergency, for purposes of Sections 11346.1 and 11349.6 of the Government Code, and the department is hereby exempted for that purpose from the requirements of subdivision (b) of Section 11346.1 of the Government Code. After the initial adoption of an emergency regulation pursuant to this subdivision, the department shall not request approval from the Office of Administrative Law to readopt the regulation as an emergency regulation pursuant to Section 11346.1 of the Government Code.

## Chapter 5 Sustainable Water Management

Section 10608.50

10608.50. (a) The department, in consultation with the board, shall promote implementation of regional water resources management practices through increased incentives and removal of barriers consistent with state and federal law. Potential changes may include, but are not limited to, all of the following:

(1) Revisions to the requirements for urban and agricultural water management plans.

(2) Revisions to the requirements for integrated regional water management plans.

(3) Revisions to the eligibility for state water management grants and loans.

(4) Revisions to state or local permitting requirements that increase water supply opportunities, but do not weaken water quality protection under state and federal law.

(5) Increased funding for research, feasibility studies, and project construction.

(6) Expanding technical and educational support for local land use and water management agencies.

(b) No later than January 1, 2011, and updated as part of the California Water Plan, the department, in consultation with the board, and with public input, shall propose new statewide targets, or review and update existing statewide targets, for regional water resources management practices, including, but not limited to, recycled water, brackish groundwater desalination, and infiltration and direct use of urban stormwater runoff.

## Chapter 6 Standardized Data Collection

SECTION 10608.52

10608.52. (a) The department, in consultation with the board, the California Bay-Delta Authority or its successor agency, the State Department of Public Health, and the Public Utilities Commission, shall develop a single standardized water use reporting form to meet the water use information needs of each agency, including the needs of urban water suppliers that elect to determine and report progress toward achieving targets on a regional basis as provided in subdivision (a) of Section 10608.28.

(b) At a minimum, the form shall be developed to accommodate information sufficient to assess an urban water supplier's compliance with conservation targets pursuant to Section 10608.24 and an agricultural water supplier's compliance with implementation of efficient water management practices pursuant to subdivision (a) of Section 10608.48. The form shall accommodate reporting by urban water suppliers on an individual or regional basis as provided in subdivision (a) of Section 10608.28.

## Chapter 7 Funding Provisions

Section 10608.56-10608.60

10608.56. (a) On and after July 1, 2016, an urban retail water supplier is not eligible for a water grant or loan awarded or administered by the state unless the supplier complies with this part.

(b) On and after July 1, 2013, an agricultural water supplier is not eligible for a water grant or loan awarded or administered by the state unless the supplier complies with this part.

(c) Notwithstanding subdivision (a), the department shall determine that an urban retail water supplier is eligible for a water grant or loan even though the supplier has not met the per capita reductions required pursuant to Section 10608.24, if the urban retail water supplier has submitted to the department for approval a schedule, financing plan, and budget, to be included in the grant or loan agreement, for achieving the per capita reductions. The supplier may request grant or loan funds to achieve the per capita reductions to the extent the request is consistent with the eligibility requirements applicable to the water funds.

(d) Notwithstanding subdivision (b), the department shall determine that an agricultural water supplier is eligible for a water grant or loan even though the supplier is not implementing all of the efficient water management practices described in Section 10608.48, if the agricultural water supplier has submitted to the department for approval a schedule, financing plan, and budget, to be included in the grant or loan agreement, for implementation of the efficient water management practices. The supplier may request grant or loan funds to implement the efficient water management practices to the extent the request is consistent with the eligibility requirements applicable to the water funds.

(e) Notwithstanding subdivision (a), the department shall determine that an urban retail water supplier is eligible for a water grant or loan even though the supplier has not met the per capita reductions required pursuant to Section 10608.24, if the urban retail water supplier has submitted to the department for approval documentation demonstrating that its entire service area qualifies as a disadvantaged community.

(f) The department shall not deny eligibility to an urban retail water supplier or agricultural water supplier in compliance with the requirements of this part and Part 2.8 (commencing with Section 10800), that is participating in a multiagency water project, or an integrated regional water management plan, developed pursuant to Section 75026 of the Public Resources Code, solely on the basis that one or more of the agencies participating in the project or plan is not implementing all of the requirements of this part or Part 2.8 (commencing with Section 10800).

10608.60. (a) It is the intent of the Legislature that funds made available by Section 75026 of the Public Resources Code should be expended, consistent with Division 43 (commencing with Section 75001) of the Public Resources Code and upon appropriation by the Legislature, for grants to implement this part. In the allocation of funding, it is the intent of the Legislature that the department give consideration to disadvantaged communities to assist in implementing the requirements of this part.

(b) It is the intent of the Legislature that funds made available by Section 75041 of the Public Resources Code, should be expended, consistent with Division 43 (commencing with Section 75001) of the Public Resources Code and upon appropriation by the Legislature, for direct expenditures to implement this part.

## Chapter 8 Quantifying Agricultural Water Use Efficiency

SECTION 10608.64

10608.64. The department, in consultation with the Agricultural Water Management Council, academic experts, and other stakeholders, shall develop a methodology for quantifying the efficiency of agricultural water use. Alternatives to be assessed shall include, but not be limited to, determination of efficiency levels based on crop type or irrigation system distribution uniformity. On or before December 31, 2011, the department shall report to the Legislature on a proposed methodology and a plan for implementation. The plan shall include the estimated implementation costs and the types of data needed to support the methodology. Nothing in this section authorizes the department to implement a methodology established pursuant to this section.

# Appendix C
# Changes to the Water Code since 2010 UWMPs

| Topic | CWC Section | Legislative Bill | Summary | Guidebook Section |
|---|---|---|---|---|
| Demand Management Measures | 10631 (f)(1) and (2) | AB 2067 Weber 2014 | Requires water suppliers to provide narratives describing their water demand management measures, as provided. Requires retail water suppliers to address the nature and extent of each water demand management measure implemented over the past 5 years and describe the water demand management measures that the supplier plans to implement to achieve its water use targets. | Chapter 9 |
| Submittal Date | 10621 (d) | AB 2067 Weber 2014 | Requires each urban water supplier to submit its 2015 plan to the Department of Water Resources by July 1, 2016. | Chapter 10 |
| Submittal Format | 10644 (a) (2) | SB 1420 Wolk 2014 | Requires the plan, or amendments to the plan, to be submitted electronically to the department. | Chapter 10 |
| Standardized Forms | 10644 (a) (2) | SB 1420 Wolk 2014 | Requires the plan, or amendments to the plan, to include any standardized forms, tables, or displays specified by the department. | CH 1, Section 1.4 |
| Water Loss | 10631 (e) (1) (J) and (e) (3) (A) and (B) | SB 1420 Wolk 2014 | Requires a plan to quantify and report on distribution system water loss. | Appendix L |

| | | | | |
|---|---|---|---|---|
| Voluntary Reporting of Passive Savings | 10631 (e) (4) | SB 1420 Wolk 2014 | Provides for water use projections to display and account for the water savings estimated to result from adopted codes, standards, ordinances, or transportation and land use plans, when that information is available and applicable to an urban water supplier. | Appendix K |
| Voluntary Reporting of Energy Intensity | 10631.2 (a) and (b) | SB 1036 | Provides for an urban water supplier to include certain energy-related information, including, but not limited to, an estimate of the amount of energy used to extract or divert water supplies. | Appendix O |
| Defining Water Features | 10632 | | Requires urban water suppliers to analyze and define water features that are artificially supplied with water, including ponds, lakes, waterfalls, and fountains, separately from swimming pools and spas. | CH 8, Section 8.2.4 |

CITY OF SANTA CRUZ

WATER DEPARTMENT

212 Locust Street, Santa Cruz, CA 95060 • (831) 420-5200 • Fax (831) 420-5201 • www.cityofsantacruz.com

December 15, 2015

Susan Mauriello, County Administrative Officer
County of Santa Cruz
701 Ocean Street, Room 520
Santa Cruz, CA 95060

SUBJECT: Urban Water Management Plan Update

Dear Ms. Mauriello,

The City of Santa Cruz is preparing an update to its Urban Water Management Plan, as required by state law. This letter is to notify the County of Santa Cruz that the Santa Cruz Water Department will be reviewing the plan and considering changes and amendments over the next few months and welcomes your input and comments during the update process. The updated plan is scheduled to be presented to the Santa Cruz City Council at a public hearing in June 2016 to meet the state's submittal deadline of July 1, 2016. We will send you notice of the time and place of the public hearing, along with information on where the 2015 UWMP can be viewed, in advance of that meeting.

Please contact Toby Goddard, Administrative Services Manager, at 420-5232, if you have any questions or wish to discuss the information covered in the plan.

Sincerely,

Rosemary Menard
Water Director

cc: Kathy Previsich, Planning Director

CITY OF SANTA CRUZ

WATER DEPARTMENT

212 Locust Street, Santa Cruz, CA 95060 • (831) 420-5200 • Fax (831) 420-5201 • www.cityofsantacruz.com

December 15, 2015

Jamie Goldstein, City Manager
City of Capitola
420 Capitola Ave.
Capitola, CA 95010

SUBJECT: Urban Water Management Plan Update

Dear Mr. Goldstein,

The City of Santa Cruz is preparing an update to its Urban Water Management Plan, as required by state law. This letter is to notify the City of Capitola that the Santa Cruz Water Department will be reviewing the plan and considering changes and amendments over the next few months and welcomes your input and comments during the update process. The updated plan is scheduled to be presented to the Santa Cruz City Council at a public hearing in June 2016 to meet the state's submittal deadline of July 1, 2016. We will send you notice of the time and place of the public hearing, along with information on where the 2015 UWMP can be viewed, in advance of that meeting.

Please contact Toby Goddard, Administrative Services Manager, at 420-5232, if you have any questions or wish to discuss the information covered in the plan.

Sincerely,

Rosemary Menard
Water Director

cc: Richard Grunow, Community Development Director

## Appendix E:

## City of Santa Cruz General Plan 2030 Policies Regarding Water Service

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

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

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

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

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

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

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

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

CC3.2.3 Maintain required federal and State laboratory certification.

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

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

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

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

*CC3.3* *Safeguard existing surface and groundwater sources.*

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

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

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

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

CC3.3.5 Pursue appropriate regulatory enforcement of environmental violations committed by other watershed stakeholders.

CC3.3.6 Conduct hydrologic and biotic monitoring throughout drinking water source watersheds to protect water supplies and habitat. Cf. CD4.3.3 and NRC2.1, 2.2, 2.4, and 6.3.

CC3.3.7 Ensure that fisheries conservation strategies address and protect water storage, drinking water source quality, and water system flexibility, as well as protect the environmental resource.

CC3.3.8 Provide adequate pumping, treatment, and distribution facilities for peak season production of groundwater of 170 mgy in normal years and 215 mgy during droughts.

CC3.3.9 Monitor groundwater levels and quality.

CC3.3.10 Participate with the Soquel-Aptos Groundwater Management Alliance in cooperative efforts to assure the quality and production of groundwater resources.

*CC3.4* *Maintain and improve the integrity of the water system.*

CC3.4.1 Maintain and improve water facilities to meet pressure and fire flow requirements and ensure customer delivery. Cf. HZ1.4.3.

CC3.4.2 Modernize City water treatment plants.

CC3.4.3 Optimize storage, transmission, and distribution capacities and efficiencies.

CC3.4.4 Evaluate and improve the water system so as to minimize water outages due to emergencies and disasters.

*CC3.5 Promote maximum water use efficiency.*

CC3.5.1 Implement 14 urban water conservation “best management practices” and meet reporting requirements in the Memorandum of Understating Regarding Urban Water Conservation in California.

CC3.5.2 Promote public education and awareness about the City’s water resources and the importance of water conservation.

CC3.5.3 Offer water audit programs and technical assistance for homes, businesses, and large landscapes to help customers reduce their average daily water use and control their utility bills.

CC3.5.4 Provide financial incentives to City water customers for installing high efficiency plumbing fixtures, appliances, and equipment.

CC3.5.5 Provide public information regarding onsite water catchment systems.

CC3.5.6 Administer and enforce water waste regulations, plumbing fixture retrofit requirements, and water efficient landscape standards for new development.

CC3.5.7 Explore and consider promoting or requiring new opportunities and technologies for more efficient use of water and energy.

CC3.5.8 Evaluate water use by residential, commercial, industrial and other customer categories and trends per capita.

CC3.5.9 Regularly audit the water distribution system and implement programs to minimize system losses and underground leaks.

CC3.5.10 Participate in regional water conservation partnerships, events, and opportunities.

CC3.5.11 Play a leadership role in supporting research, policy development, standards, and legislation aimed at furthering water use efficiency across the state.

CC3.5.12 Implement additional water conservation programs that provide a reliable gain in supply and can be justified in terms of their cost.

*CC3.6 Coordinate major land use planning decisions in all three jurisdictions served by the City water system based on water supply availability.*

CC3.6.1 Implement the City's Urban Water Management Plan and update it periodically as required by State law.

CC3.6.2 Provide annual updates to the city council on the status of remaining water supply.

CC3.6.3 Confirm or adjust the estimate of remaining supply to avoid oversubscribing the water system.

CC3.6.4 Consider developing criteria for determining significance of environmental impacts of development projects on the City water system to streamline the environmental review process.

*CC3.7 Allow extension of the Water Service Area only if an application is approved by city council and/or LAFCO*

*CC3.8 Prohibit additional connections to the North Coast water system, in accordance with City Council Resolutions NS-17372 and NS-21056.*

*CC3.9 Sustain long-term fiscal stability.*

CC3.9.1 Maintain a rate schedule based on cost of service and designed to provide an economic incentive for conservation.

CC3.9.2 Collect sufficient revenues to assure adequate maintenance of the water system infrastructure.

CC3.9.3 Maintain a Water Rate Stabilization Fund to protect against unanticipated emergencies, and Operating Reserves as needed for cash flow.

CC3.9.4 Confine long-term borrowing to major capital improvements.

CC3.9.5 Develop and implement a long-term Capital Improvements Plan for prioritizing and financing major projects.

*CC3.10 Investigate new supply options to meet planned growth.*

CC3.10.1 Explore opportunities to use recycled water for future water supply.

*CC3.11 Conserve water resources. Cf. NRC1.3.1 and 3.1.*

CC3.11.1 Promote water conservation.

CC3.11.2 Regularly update guidelines and standards for new landscaping that emphasizes xeriscaping, climate-appropriate landscape design, and other water-conserving practices.

CC3.11.3 Conduct a landscape irrigation audit program and target large water consumers to reduce consumption. Examples of large consumers are large turf customers, large commercial and industrial customers, and property management firms.

# CITY OF SANTA CRUZ WATER DEMAND FORECAST


## Abstract

This report presents an econometric analysis of water demand and forecasts of class-level customer demands and total system production through 2035. The report was commissioned by the City of Santa Cruz Water Department and the City's Water Supply Advisory Committee to update the Department's existing demand forecast to reflect current information on water usage and to account for effects of conservation, water rates, and other factors expected to impact the future demand for water.



Prepared by
David Mitchell
M.Cubed


October 2015

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# EXECUTIVE SUMMARY

The City of Santa Cruz is currently undertaking a comprehensive evaluation of its future water supply and infrastructure requirements. The forecast of future water demand is a foundational component to this assessment. In recent years the historical patterns of water demand have been upended by a variety of factors, including the cumulative effects of tighter efficiency standards for appliances and plumbing fixtures, greater investment in conservation, a significant uptick in water rates, an equally significant downturn in economic activity during the Great Recession, and on-going drought. These events have resulted in even more uncertainty than usual regarding future water demand and have placed even greater importance on sorting out the effect each has had on demand in recent years as well as how they are likely to affect demand going forward.

The City of Santa Cruz has appointed a public Water Supply Advisory Committee (WSAC) to examine the City's water supply situation. Its specific charge, as stated in its Charter, is to

> *explore, through an iterative, fact-based process, the City's water profile, including supply, demand and future risks; analyze potential solutions to deliver a safe, adequate, reliable, affordable, and environmentally sustainable water supply and develop recommendations for City Council consideration.*

The Water Department last prepared a formal forecast of water demand as part of its 2010 Urban Water Management Plan (UWMP). That forecast covered the period 2010 to 2030. The forecast reflected average consumption levels circa 2008 and growth projections based on the City's General Plan, UC Santa Cruz's (UCSC) Long Range Development Plan (LRDP) and Association of Monterey Bay Area Governments (AMBAG) population and housing projections. The 2010 UWMP forecast did not account for potential effects of future conservation, higher water rates, or other factors affecting average water use over time. Since the adoption of its 2010 UWMP, actual demand has trended well below forecasted demand. Drought, economic recession, higher water rates, and conservation have been cited as possible reasons for the divergence.

One of the first requests made by the WSAC was for the Water Department to update the demand forecast to reflect current information on water usage and to account for effects of conservation, water rates, and other factors expected to impact the future demand for water.

**Statistical Models of Average Demand**

This report develops statistically-based models of average water demand. The demand forecasts based on these models cover the period 2020-2035 and incorporate empirical relationships between water use and key explanatory variables, including season, weather, water rates, household income, employment, conservation, and drought restrictions. The approach builds on similar models of water demand developed for the California Urban Water Conservation Council (Western Policy Research, 2011), Bay Area Water Supply and Conservation Agency (Western Policy Research, 2014), California Water Services Company (A&N Technical Services, 2014, M.Cubed 2015), and Contra Costa Water District (M.Cubed 2014).

The statistical models of demand were estimated using historical data on class water use, weather, water price, household income, conservation, and other economic variables driving water demand. The

monthly models of average water demand are combined with service and housing growth forecasts to predict future water demands. The average demand models explain 90 to 99% of the observed variation in historical average use over the 14 year estimation period.

The forecasts of average demand by customer class are summarized in Table ES-1. The forecasts include adjustments for future effects of plumbing codes and the City's baseline conservation program[1] and are predicated on average weather and normal economic conditions.

*Table ES - 1. Forecasted Average Demand by Customer Class (CCF/Year)*

| YEAR | | 2013 | 2020 | | 2025 | | 2030 | | 2035 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Per | Actual 1/ | Forecast | CI | Forecast | CI | Forecast | CI | Forecast | CI |
| Single Family | Housing Unit | 87 | 86 | ± 3 | 83 | ± 3 | 80 | ± 4 | 78 | ± 4 |
| Multi Family | Housing Unit | 53 | 56 | ± 2 | 52 | ± 2 | 50 | ± 2 | 49 | ± 3 |
| Business | Service | 405 | 400 | ± 12 | 389 | ± 12 | 382 | ± 13 | 377 | ± 13 |
| Municipal | Service | 388 | 296 | ± 26 | 290 | ± 27 | 283 | ± 29 | 277 | ± 30 |
| Irrigation | Service | 365 | 286 | ± 28 | 271 | ± 28 | 257 | ± 28 | 244 | ± 28 |
| Golf | Acre | 990 | 671 | ± 130 | 641 | ± 134 | 606 | ± 137 | 593 | ± 144 |

1/ Actual use, unadjusted for weather or economy. Stage 1 drought water use restrictions in effect May - Dec.

CI = 95% confidence interval.

**Industrial and UCSC Demand Forecast**

Because of their unique characteristics, industrial and UCSC demands were forecasted separately from the other customer categories. In the case of industrial demand, there is a strong relationship between Santa Cruz County manufacturing employment and aggregate industrial water use. This relationship is used to generate the industrial demand forecast shown in Table ES-2.

*Table ES - 2. Industrial Demand Forecast (MGY)*

| | 2013 1/ | 2020 | 2025 | 2030 | 2035 |
|---|---|---|---|---|---|
| Mfg Employment Forecast2/ | | 5,900 | 6,200 | 6,400 | 6,500 |
| Industrial Water Demand (MG) | | | | | |
| Low | 56 | 56 | 58 | 59 | 60 |
| Primary | 56 | 57 | 59 | 61 | 62 |
| High | 56 | 57 | 60 | 63 | 64 |

Notes
1/ Actual per Water Department billing records.
2/ Caltrans Economic Forecast for Santa Cruz County.

The forecast of future UCSC demand is based on a linear projection of the university's buildout demand in its 2005 LRDP, assuming two alternative buildout dates. In both cases, buildout demand is 349 MGY. In the lower bound forecast, buildout occurs in 2050. In the upper bound forecast it occurs in 2035. The primary forecast is the midpoint between the lower and upper bound forecasts. The forecast of UCSC

[1] The baseline conservation program level is Program A in the City's forthcoming water conservation master plan.

demand is given in Table ES-3. The primary forecast almost exactly replicates a forecast based on projected enrollment and average rates of water use per student.[2]

*Table ES - 3. UCSC Water Demand Forecast (MGY)*

| | 2013 1/ | 2020 | 2025 | 2030 | 2035 |
|---|---|---|---|---|---|
| Low | 182 | 186 | 213 | 240 | 268 |
| Primary | 182 | 196 | 234 | 271 | 308 |
| High | 182 | 207 | 254 | 302 | 349 |

Notes
1/ Actual per Water Department billing records.

**Population, Housing, and Non-Residential Connection Forecasts**

Forecasts of population, housing units, and non-residential connections are anchored to AMBAG's 2014 Regional Growth Forecast (AMBAG 2014). Projected growth in single- and multi-family housing units are shown in Table ES-4 and projected growth in non-residential services (excluding industrial and UCSC) are summarized in Table ES-5.[3]

*Table ES - 4. Forecast of Occupied Housing Units*

| | 2014 1/ | 2020 | 2025 | 2030 | 2035 |
|---|---|---|---|---|---|
| Inside-City | | | | | |
| Single Family | 12,246 | 12,534 | 12,780 | 13,030 | 13,246 |
| Multi Family | 9,583 | 10,958 | 11,398 | 12,106 | 12,679 |
| Subtotal | 21,829 | 23,492 | 24,177 | 25,136 | 25,925 |
| Outside-City | | | | | |
| Single Family | 6,743 | 6,922 | 7,074 | 7,230 | 7,390 |
| Multi Family | 7,901 | 7,910 | 8,033 | 8,310 | 8,495 |
| Subtotal | 14,644 | 14,832 | 15,107 | 15,540 | 15,884 |
| Service Area | | | | | |
| Single Family | 18,989 | 19,456 | 19,854 | 20,260 | 20,636 |
| Multi Family | 17,484 | 18,868 | 19,431 | 20,416 | 21,174 |
| Total | 36,473 | 38,324 | 39,284 | 40,676 | 41,809 |

Notes
1/ Actual per Water Department billing records.

[2] The enrollment-based approach yields a 2035 demand of 304 MG, which differs from the primary forecast by less than 2%.

[3] The decrease in forecasted golf acreage is due to the intention of Pasatiempo golf course to shift to non-City sources of irrigation water.

*Table ES - 5. Forecast of Non-Residential Services and City-Irrigated Golf Acreage*

| | 2013 [1/] | 2020 | 2025 | 2030 | 2035 |
|---|---|---|---|---|---|
| Business [2/] | 1,889 | 1,948 | 1,971 | 2,008 | 2,055 |
| Municipal [3/] | 218 | 218 | 218 | 218 | 218 |
| Irrigation [4/] | 452 | 651 | 723 | 845 | 951 |
| Golf | | | | | |
| Delaveaga | 79 | 79 | 79 | 79 | 79 |
| Pasatiempo | 68 | 40 | 30 | 20 | 20 |
| Total Golf | 146 | 119 | 109 | 99 | 99 |

Notes
1/ Actual per Water Department billing records.
2/ Based on ratio of business to residential demand.
3/ No expected growth in number of municipal services.
4/ Based on historical rate of gain in irrigation services per gain in multi-family and business services.

**Demand Forecasts**

The primary, low, and high forecasts of system demand are provided in Tables ES-6, ES-7, and ES-8. Under the primary forecast, total system demand is expected to remain stable at about 3,400 MGY over the forecast period, despite a 13 percent increase in population over the same period. Per capita water use is projected to go from 93 gallons per day in 2020 to 84 gallons per day in 2035, a decrease of approximately 10 percent.

Forecasted demands are significantly lower than the 2010 UWMP forecast, as shown in Figure ES-1. The primary reasons for this are that the 2010 UWMP forecast (1) did not include adjustments for the future effects of passive and active conservation and higher water rates on future water use and (2) assumed higher UCSC demand.

While the econometric demand models were under development, an interim demand forecast was developed for the WSAC by adjusting the 2010 UWMP forecast for future conservation and other economic effects and by adjusting downward the UC demands (M.Cubed, 2015b). Figure ES-2 provides a comparison of the econometric model and WSAC interim demand forecasts. On average, the econometric demand forecast is approximately five and a half percent greater than the WSAC interim forecast. The econometric forecast represented by the dark blue line essentially tracks the upper-bound of the WSAC interim forecast while the WSAC interim forecast represented by the dark yellow line essentially tracks the lower-bound of the econometric forecast. Between these two lines, the forecasts overlap. Future production in the range of 3,200 to 3,400 MGY is consistent with both forecasts.

Figure ES-3 shows a comparison of historical production and the primary, lower, and upper bound forecasts. It is interesting to see how historical production has been influenced by weather and economic events. The forecast does not exhibit a similar degree of variability because it is based on average weather and normal economic conditions. In other words, it is a forecast of *expected future demand*. Realized future demand will certainly not be smooth like the forecast. It will vary about the expected value depending on year-to-year variation in future weather and economic conditions. The forecast, however, provides the baseline around which this variability is likely to occur.

*Figure ES - 1. Comparison of Demand Forecast with 2010 UWMP Forecast*

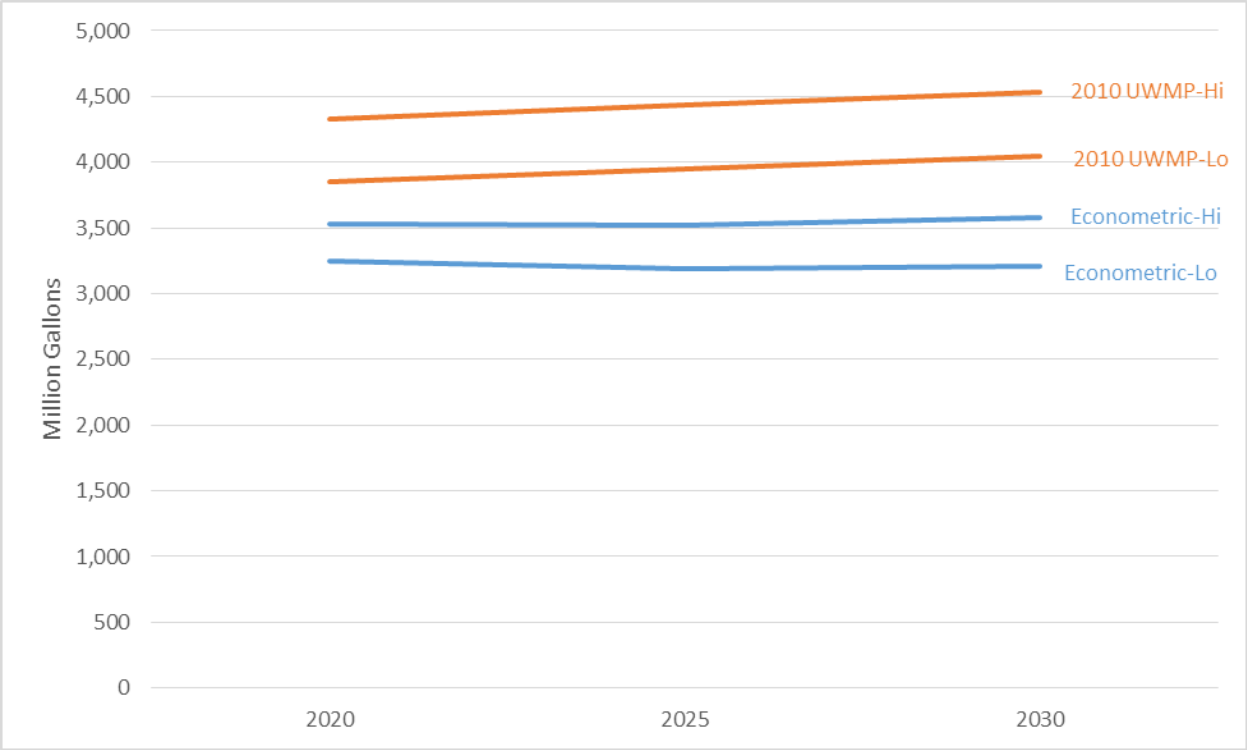


*Figure ES - 2. Comparison of Demand Forecast with Interim WSAC Demand Forecast*

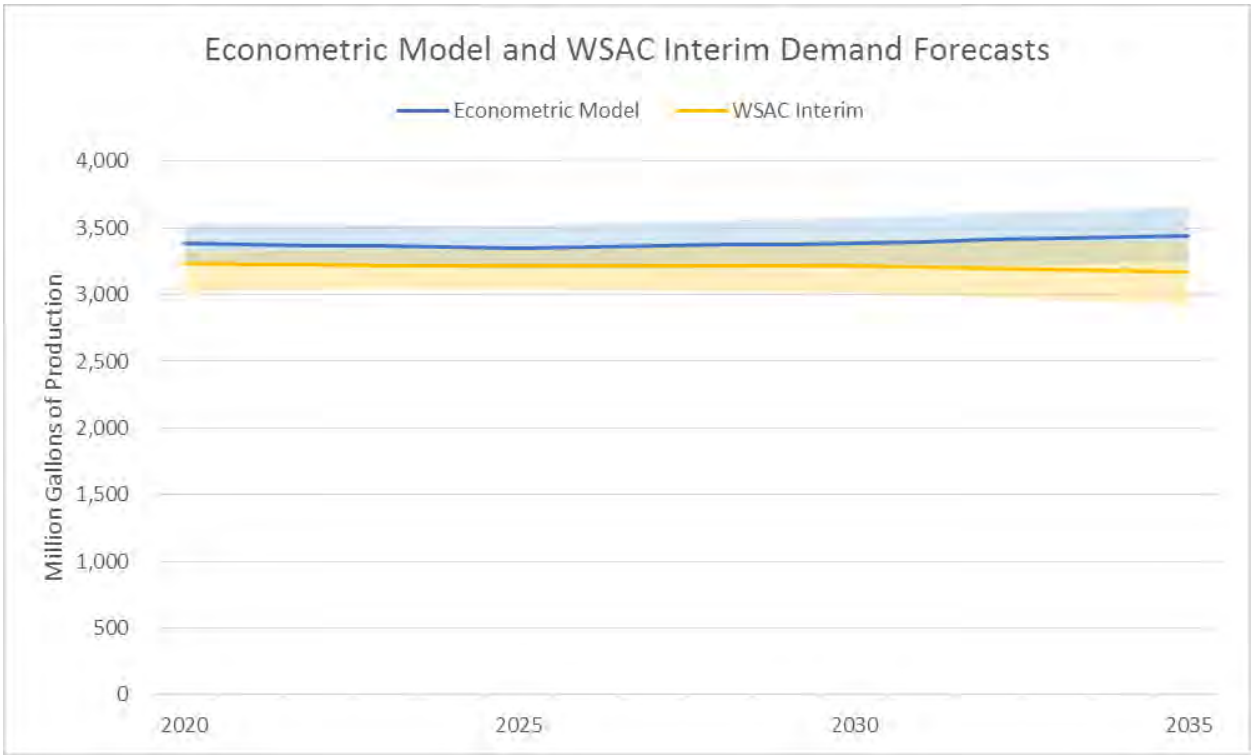



*Figure ES - 3. Historical and Forecast Production in Millions of Gallons*

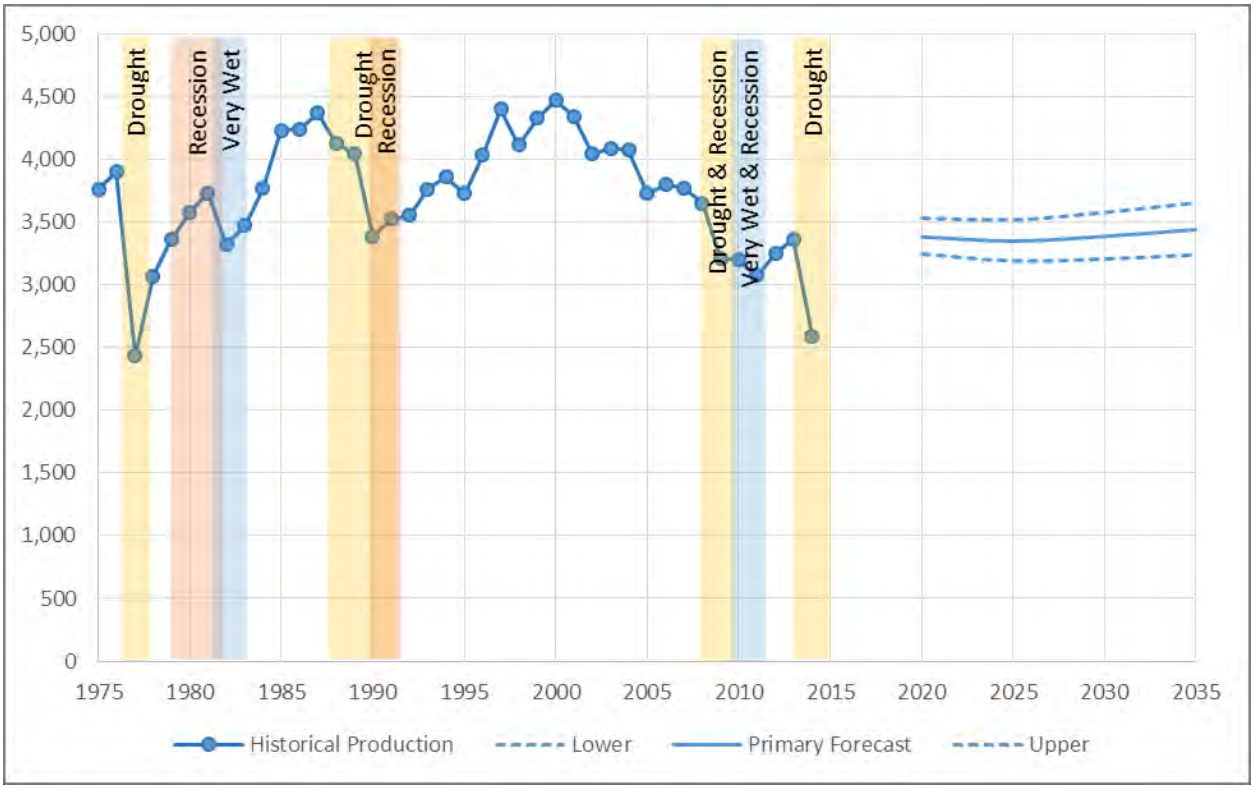


*Table ES - 6. Primary Forecast of Class Demands and System Production*

| **YEAR** | | **2020** | **2025** | **2030** | **2035** |
|---|---|---|---|---|---|
| | | Forecast | Forecast | Forecast | Forecast |
| **Service Units** | **Units** | | | | |
| SFR | Housing Units | 19,456 | 19,854 | 20,260 | 20,636 |
| MFR | Housing Units | 18,867 | 19,430 | 20,416 | 21,174 |
| BUS | Services | 1,948 | 1,971 | 2,008 | 2,055 |
| IND | NA | NA | NA | NA | NA |
| MUN | Services | 218 | 218 | 218 | 218 |
| IRR | Services | 651 | 723 | 845 | 951 |
| GOLF | Acres | 119 | 109 | 99 | 99 |
| UC | NA | NA | NA | NA | NA |
| **Avg Demand** | **Units** | | | | |
| SFR | CCF | 86 | 83 | 80 | 78 |
| MFR | CCF | 56 | 52 | 50 | 49 |
| BUS | CCF | 400 | 389 | 382 | 377 |
| IND | NA | NA | NA | NA | NA |
| MUN | CCF | 296 | 290 | 283 | 277 |
| IRR | CCF | 286 | 271 | 257 | 244 |
| GOLF | CCF | 671 | 641 | 606 | 593 |
| UC | NA | NA | NA | NA | NA |
| **Annual Demand** | **Units** | | | | |
| SFR | MG | 1,256 | 1,228 | 1,208 | 1,196 |
| MFR | MG | 792 | 759 | 766 | 775 |
| BUS | MG | 583 | 573 | 575 | 580 |
| IND | MG | 57 | 59 | 61 | 62 |
| MUN | MG | 48 | 47 | 46 | 45 |
| IRR | MG | 139 | 147 | 163 | 174 |
| GOLF | MG | 60 | 52 | 45 | 44 |
| UC | MG | 196 | 234 | 271 | 308 |
| **Total Demand** | **MG** | **3,131** | **3,099** | **3,134** | **3,184** |
| MISC/LOSS | MG | 254 | 251 | 254 | 258 |
| **Total Production** | **MG** | **3,385** | **3,351** | **3,388** | **3,442** |
| **Rounded** | **MG** | **3,400** | **3,400** | **3,400** | **3,400** |

*Table ES - 7. Lower Bound Forecast of Class Demands and System Production*

| **YEAR** | | **2020** | **2025** | **2030** | **2035** |
|---|---|---|---|---|---|
| | | Forecast | Forecast | Forecast | Forecast |
| **Service Units** | **Units** | | | | |
| SFR | Housing Units | 19,456 | 19,854 | 20,260 | 20,636 |
| MFR | Housing Units | 18,867 | 19,430 | 20,416 | 21,174 |
| BUS | Services | 1,948 | 1,971 | 2,008 | 2,055 |
| IND | NA | NA | NA | NA | NA |
| MUN | Services | 218 | 218 | 218 | 218 |
| IRR | Services | 651 | 723 | 845 | 951 |
| GOLF | Acres | 119 | 109 | 99 | 99 |
| UC | NA | NA | NA | NA | NA |
| **Avg Demand** | **Units** | | | | |
| SFR | CCF | 83 | 79 | 76 | 74 |
| MFR | CCF | 54 | 50 | 48 | 46 |
| BUS | CCF | 389 | 377 | 370 | 364 |
| IND | NA | NA | NA | NA | NA |
| MUN | CCF | 271 | 264 | 256 | 248 |
| IRR | CCF | 260 | 245 | 231 | 218 |
| GOLF | CCF | 553 | 521 | 485 | 466 |
| UC | NA | NA | NA | NA | NA |
| **Annual Demand** | **Units** | | | | |
| SFR | MG | 1,208 | 1,178 | 1,155 | 1,142 |
| MFR | MG | 764 | 728 | 731 | 736 |
| BUS | MG | 567 | 556 | 556 | 560 |
| IND | MG | 56 | 58 | 59 | 60 |
| MUN | MG | 44 | 43 | 42 | 40 |
| IRR | MG | 126 | 133 | 146 | 155 |
| GOLF | MG | 49 | 42 | 36 | 35 |
| UC | MG | 186 | 213 | 240 | 268 |
| **Total Demand** | **MG** | **3,001** | **2,951** | **2,965** | **2,995** |
| MISC/LOSS | MG | 243 | 239 | 240 | 243 |
| **Total Production** | **MG** | **3,244** | **3,190** | **3,206** | **3,238** |
| **Rounded** | **MG** | **3,200** | **3,200** | **3,200** | **3,200** |

*Table ES - 8. Upper Bound Forecast of Class Demands and System Production*

| **YEAR** | | **2020** | **2025** | **2030** | **2035** |
|---|---|---|---|---|---|
| | | Forecast | Forecast | Forecast | Forecast |
| **Service Units** | **Units** | | | | |
| SFR | Housing Units | 19,456 | 19,854 | 20,260 | 20,636 |
| MFR | Housing Units | 18,867 | 19,430 | 20,416 | 21,174 |
| BUS | Services | 1,948 | 1,971 | 2,008 | 2,055 |
| IND | NA | NA | NA | NA | NA |
| MUN | Services | 218 | 218 | 218 | 218 |
| IRR | Services | 651 | 723 | 845 | 951 |
| GOLF | Acres | 119 | 109 | 99 | 99 |
| UC | NA | NA | NA | NA | NA |
| **Avg Demand** | **Units** | | | | |
| SFR | CCF | 90 | 86 | 83 | 81 |
| MFR | CCF | 58 | 54 | 53 | 52 |
| BUS | CCF | 412 | 401 | 395 | 391 |
| IND | NA | NA | NA | NA | NA |
| MUN | CCF | 323 | 318 | 313 | 308 |
| IRR | CCF | 315 | 300 | 287 | 274 |
| GOLF | CCF | 814 | 790 | 758 | 754 |
| UC | NA | NA | NA | NA | NA |
| **Annual Demand** | **Units** | | | | |
| SFR | MG | 1,305 | 1,280 | 1,262 | 1,253 |
| MFR | MG | 820 | 792 | 803 | 816 |
| BUS | MG | 601 | 591 | 594 | 601 |
| IND | MG | 57 | 60 | 63 | 64 |
| MUN | MG | 53 | 52 | 51 | 50 |
| IRR | MG | 153 | 162 | 181 | 195 |
| GOLF | MG | 72 | 64 | 56 | 56 |
| UC | MG | 207 | 254 | 302 | 349 |
| **Total Demand** | **MG** | **3,268** | **3,255** | **3,311** | **3,383** |
| MISC/LOSS | MG | 265 | 264 | 268 | 274 |
| **Total Production** | **MG** | **3,533** | **3,519** | **3,580** | **3,658** |
| **Rounded** | **MG** | **3,500** | **3,500** | **3,600** | **3,700** |

# 1 INTRODUCTION

## 1.1 NEED FOR UPDATED DEMAND FORECAST

The City of Santa Cruz is currently undertaking a comprehensive evaluation of its future water supply and infrastructure requirements. The forecast of future water demand is a foundational component to this assessment. In recent years the historical patterns of water demand have been upended by a variety of factors, including the cumulative effects of tighter efficiency standards for appliances and plumbing fixtures, greater investment in conservation, a significant uptick in water rates, an equally significant downturn in economic activity during the Great Recession, and on-going drought. These events have resulted in even more uncertainty than usual regarding future water demand and have placed even greater importance on sorting out the effect each has had on demand in recent years as well as how they are likely to affect demand going forward.

The City of Santa Cruz has appointed a public Water Supply Advisory Committee (WSAC) to examine the City's water supply situation. Its specific charge, as stated in its Charter, is to

> *explore, through an iterative, fact-based process, the City's water profile, including supply, demand and future risks; analyze potential solutions to deliver a safe, adequate, reliable, affordable, and environmentally sustainable water supply and develop recommendations for City Council consideration.*

The Water Department last prepared a formal forecast of water demand as part of its 2010 Urban Water Management Plan (UWMP). That forecast covered the period 2010 to 2030. The forecast reflected average consumption levels circa 2008 and growth projections based on the City's General Plan, UC Santa Cruz's (UCSC) Long Range Development Plan (LRDP) and Association of Monterey Bay Area Governments (AMBAG) population and housing projections. The 2010 UWMP forecast did not account for potential effects of future conservation, higher water rates, or other factors affecting average water use over time. Since the adoption of its 2010 UWMP, actual demand has trended well below forecasted demand. Drought, economic recession, higher water rates, and conservation have been cited as possible reasons for the divergence.

One of the first requests made by the WSAC was for the Water Department to update the demand forecast to reflect current information on water usage and to account for effects of conservation, water rates, and other factors expected to impact the future demand for water. Because of timing considerations, it was decided to do this in two steps. First, the Water Department would prepare an interim demand forecast based on the 2010 UWMP forecast. The interim forecast would extend the forecast period to 2035 and include adjustments for conservation and rate effects as well as incorporate new information on economic development and expansion of UCSC. The data and methods used to develop the interim forecast are documented in two Technical Memoranda (M.Cubed 2015a, M.Cubed 2015b). Second, the Water Department would compile data and complete statistical models needed to prepare a new demand forecast. The remainder of this report describes the data and methods used to prepare the new demand forecast that replaces the interim forecast.

## 1.2 Project Objective

The objective of this project is to develop statistically-based models of water demand that will be used to support WSAC deliberations as well as the 2015 UWMP being developed by the Water Department. Demand forecasts based on these models will cover the period 2020-2035 and will incorporate empirical relationships between water use and key explanatory variables, including season, weather, water rates, household income, employment, and drought restrictions.

## 1.3 Report Organization

The remainder of this report is organized as follows. In Section 2, the statistical models of average demand are presented, including general approach, data development, model definition, model estimation, and forecasts of average demand by customer class. In Section 3, forecasts of population, housing units, and services are presented. The population and housing unit forecasts are derived from the most recently adopted AMBAG regional forecasts (AMBAG, 2014). Forecasts of non-residential services (e.g. business, irrigation, golf, and municipal) are derived from the residential projections using empirical relationships between the different sectors. In Section 4, forecasts of water demand are developed by combining the forecasts of average demand with the forecasts of housing units and non-residential services. Industrial and UCSC demands, which are treated separately from the other customer categories, are also addressed in this section. In Section 5, a comparison of the new forecast with previous forecasts is presented.

# 2 Statistical Models of Average Demand

## 2.1 Approach

The general approach is to statistically estimate class-level conditional expectation functions of water demand using historical data on class water use, weather, water price, household income, conservation, and other economic variables driving water demand. The result for each customer class is a monthly model of average water use per housing unit (for single- and multi-family residential classes), service (for business, municipal, and irrigation classes), or acre (for golf courses), which can then be combined with forecasts of housing units, services, and acres, to forecast future water demands. The conditional expectation functions are used with forecasts of future conservation, water rates, household income, unemployment, and other economic factors to predict the trajectory of average water use over the forecast period. This represents a key departure from the 2010 UWMP forecast methodology, which relied on static average use estimates to forecast future demands.

## 2.2 Model Definition

The model of expected demand builds on similar models of water demand developed for the California Urban Water Conservation Council (Western Policy Research, 2011), Bay Area Water Supply and Conservation Agency (Western Policy Research, 2014), California Water Services Company (A&N Technical Services, 2014, M.Cubed 2015), and Contra Costa Water District (M.Cubed 2014).

The model of expected demand has several useful features. First, climate and weather effects on demand are decomposed into two distinct components. The climate component measures the seasonal

load shape of monthly demand under normal weather conditions. The weather component measures the effect on demand when weather departs from normal conditions. The seasonal and weather components can be interacted to get season-specific weather effects. This is useful if the response to weather is expected to vary by season. For example, the effect of above normal rainfall on demand in winter, when outdoor water uses are lower, may be different than its effect in spring or fall, when outdoor water uses are higher. Second, prior to model estimation, monthly water use is adjusted for historical conservation from plumbing codes. This helps to address the confounding effect of conservation on the estimation of other demand parameters like price, employment, and income. Third, the model includes economic parameters (e.g. price, household income, unemployment) known to influence urban water demand (Renzetti, 2002; Billings and Jones, 1996). Fourth, the model includes drought policy parameters to measure the effect of drought restrictions on demand. Thus, expected demand can be expressed conditional on season, weather, conservation, economic conditions, and drought stage.

The model of expected demand is stated as:

$$ln(\tilde{y}_{it}) = \mu_i + \beta_S Season_t + \beta_W Weather_t + \beta_E Economic_{it} + \beta_D Drought_t + \varepsilon_{it} \quad (1)$$

Where:

| | |
|---|---|
| $\tilde{y}_{it}$ | average use in month t for service region i adjusted to remove the effects of water savings due to plumbing codes and appliance standards |
| $\mu_i$ | model intercept for service region i |
| $\beta_S Season_t$ | seasonal component of average use in month t |
| $\beta_W Weather_t$ | weather component of average use in month t |
| $\beta_E Economic_{it}$ | economic component of average use in month t |
| $\beta_D Drought_t$ | drought component of average use in month t |
| $\varepsilon_{it}$ | stochastic component (error term) |

The seasonal component is specified using eleven monthly indicator variables. The monthly indicator variables take the value of one if t = j, and zero otherwise.

$$\beta_S Season_t = \sum_{j=2}^{12} \beta_j \, month_{jt} \quad (2)$$

The eleven monthly parameters plus the model intercept describe the seasonal load shape of average demand. A seasonal index of monthly demand, where January has an index value of one, is easily constructed as shown in Table 1. The eleven seasonal parameters are seen to scale monthly demand relative to January demand.

*Table 1. Seasonal Index of Monthly Average Demand*

| Month | Seasonal Index | Month | Seasonal Index |
|---|---|---|---|
| Jan | 1 | Jul | $e^{\beta_7}$ |
| Feb | $e^{\beta_2}$ | Aug | $e^{\beta_8}$ |
| Mar | $e^{\beta_3}$ | Sep | $e^{\beta_9}$ |
| Apr | $e^{\beta_4}$ | Oct | $e^{\beta_{10}}$ |
| May | $e^{\beta_5}$ | Nov | $e^{\beta_{11}}$ |
| Jun | $e^{\beta_6}$ | Dec | $e^{\beta_{12}}$ |

The weather component is comprised of weather measures (monthly rainfall, monthly average of maximum daily air temperatures, monthly ETo) that are transformed logarithmically with their monthly average subtracted away. In the case of rainfall, both contemporaneous and lagged measures are included in the model.

$$\beta_W Weather_t = \beta_{w1} dlR_t + \beta_{w2} dlR_{t-1} + \beta_{w3} dlR_{t-2} + \beta_{w4} dlT_t \ (or\ dlET_t) \quad (3)$$

Where[4]

$$dlR_t = ln(Rain_t + 1) - \overline{ln(Rain_t + 1)} \quad (4)$$

$$dlT_t = ln(Temp_t) - \overline{ln(Temp_t)} \quad (5)$$

$$dlET_t = ln(ET_t) - \overline{ln(ET_t)} \quad (6)$$

For the residential and business customer classes, average daily maximum air temperature is used rather an ET. For the golf, irrigation, and municipal categories, which have greater landscape water uses, ET is used.

The percentage effect on demand due to changes in weather can be calculated from the model parameters and weather observations. Let α be a scalar that expresses the weather measure as a percentage of the observed weather measure. If, for example, α is 1.1, then $\alpha R_t$ would be 110% of observed rainfall. For any $\alpha R_t$, the expected change in average demand, all else equal, is

$$\%\ change\ in\ average\ demand\ given\ (\alpha - 1)\%\ change\ in\ rain = \left(\frac{\alpha R_t + 1}{R_t + 1}\right)^{\beta_{w1}} - 1 \quad (7)$$

For temperature or ET, which do not have one added to their values prior to transforming them logarithmically, the calculation is even simpler.

$$\%\ change\ in\ average\ demand\ given\ (\alpha - 1)\%\ change\ in\ temp\ or\ ET = \alpha^{\beta_{w4}} - 1 \quad (8)$$

[4] One is added to monthly rain totals to ensure the rainfall measure is defined in months in which total rainfall is zero.

During model estimation, the weather component is interacted with seasonal indicators to estimate separate seasonal weather effects for fall-winter (Nov-Mar), spring (Apr-Jun), and summer-fall (Jul-Oct).[5]

Weather normalization of historical demands can be done in two ways. The first way is to use the predicted model values assuming average weather. In this case the model's weather component simply falls away and we are left with:

$$Weather\ Normalized\ \tilde{y}_{it} = exp(\mu_i + \beta_S Season_t + \beta_E Economic_{it}) \quad (9)$$

The second approach is to rescale observed water use using the estimated weather effects. The ratio of observed to weather normalized demand is

$$WeatherEffect_t = exp\left(\beta_{w1} dlR_t + \beta_{w2} dlR_{t-1} + \beta_{w3} dlR_{t-2} + \beta_{w4} dlT_t\ (or\ dlET_t)\right) \quad (10)$$

Weather normalized observed demand is then given by

$$Weather\ Normalized\ \tilde{y}_{it} = \frac{\tilde{y}_{it}}{WeatherEffect_t} \quad (11)$$

The economic component consists of economic variables that influence average water demand, including water price, household income, vacancy rate, and unemployment rate.

$$\beta_E Economic_{it} = \beta_{E1} lPrice_{it} + \beta_{E2} lInc_{it} + \beta_{E3} dlVac_t + \beta_{E4} dlUnempl_t \quad (12)$$

Where

$$lPrice_{it} = ln(marginal\ price)\ in\ service\ region\ i, period\ t \quad (13)$$

$$lInc_{it} = ln(median\ household\ income)\ in\ service\ region\ i, period\ t \quad (14)$$

$$dlVac_t = ln(housing\ vacancy\ rate) - \overline{ln(housing\ vacancy\ rate)} \quad (15)$$

$$dlUnempl_t = \ln(unemployment\ rate) - \overline{\ln(unemployment\ rate)} \quad (16)$$

The economic variables are logarithmically transformed prior to model estimation. The vacancy rate and unemployment rate variables are expressed as departures from their long-run average values. Each customer class model uses a restricted form of equation 12, as shown in the following table. These restrictions are guided both by economic theory and model diagnostics. For the single family model, the primary economic drivers are marginal water price and household income. For the multi-family model, vacancy rate replaces household income. For the business and municipal class models, marginal price and unemployment measures are used. For golf and irrigation, only marginal price is included in the models.

[5] The seasonal construct follows the CUWCC's GPCD weather normalization methodology (Western Policy Research, 2011).

*Table 2. Economic Variable Restrictions in Customer Class Models*

| Customer Class Model | Economic Variable Restrictions |
|---|---|
| Single Family | $\beta_{E3} = \beta_{E4} = 0$ |
| Multi Family | $\beta_{E2} = \beta_{E4} = 0$ |
| Business, Municipal | $\beta_{E2} = \beta_{E3} = 0$ |
| Golf, Irrigation | $\beta_{E2} = \beta_{E3} = \beta_{E4} = 0$ |

## 2.3 DATA DEVELOPMENT

### 2.3.1 Water Consumption

The models were estimated with monthly consumption data for the period January 2000 to November 2014. Class-level aggregated meter read data were obtained from the Water Department. The Water Department data were separated between Inside City and Outside City accounts, and contained aggregated data from both bi-monthly and monthly meter read cycles. Before the data could be used for model estimation, it had to be transformed into estimated aggregate monthly consumption. This was done as follows:

- Aggregated meter read data were allocated to consumption month using the share of total consumption days in each month represented in the aggregated meter read data.
- In the case of aggregated data from bi-monthly meter reads done in month t, the aggregated consumption was allocated approximately 25% to month t-2, 50% to month t-1, and 25% to month t. Thus for data from meters read in March, approximately 25% of the consumption was allocated to January, 50% to February, and 25% to March.
- In the case of aggregated data from monthly meter reads done in month t, the aggregated consumption was allocated approximately 50% to month t-1 and 50% to month t. Thus for data from monthly meters read in March, approximately 50% was allocated to February and 50% to March.
- The allocation percentages cited above are approximate values. To do the actual allocations, seasonal weights were applied to each month to account for the seasonal shape of consumption. The seasonal weights and allocation percentages for each customer class are provided in Attachment 1.
- For Inside City customers, meters were read on a bi-monthly schedule until 2005, when the City started billing customers on a monthly cycle. In the case of Outside City customers, bi-monthly billing was continued until 2014.

Once aggregate monthly consumption was estimated, it was divided by the annual number of housing units (for single and multi-family classes), services (for business, municipal, and irrigation classes), or acres (for golf courses) to get average monthly consumption. Figure 1 illustrates the transformation of the raw aggregated meter read data into its corresponding estimated monthly aggregate and average consumption for the Inside City Single Family customer class. The erratic pattern in the raw meter read

data prior to 2005 is primarily due to variability in the number of meters being read in a month and thus total consumption recorded in the aggregate data.[6]

### 2.3.2 Weather

The weather variables were constructed from monthly data on precipitation, ETo, and average maximum air temperature from October 1990 to April 2015 taken from CIMIS Station 104 (De Laveaga), which is situated within Santa Cruz city limits. Even though model estimation uses monthly data from 2000 to 2014, the average weather values used in equations (4) – (6) are based on the full 1990 to 2015 data series – i.e., they are 25 year normals. The weather data used to estimate the models are provided in Attachment 2.

### 2.3.3 Economic Variables

The economic data came from multiple sources. The water rate data set was constructed with Water Department records of water rates for each customer class. Annual unemployment rates in Santa Cruz for the period 1990 to 2014 come from the California Employment Development Department. Median and per capita income estimates for Inside City and Outside City customers come from Decennial Census and American Community Survey data. The income data cover estimation years 2000 and 2005-2013. Values for other years were imputed. Average annual residential vacancy rates for City of Santa Cruz for the years 1991-2014 are taken from the California Department of Finance (DOF E-8). These data sets are provided in Attachment 3.

### 2.3.4 Conservation Adjustment

Prior to estimating the model given by equation (1), average monthly use was adjusted to remove the effect of plumbing codes. That is, if $y_{it}$ is observed average use and $c_{it}$ is estimated average water savings from plumbing codes in month t, then adjusted average monthly use, $\tilde{y}_{it}$, is given by:

$$\tilde{y}_{it} = y_{it} + c_{it} \tag{17}$$

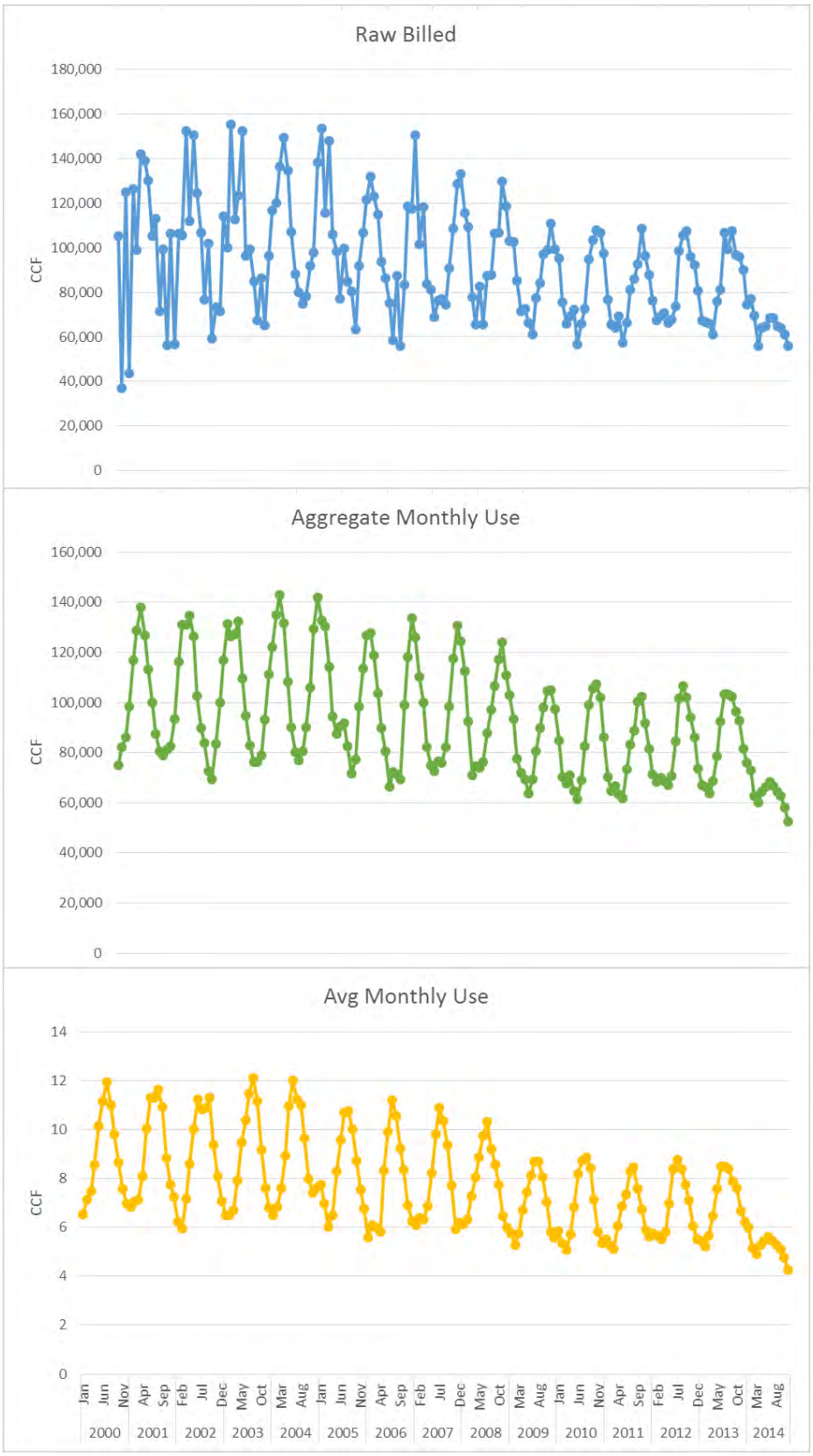
The estimated model yields a predicted value for adjusted monthly use, which we symbolize as $\widehat{\tilde{y}_{it}}$ . The predicted value for observed average use, $\hat{y}_{it}$, is then given by:

$$\hat{y}_{it} = \widehat{\tilde{y}_{it}} - c_{it} \tag{18}$$

This adjustment is made to limit the confounding effect of passive conservation on the estimation of the other economic parameters (e.g. price, income, unemployment). Average monthly passive water savings over the estimation period were estimated using the Alliance for Water Efficiency's Water Conservation Tracking Tool. The conservation adjustment, $c_{it}$, and adjusted average monthly use from which the models were estimated, $\tilde{y}_{it}$, are given in Attachment 4.

[6] In Jan 2000, for example, 7,823 Inside City Single Family meters were read. In Feb 2000, only 3,004 meters were read. In March 2000, 9,529 meters were read, and so on.

*Figure 1. Inside City Single Family Consumption Data*



## 2.4 Model Estimation Results

The average demand models were estimated with R version 3.2 statistical software. Robust regression methods were applied to down-weight outlier consumption data. For customer classes that had both Inside City and Outside City customers (e.g. residential, business, irrigation, and golf) fixed effects models were estimated so that the data could be pooled. Estimation results as summarized by adjusted R-squared are shown in Table 3. Across all classes, the models explain 90% to 99% of the observed variation in the data. All statistically significant model coefficients have the expected signs and magnitudes. Estimation results for each customer class are provided in Attachment 5.

*Table 3. Average Demand Model Estimation, Adjusted R-Square*

| Customer Class | Number of Observations | Adjusted R-Square |
|---|---|---|
| Single Family | 358 | 0.917 |
| Multi Family | 351 | 0.900 |
| Business | 353 | 0.942 |
| Municipal | 177 | 0.951 |
| Irrigation | 358 | 0.916 |
| Golf | 352 | 0.988 |

### 2.4.1 Seasonal Load Shape

The seasonal load shape describes how monthly average demand changes over the year due to seasonal effects. Average demand is lower in the winter months and peaks in the summer months. However, the degree of difference between these periods varies by customer class depending on the extent of irrigation uses. Table 1 shows how the seasonal parameter estimates can be used to estimate a seasonal index for each customer class. The estimated seasonal indices are given in Table 4.[7] The indices express average monthly demand as a percentage of total annual demand. For example, from Table 4 it is seen that single family average demand in May is about 1.6 times greater than average demand in January. More generally, single family average demand in the summer months is a bit less than double winter average demand. Summer peaking for multi-family is much less pronounced, with summer average demand only about 20% greater than winter average demand. Business average demand mostly falls between single- and multi-family average demands. The municipal and irrigation classes show greater peaking than the residential or business categories, with summer average demand five to eight times greater than winter average demand.[8] Average demands by the two golf courses served by the City are almost entirely in the summer. There is very little golf course demand in the winter months.

[7] These have been expressed as average monthly share of total annual demand. Thus the 12 monthly values sum to 100.

[8] Summer peak demands have been greatly reduced during the current drought so that the differential between winter and summer average use has been almost erased. This is likely to be a transitory response to the drought. However, peak demand may not fully return to its historical pattern if the drought induces more drought-tolerant landscaping or the elimination of landscaped area within the service area.

*Table 4. Seasonal Indices of Average Demand*

| | Inside City Seasonal Index [1/] | | | | | |
|---|---|---|---|---|---|---|
| **Month** | **SFR** | **MFR** | **BUS** | **MUN** | **IRR** | **GOLF** |
| **Jan** | 6.0 | 7.6 | 7.0 | 3.1 | 2.0 | 0.0 |
| **Feb** | 5.9 | 7.7 | 7.2 | 3.1 | 2.1 | 0.0 |
| **Mar** | 6.1 | 7.6 | 7.3 | 3.5 | 2.9 | 0.0 |
| **Apr** | 7.1 | 7.9 | 7.8 | 6.8 | 6.9 | 2.2 |
| **May** | 9.5 | 8.8 | 8.9 | 10.6 | 10.8 | 8.5 |
| **Jun** | 10.6 | 9.2 | 9.7 | 13.0 | 13.7 | 16.6 |
| **Jul** | 11.3 | 9.3 | 10.3 | 14.8 | 15.0 | 19.7 |
| **Aug** | 11.1 | 9.2 | 10.2 | 15.2 | 14.4 | 21.4 |
| **Sep** | 10.4 | 8.9 | 9.1 | 12.2 | 13.4 | 17.1 |
| **Oct** | 8.6 | 8.5 | 8.3 | 9.1 | 9.9 | 11.2 |
| **Nov** | 7.0 | 7.9 | 7.3 | 5.3 | 5.8 | 2.7 |
| **Dec** | 6.3 | 7.6 | 6.9 | 3.4 | 3.2 | 0.7 |
| | **Outside City Seasonal Index** [1/] | | | | | |
| **Month** | **SFR** | **MFR** | **BUS** | **MUN** | **IRR** | **GOLF** |
| **Jan** | 6.0 | 7.4 | 7.0 | NA | 2.0 | 0.2 |
| **Feb** | 5.9 | 7.3 | 7.0 | NA | 2.1 | 0.3 |
| **Mar** | 6.1 | 7.4 | 7.2 | NA | 2.9 | 0.4 |
| **Apr** | 7.1 | 8.1 | 8.0 | NA | 6.9 | 3.9 |
| **May** | 9.5 | 8.7 | 8.7 | NA | 10.8 | 9.5 |
| **Jun** | 10.6 | 9.1 | 9.5 | NA | 13.7 | 15.3 |
| **Jul** | 11.3 | 9.4 | 9.8 | NA | 15.0 | 17.9 |
| **Aug** | 11.1 | 9.3 | 9.6 | NA | 14.4 | 19.3 |
| **Sep** | 10.4 | 9.1 | 9.3 | NA | 13.4 | 15.6 |
| **Oct** | 8.6 | 8.4 | 8.5 | NA | 9.9 | 11.3 |
| **Nov** | 7.0 | 8.0 | 7.8 | NA | 5.8 | 5.0 |
| **Dec** | 6.3 | 7.7 | 7.3 | NA | 3.2 | 1.2 |
| 1/ Average monthly share of total annual demand. | | | | | | |

### 2.4.2 Weather Effects

The average demand models include controls for the effects of weather – rainfall and temperature for residential and business classes and rainfall and ETo for municipal, irrigation, and golf classes. During model estimation, the weather component is interacted with seasonal indicators to estimate separate seasonal weather effects for fall-winter (Nov-Mar), spring (Apr-Jun), and summer-fall (Jul-Oct).[9] Estimated weather effects were found to be largest in the spring, when outdoor irrigation can be either accelerated or delayed depending on weather. Spring weather effects are statistically significant in

[9] The seasonal construct follows the CUWCC's GPCD weather normalization methodology (Western Policy Research, 2011).

every class model whereas they are not always statistically significant in the fall-winter or the summer-fall seasons. Table 5 shows the estimated weather parameters for each customer class. As would be expected, average demand is negatively correlated with rainfall and positively correlated with temperature and ETo. With the exception of the multi-family category, average monthly demand is also negatively correlated with lagged rainfall.

Table 5 shows that municipal, irrigation, and golf average demands are more weather sensitive than residential and business average demands. This is expected since outdoor water use makes up a larger share of average demand in these three customer classes. Multi-family demand is the least sensitive to weather.

*Table 5. Statistically Significant Weather Parameters in Average Demand Models*

| **Rainfall** | **SFR** | **MFR** | **BUS** | **MUN** | **IRR** | **GOLF** |
|---|---|---|---|---|---|---|
| Fall-Winter (Nov-Mar) | -0.016 | NS | NS | NS | -0.044[1/] | -0.129 |
| Spring (Apr-Jun) | -0.069 | -0.020 | -0.034 | -0.147 | -0.116 | -0.441 |
| Summer-Fall (Jul-Oct) | -0.040 | -0.018 | -0.028 | NS | -0.085 | -0.038[1/] |
| Lagged 1 month | -0.034 | NS | -0.017[2/] | -0.097 | -0.166 | -0.546 |
| Lagged 2 months | -0.026 | NS | NS | -0.063 | -0.090 | -0.074[1/] |
| **Temperature** | | | | | | |
| Fall-Winter (Nov-Mar) | 0.203 | 0.100[1/] | 0.243 | NA | NA | NA |
| Spring (Apr-Jun) | 0.422 | 0.338 | 0.400 | NA | NA | NA |
| Summer-Fall (Jul-Oct) | 0.636 | NS | NS | NA | NA | NA |
| **ETo** | | | | | | |
| Fall-Winter (Nov-Mar) | NA | NA | NA | 0.516 | 0.509 | 1.135 |
| Spring (Apr-Jun) | NA | NA | NA | 0.804 | 0.660 | 0.173[1/] |
| Summer-Fall (Jul-Oct) | NA | NA | NA | 0.357 | 0.163 | 0.792 |
| 1/ Correct sign but not statistically significant. 2/ Apr-Jun only. NA = Not applicable. NS= Not statistically different from 0. | | | | | | |

Using equations (7) and (8), the effect of a given change in a weather measure on average demand can be calculated using the parameter estimates in Table 5. An example is provided in Table 6, which shows the percentage effect on average demand in January, April, and July, given weather that is one standard deviation above the average for the month. Note that in Table 6 the percentage effect for each weather measure is being calculated independently of the other weather measures to show their relative impact. When doing weather normalization or forecasting, the weather effects need to be combined. For example, if in April, rainfall was one standard deviation above its average and temperature was one standard deviation below its average (i.e., April is wet and cool), the combined effect on single-family demand would be -5.3%.[10]

The estimated weather parameters in Table 5 can also be used to weather normalize historical average demand using equations (10) and (11). An example is provided in Table 7. It shows the estimated

[10] This presumes average lagged rainfall. In this example and in Table 6 the effect of lagged rainfall is being ignored for sake of simplicity.

monthly weather effects and weather normalization factors for the single family and irrigation classes for water year (WY) 2011. Rainfall in WY 2011 was above average in most months and the spring, in particular, was unusually wet. WY 2011 was also cooler than normal in every month. As shown in the table, above average rainfall and below average temperature (and ETo) had a negative effect on average demand. The effect is more pronounced in the irrigation class than in the single family class, but in both cases the effect is substantial, especially in the May-August period.

*Table 6. Percentage Effect on Average Demand if Weather Measure is 1 S.D. above its Average*

| **Rainfall** | **SFR** | **MFR** | **BUS** | **MUN** | **IRR** | **GOLF** |
|---|---|---|---|---|---|---|
| Jan | -0.9% | NS | NS | NS | NS | -7.0% |
| Apr | -3.2% | -0.9% | -1.6% | -6.6% | -5.3% | -18.6% |
| Jul | -0.5% | -0.2% | -0.4% | NS | -1.1% | -1.6% |
| **Temperature** | | | | | | |
| Jan | 1.1% | NS | 1.3% | NA | NA | NA |
| Apr | 2.1% | 1.7% | 2.0% | NA | NA | NA |
| Jul | 3.7% | NS | NS | NA | NA | NA |
| **ETo** | | | | | | |
| Jan | NA | NA | NA | 10.8% | 10.6% | 25.3% |
| Apr | NA | NA | NA | 10.1% | 8.3% | 2.1% |
| Jul | NA | NA | NA | 3.1% | 1.4% | 6.9% |

Note: Rainfall effect is only for change in contemporaneous rainfall. Effects of lagged rainfall are not shown in the table.

*Table 7. Single Family and Irrigation Class Monthly Weather Effects for WY 2011*

| | Monthly Weather Measures | | | | SFR Weather Parameters | | | | Weather Effect [1/] | Normalization Factor [2/] |
|---|---|---|---|---|---|---|---|---|---|---|
| WY 2011 | $dlR_t$ | $dlR_{t-1}$ | $dlR_{t-2}$ | $dlT_t$ | $dlR_t$ | $dlR_{t-1}$ | $dlR_{t-2}$ | $dlT_t$ | | |
| Oct-10 | 0.707 | -0.142 | 0.088 | -0.042 | -0.040 | -0.034 | -0.026 | 0.636 | 0.95 | 1.05 |
| Nov-10 | 0.460 | 0.707 | -0.142 | -0.021 | -0.016 | -0.034 | -0.026 | 0.203 | 0.97 | 1.03 |
| Dec-10 | 0.826 | 0.460 | 0.707 | -0.024 | -0.016 | -0.034 | -0.026 | 0.203 | 0.95 | 1.05 |
| Jan-11 | -0.483 | 0.826 | 0.460 | 0.039 | -0.016 | -0.034 | -0.026 | 0.203 | 0.98 | 1.02 |
| Feb-11 | 0.312 | -0.483 | 0.826 | -0.038 | -0.016 | -0.034 | -0.026 | 0.203 | 0.98 | 1.02 |
| Mar-11 | 1.180 | 0.312 | -0.483 | -0.042 | -0.016 | -0.034 | -0.026 | 0.203 | 0.97 | 1.03 |
| Apr-11 | -0.400 | 1.180 | 0.312 | -0.010 | -0.069 | -0.034 | -0.026 | 0.422 | 0.98 | 1.03 |
| May-11 | 0.481 | -0.400 | 1.180 | -0.031 | -0.069 | -0.034 | -0.026 | 0.422 | 0.94 | 1.07 |
| Jun-11 | 1.028 | 0.481 | -0.400 | -0.068 | -0.069 | -0.034 | -0.026 | 0.422 | 0.90 | 1.11 |
| Jul-11 | 0.080 | 1.028 | 0.481 | -0.018 | -0.040 | -0.034 | -0.026 | 0.636 | 0.94 | 1.06 |
| Aug-11 | -0.027 | 0.080 | 1.028 | -0.065 | -0.040 | -0.034 | -0.026 | 0.636 | 0.93 | 1.07 |
| Sep-11 | -0.056 | -0.027 | 0.080 | -0.027 | -0.040 | -0.034 | -0.026 | 0.636 | 0.98 | 1.02 |
| | Monthly Weather Measures | | | | IRR Weather Parameters | | | | Weather Effect | Normalization Factor |
| WY 2011 | $dlR_t$ | $dlR_{t-1}$ | $dlR_{t-2}$ | $dlET_t$ | $dlR_t$ | $dlR_{t-1}$ | $dlR_{t-2}$ | $dlET_t$ | | |
| Oct-10 | 0.707 | -0.142 | 0.088 | -0.165 | -0.085 | -0.166 | -0.090 | 0.163 | 0.93 | 1.07 |
| Nov-10 | 0.460 | 0.707 | -0.142 | 0.048 | -0.044 | -0.166 | -0.090 | 0.509 | 0.90 | 1.11 |
| Dec-10 | 0.826 | 0.460 | 0.707 | -0.337 | -0.044 | -0.166 | -0.090 | 0.509 | 0.71 | 1.42 |
| Jan-11 | -0.483 | 0.826 | 0.460 | 0.194 | -0.044 | -0.166 | -0.090 | 0.509 | 0.94 | 1.06 |
| Feb-11 | 0.312 | -0.483 | 0.826 | 0.156 | -0.044 | -0.166 | -0.090 | 0.509 | 1.07 | 0.93 |
| Mar-11 | 1.180 | 0.312 | -0.483 | -0.120 | -0.044 | -0.166 | -0.090 | 0.509 | 0.89 | 1.13 |
| Apr-11 | -0.400 | 1.180 | 0.312 | 0.016 | -0.116 | -0.166 | -0.090 | 0.660 | 0.85 | 1.18 |
| May-11 | 0.481 | -0.400 | 1.180 | 0.022 | -0.116 | -0.166 | -0.090 | 0.660 | 0.92 | 1.08 |
| Jun-11 | 1.028 | 0.481 | -0.400 | -0.108 | -0.116 | -0.166 | -0.090 | 0.660 | 0.79 | 1.26 |
| Jul-11 | 0.080 | 1.028 | 0.481 | 0.057 | -0.085 | -0.166 | -0.090 | 0.163 | 0.81 | 1.24 |
| Aug-11 | -0.027 | 0.080 | 1.028 | -0.149 | -0.085 | -0.166 | -0.090 | 0.163 | 0.88 | 1.14 |
| Sep-11 | -0.056 | -0.027 | 0.080 | -0.060 | -0.085 | -0.166 | -0.090 | 0.163 | 0.99 | 1.01 |
| 1/ Calculated with equation (10). 2/ The inverse of the weather effect, per equation (11). | | | | | | | | | | |

### 2.4.3 Economic Effects

The estimated economic parameters are summarized in Table 8. The price and income parameters are elasticities, which measure the percentage change in average demand given a one percent change in price or income. For example, a one percent increase in price would be expected to cause 0.075 and 0.139 percent decreases in winter and summer single family demands, respectively. Similarly, a one percent increase in price would be expected to result in 0.237 and 0.545 percent decreases in municipal and irrigation average demands, respectively.

The estimated price responses for single family are significantly lower than what the interim WSAC forecast assumed: -0.15 versus -0.075 for winter and -0.30 versus -0.139 for summer.[11] However, the estimated price responses for multi-family and business (inside city) are essentially identical to what was assumed in the interim forecast: -0.12 for multi-family and -0.10 for business. Outside city business use showed significantly more price response. As discussed in the next section, it also showed greater response to drought restriction.

[11] In terms of an average annual price response, the interim WSAC forecast assumed an elasticity of -0.24 whereas the econometric analysis indicates the true value is in the neighborhood of -0.11.

The estimated income elasticity for the single family customer class is also very close to the 0.25 assumption used in the interim WSAC forecast. Thus, the econometric analysis mostly confirms the price and income elasticity assumptions used to prepare the interim WSAC demand forecast. Table 8 also confirms the expectation that the magnitude of price response is positively correlated with outdoor irrigation water use. The Pasatiempo golf course is an exception to this general finding. Its price response was not statistically different from zero. Perhaps this is because it is a top tier course and has a substantially higher willingness to pay for water than other irrigators.

*Table 8. Economic Parameter Estimates*

| Parameter | SFR | MFR | BUS | MUN | IRR | GOLF |
|---|---|---|---|---|---|---|
| Price | winter: -0.075 Summer: -0.139 | -0.124 | Inside City: -0.099 Outside City: -0.262 | -0.237 | -0.545 | -0.358[1/] |
| Income | 0.228 | | | | | |
| Vacancy | | -0.164 | | | | |
| Unemployment | | | -0.160 | -0.142 | | |
| 1/Delaveaga price response. Pasatiempo price response not statistically significant. | | | | | | |

The vacancy and unemployment rate parameters measure the effect that deviations from normal have on average demand. That is, how average demand is expected to change if the vacancy or unemployment rate is above or below its long-term average. Both parameters are negative, as expected. A higher rate of vacancy is expected to decrease average multi-family demand. Likewise, a higher rate of unemployment is expected to decrease average business demand. The effect of a departure from normal on average demand can be calculated in the same manner that temperature (or ETo) effects are calculated, per equation (8). For example, a 50% increase in the unemployment rate from its long-term average would be expected to reduce average business demand by approximately 6.4% and municipal demand by approximately 5.6%.[12] Similarly, a vacancy rate that is 20% above its long-term average would be expected to decrease average multi-family demand by about 2.9%.

### 2.4.4 Drought Effects

The model's drought component uses an indicator variable for each drought stage that takes the value of one if the drought stage was in effect and zero otherwise. The months in which each drought stage was in effect during the model estimation period are shown in Attachment 6. The estimated drought stage parameters are shown in Table 9.

[12] For business, the effect is calculated as $1.5^{-0.16} - 1 = 0.0643$; while for municipal the effect is calculated as $1.5^{-0.142} - 1 = 0.0559$.

*Table 9. Estimated Drought Stage Parameters*

| Parameter | SFR | MFR | BUS | MUN | IRR | GOLF |
|---|---|---|---|---|---|---|
| Stage 1 | -0.051 | -0.009 1/ | NS | NS | -0.077 1/ | NS |
| Stage 2 | -0.071 | -0.028 | NS | -0.108 | -0.250 | NS |
| Stage 3 | -0.431 | -0.192 | Inside City: -0.123 Outside City: -0.191 | -0.621 | -0.930 | -0.319 |
| NS = not statistically different from zero. 1/ correct sign but not statistically different from zero. | | | | | | |

The average percentage effect of a drought stage on average demand is estimated by exponentiating the parameter estimates in Table 9 and subtracting one from the result. Thus, the expected reduction in single family average demand during a Stage 1 drought restriction is $e^{-0.051} - 1 = -0.0497$, or about 5%. Table 10 shows the estimated average change in monthly demand by drought stage and customer class.

*Table 10. Percent Reduction in Average Demand by Drought Stage and Customer Class*

| Stage | SFR | MFR | BUS | MUN | IRR | GOLF |
|---|---|---|---|---|---|---|
| Stage 1 | -5% | -1% 1/ | NS | NS | -7% 1/ | NS |
| Stage 2 | -7% | -3% | NS | -10% | -22% | NS |
| Stage 3 | -35% | -17% | Inside City: -12% Outside City: -17% | -46% | -61% | -27% |
| NS = not statistically different from zero. 1/ correct sign but not statistically different from zero. | | | | | | |

## 2.5 Forecasts of Average Demand by Customer Class

Class-level forecasts of average demand derived from the econometric models are shown in Table 11. These forecasts are based on the water rate and income growth assumptions developed for the interim WSAC demand forecast and have been adjusted for plumbing code and Program A water savings. The water rate and income growth forecasts are provided in Attachment 7. The plumbing code and Program A water savings forecasts are provided in Attachment 8. The forecasts in Table 11 assume normal weather and economic conditions.[13] The 95% confidence interval for each forecast is shown in the column to the right of the forecast.[14]

[13] This means the weather, unemployment rate, and housing vacancy rate variables are set to their long-term average values in the forecast.

[14] Given a vector of forecast inputs, $\mathbf{x}_0$, the predicted mean response, $y_0$, is $y_0 = \mathbf{x}_0'\mathbf{b}$, where $\mathbf{b}$ is the vector of estimated model coefficients. The 100(1-α)% confidence interval for the expected value of the mean response is $\pm t_c(\frac{\alpha}{2}, n-p-1)\sqrt{\hat{\sigma}^2 \mathbf{x}_0'(\mathbf{X}'\mathbf{W}\mathbf{X})^{-1}\mathbf{x}_0}$, where $\mathbf{X}$ is the n x p design matrix used to estimate the model, $\mathbf{W}$ is the n x n diagonal matrix of estimation weights, $\hat{\sigma}$ is the estimated standard error of the model, n is the number of

The predicted decreases in residential and business average use over the forecast period is due to the combination of plumbing code and Program A water savings and the effects of increasing water rates. Higher water costs are the primary factor in the predicted decreases for municipal and irrigation average uses. The predicted decrease in average golf use reflects both a response to higher water costs and the expected decrease in acreage irrigated with City water at the Pasatiempo golf course.[15]

The 95% confidence intervals are generally in the ± 3 to 10% range. The confidence intervals for golf are an exception. They are wider because of the significant within-month variation in water use over the model estimation period. The increasing width of all the intervals over the forecast horizon is a reflection of the greater uncertainty associated with outer years of the forecast.[16]

*Table 11. Forecasted Average Demand by Customer Class (CCF/Year)*

| YEAR | | 2013 | 2020 | | 2025 | | 2030 | | 2035 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Per | Actual [1/] | Forecast | CI | Forecast | CI | Forecast | CI | Forecast | CI |
| Single Family | Housing Unit | 87 | 86 | ± 3 | 83 | ± 3 | 80 | ± 4 | 78 | ± 4 |
| Multi Family | Housing Unit | 53 | 56 | ± 2 | 52 | ± 2 | 50 | ± 2 | 49 | ± 3 |
| Business | Service | 405 | 400 | ± 12 | 389 | ± 12 | 382 | ± 13 | 377 | ± 13 |
| Municipal | Service | 388 | 296 | ± 26 | 290 | ± 27 | 283 | ± 29 | 277 | ± 30 |
| Irrigation | Service | 365 | 286 | ± 28 | 271 | ± 28 | 257 | ± 28 | 244 | ± 28 |
| Golf | Acre | 990 | 671 | ± 130 | 641 | ± 134 | 606 | ± 137 | 593 | ± 144 |

1/ Actual use, unadjusted for weather or economy. Stage 1 drought water use restrictions in effect May - Dec.

CI = 95% confidence interval.

observations, p is the number of parameter estimates, and $t_c$ is the t-distribution critical value given n-p-1 degrees of freedom.

[15] Average golf use in Table 11 is an acreage-weighted average of the two golf courses the City serves. Historically, Pasatiempo average water use per acre has been greater than Delaveaga. Therefore, as Pasatiempo's share of total golf acreage irrigated with City water decreases over the forecast, average use per acre also decreases.

[16] The confidence intervals only reflect uncertainty in the estimate of adjusted average use, $\widehat{\bar{y}_{it}}$, which is derived from the econometric models. The DSS model, which generated the forecast of plumbing code and Program A water savings, is not a statistical model and forecast errors cannot be derived from its output. The confidence intervals in Table 11 therefore are implicitly assuming 100% accuracy in the plumbing code and Program A water savings forecasts.

# 3 FORECASTS OF POPULATION, HOUSING, AND SERVICES

## 3.1 APPROACH

The population and housing unit forecasts are based on the AMBAG 2014 Regional Growth Forecast (AMBAG 2014). The forecasts of business and irrigation services are in turn driven by the residential forecasts. Currently, Water Department staff do not expect appreciable growth in the number of municipal services. Municipal services are therefore assumed to remain at their current number throughout the forecast period.

## 3.2 FORECAST DEVELOPMENT

### 3.2.1 Population

The forecast of service area population is divided into its inside-city and outside-city components. The inside-city component comes directly from the AMBAG 2014 Regional Growth Forecast (AMBAG 2014) and is inclusive of the UCSC population. The outside-city component was derived by Water Department staff using data from the 2014 Regional Growth Forecast. The component population forecasts and total service area population forecast are shown in Table 12.

*Table 12. Service Area Population Forecast*

| | 2010 [1/] | 2020 | 2025 | 2030 | 2035 |
|---|---|---|---|---|---|
| Inside-City [2/] | 59,946 | 66,860 | 70,058 | 73,375 | 76,692 |
| Outside-City [3/] | 31,342 | 32,543 | 33,562 | 34,614 | 35,698 |
| Service Area | 91,288 | 99,403 | 103,620 | 107,989 | 112,390 |

Notes:
1/ Actual per 2010 Census
2/ AMBAG 2014 Regional Growth Forecast (adopted June 11, 2014). Includes UCSC population.
3/ Developed by Water Department Staff from 2014 Regional Growth Forecast data.

### 3.2.2 Housing Units

The forecast of occupied housing units is calculated by dividing the population in households by average household size. This is the same methodology AMBAG uses, but we use our own forecast of population in households.[17]

For the inside-city portion of the service area, the population in households is the total inside-city population from Table 12 less the UCSC campus population and the off campus population in group quarters. AMBAG's student enrollment forecast is multiplied by the ratio of students living on campus to total enrollment to get the UCSC campus population estimate (see Attachment 9). The ratio of group quarters population to total (non-campus) population is then multiplied by total (non-campus)

[17] We use our own forecast for two reasons. First, the AMBAG forecast only covers the inside-city (i.e. City of Santa Cruz) portion of the service area. Second, AMBAG's City of Santa Cruz housing unit forecast incorrectly equates student enrollment with campus population, causing it to underestimate off-campus housing units.

population to get the group quarters population estimate.[18] The household population is the residual population. These calculations are shown in Table 13 for the inside-city portion of the service area.

The same approach is used to forecast household population for the outside-city portion of the service area, except that no adjustment for campus population is required. Table 14 gives the outside-city household population forecast.

*Table 13. Inside-City Household Population Forecast*

| | **2010** [1/] | **2020** | **2025** | **2030** | **2035** |
|---|---|---|---|---|---|
| Total Population | 59,946 | 66,860 | 70,058 | 73,375 | 76,692 |
| Adjustments | | | | | |
| Campus population [2/] | 7,331 | 8,845 | 9,602 | 10,359 | 11,116 |
| Group quarters [3/] | 1,904 | 2,099 | 2,188 | 2,280 | 2,373 |
| Non-household population | 9,235 | 10,944 | 11,790 | 12,639 | 13,489 |
| Population In households [4/] | 50,711 | 55,916 | 58,268 | 60,736 | 63,203 |

Notes
1/ Actual per 2010 Census.
2/ See Attachment 9 for calculation.
3/ Ratio of group quarters population to total (non-campus) population from 2010 Census multiplied by total (non-campus) population.

*Table 14. Outside-City Household Population Forecast*

| | **2010** [1/] | **2020** | **2025** | **2030** | **2035** |
|---|---|---|---|---|---|
| Total Population | 31,342 | 32,543 | 33,562 | 34,614 | 35,698 |
| Group quarters adjustment [2/] | 665 | 690 | 712 | 734 | 757 |
| Population In households | 30,677 | 31,853 | 32,850 | 33,880 | 34,941 |

Notes
1/ Actual per 2010 Census
2/ Ratio of group quarters population to total population from 2010 Census multiplied by total population.

Total occupied housing units are then estimated by dividing household population by average household size. Average household size starts with the 2010 Census estimate, which is then scaled to increase at the same rate as average household size in the AMBAG 2014 Regional Growth Forecast. The forecast of

[18] The ratio of within-city population in group quarters to total population (excluding campus population) is calculated from 2010 Census data. This ratio is approximately 0.0362, or 3.62% of the population.

total occupied housing units for the inside- and outside-city portions of the service are shown in Table 15.[19]

*Table 15. Forecast of Occupied Housing Units*

| | 2010 1/ | 2020 | 2025 | 2030 | 2035 |
|---|---|---|---|---|---|
| Household Population | | | | | |
| Inside-City | 50,711 | 55,916 | 58,268 | 60,736 | 63,203 |
| Outside-City | 30,677 | 31,853 | 32,850 | 33,880 | 34,941 |
| Average Household Size 2/ | | | | | |
| Inside-City | 2.34 | 2.38 | 2.41 | 2.42 | 2.44 |
| Outside-City | 2.39 | 2.43 | 2.46 | 2.46 | 2.48 |
| Occupied Housing Units | | | | | |
| Inside-City | 21,657 | 23,492 | 24,177 | 25,136 | 25,925 |
| Outside-City | 12,856 | 13,132 | 13,376 | 13,759 | 14,064 |

Notes
1/ Actual per 2010 Census
2/ Average household size starts with the 2010 Census estimate, which is then scaled to increase at the same rate as average household size in the AMBAG 2014 Regional Growth Forecast.

The last step in the forecast of service area housing units is to allocate total housing units between single-family and multi-family units. This is shown in Table 16. It starts with the Water Department's 2014 estimates of housing units calculated from its billing data. Single-family housing units are then increased at their historical growth rate. In the case of inside-city single-family housing, growth is capped at 1,000 units based on the General Plan's estimate of potential for new single family housing.[20] No cap is applied to the outside-city forecast. Multi-family units are then the difference between the forecast of total units and single-family units. For the inside-city portion of the service area, three-fourths of the gain in housing units is in the multi-family category. For the outside-city portion of the service area, a little less than half of the gain is in the multi-family category. For the whole service area, more than two-thirds of the gain in housing units is in the multi-family category.

Total housing units shown for the inside-city portion of the service area in Table 16 calibrates exactly to the total shown in Table 15. This is not the case for the outside-city total in Table 16. There is a discrepancy between Water Department data on total outside-city housing units in 2014 and the forecast of occupied housing units in Table 15. The Water Department's estimate is higher by several hundred housing units. The water demand forecast uses the housing unit forecasts shown in Table 16.[21]

[19] Occupied housing units rather than total housing units are used to forecast water demand because it is assumed that water use in vacant units is negligible.
[20] The General Plan, which extends to 2030, identified a potential for 840 new single family units. This was increased to 1000 units since this forecast runs to 2035.
[21] The outside-city housing unit forecast in Table 16 assumes the same rate of growth in the housing stock as the forecast in Table 15, but starts with the Water Department's higher estimate of housing units in 2014.

*Table 16. Service Area Single-Family and Multi-Family Housing Unit Forecast*

| | 2014 [1/] | 2020 | 2025 | 2030 | 2035 | Gain From 2014 | % of Gain |
|---|---|---|---|---|---|---|---|
| Inside-City | | | | | | | |
| Single Family | 12,246 | 12,534 | 12,780 | 13,030 | 13,246 | 1,000 | 24% |
| Multi Family | 9,583 | 10,958 | 11,398 | 12,106 | 12,679 | 3,096 | 76% |
| Subtotal | 21,829 | 23,492 | 24,177 | 25,136 | 25,925 | 4,096 | |
| Outside-City | | | | | | | |
| Single Family | 6,743 | 6,922 | 7,074 | 7,230 | 7,390 | 647 | 52% |
| Multi Family | 7,901 | 7,910 | 8,033 | 8,310 | 8,495 | 594 | 48% |
| Subtotal | 14,644 | 14,832 | 15,107 | 15,540 | 15,884 | 1,240 | |
| Service Area | | | | | | | |
| Single Family | 18,989 | 19,456 | 19,854 | 20,260 | 20,636 | 1,647 | 31% |
| Multi Family | 17,484 | 18,868 | 19,431 | 20,416 | 21,174 | 3,690 | 69% |
| Total | 36,473 | 38,324 | 39,284 | 40,676 | 41,809 | 5,336 | |

Notes
1/ Actual per Water Department billing records.

### 3.2.3 Non Residential Services and City-Irrigated Golf Acreage

The forecast of business services is based on the ratio of business to residential water use. Historically this ratio has averaged about 0.295 with very little variation (see Figure 2). The number of new business services is forecast such that the ratio of business to residential water use is maintained at 0.295 over the forecast period. This results in a gain of 166 new business services between 2013 and 2035.[22]

As seen in Figure 3, there is a strong relationship between growth in irrigation services and growth in multi-family and business services. On average, 0.6 irrigation services are added for each new multi-family or business service. This growth factor is used with the forecast of multi-family and business services to project new irrigation services over the forecast horizon.

The City is currently the sole water sources for the Delaveaga and Pasatiempo golf courses. This is not forecast to change for Delaveaga. However, interviews with Pasatiempo staff indicate it has plans to reduce its reliance of City water starting this year. It expects to irrigate not more than 40 acres with City

[22] As a check on the forecast, it is noted that over the 18 year period 1996-2013, there was a gain of 120 business services. Extending this rate of growth to 22 years to match the length of our forecast would results in 147 new services, which is very close to the forecast of 166 new services for the 22 year period 2013 to 2035.

water by 2020 and not more than 20 acres by 2030. It currently irrigates about 67.5 acres with City water.

The forecasts of non-residential services and City-irrigated golf acreage are given in Table 17.

*Table 17. Forecast of Non-Residential Services and City-Irrigated Golf Acreage*

| | 2013 [1/] | 2020 | 2025 | 2030 | 2035 | Gain From 2013 |
|---|---|---|---|---|---|---|
| Business [2/] | 1,889 | 1,948 | 1,971 | 2,008 | 2,055 | 166 |
| Municipal [3/] | 218 | 218 | 218 | 218 | 218 | 0 |
| Irrigation [4/] | 452 | 651 | 723 | 845 | 951 | 499 |
| Golf | | | | | | |
| Delaveaga | 79 | 79 | 79 | 79 | 79 | 0 |
| Pasatiempo | 68 | 40 | 30 | 20 | 20 | -48 |
| Total Golf | 146 | 119 | 109 | 99 | 99 | -48 |

Notes

1/ Actual per Water Department billing records.

2/ Based on ratio of business to residential demand.

3/ No expected growth in number of municipal services.

4/ Based on historical rate of gain in irrigation services per gain in multi-family and business services.

*Figure 2. Ratio of Business to Residential Water Demand: 1999-2013*

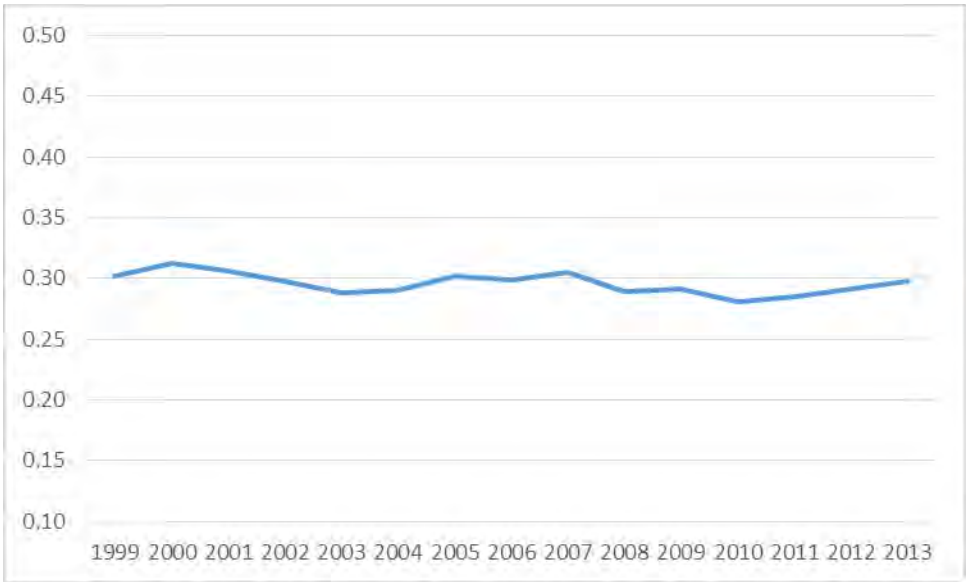
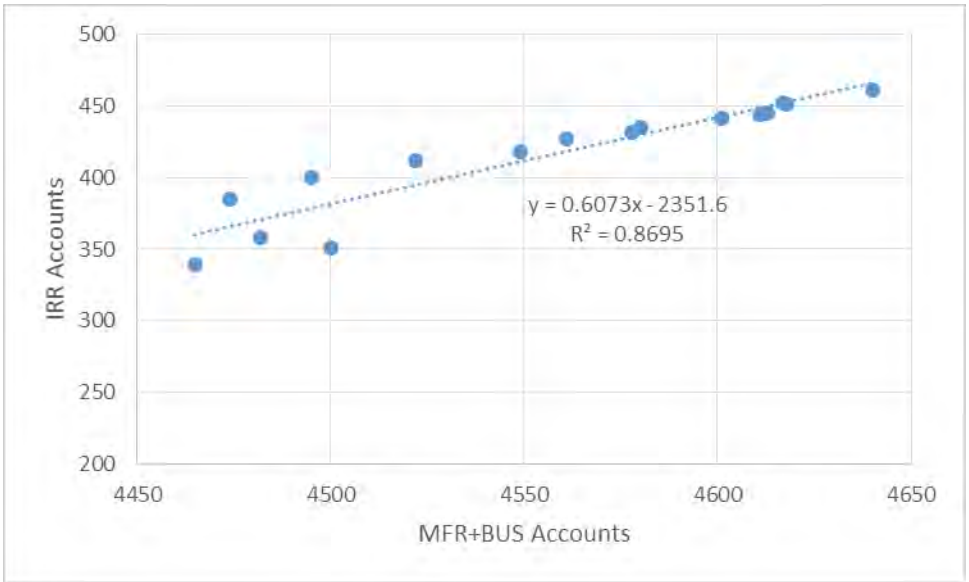



*Figure 3. Irrigation vs Multi-Family + Business Accounts: 1999-2013*



# 4 FORECASTS OF WATER DEMAND

## 4.1 APPROACH

### 4.1.1 Class Demands other than Industrial and UCSC

The approach to the forecast of customer class demands other than industrial and UCSC is straightforward. The class average use forecasts from Table 11 are multiplied by their respective housing unit, service, or acreage forecasts from Tables 16 and 17 to yield the class-level demand forecasts. Lower and upper bounds are put on the forecasts using the confidence intervals in Table 11. In all cases, the forecasts are assuming normal economic conditions, average weather, and no drought or other restrictions on customer water use.

### 4.1.2 Industrial and UCSC Demands

There is a strong relationship between Santa Cruz County manufacturing employment and industrial water demand. This relationship is illustrated in Figure 4. Prior to the recession, annual industrial demand increased by 11.9 CCF per manufacturing job, on average. Immediately after the recession this increased to about 38.3 CCF per job. We use the pre-recession rate with a forecast of manufacturing employment in Santa Cruz County to project future industrial water demand. The pre-recession rate of water use per job is used because it does not include the transitory effects of the economic recovery. The 95% confidence interval for the water use per job parameter is used to produce the lower and upper bound forecasts.[23] The Caltrans forecast of manufacturing employment for Santa Cruz County is used to forecast industrial water use. The California Employment Development Department also has a forecast of manufacturing employment, but this forecast extends only to 2022. However, the two forecasts are consistent. The forecast of industrial demand is given in Table 18.

*Table 18. Industrial Demand Forecast*

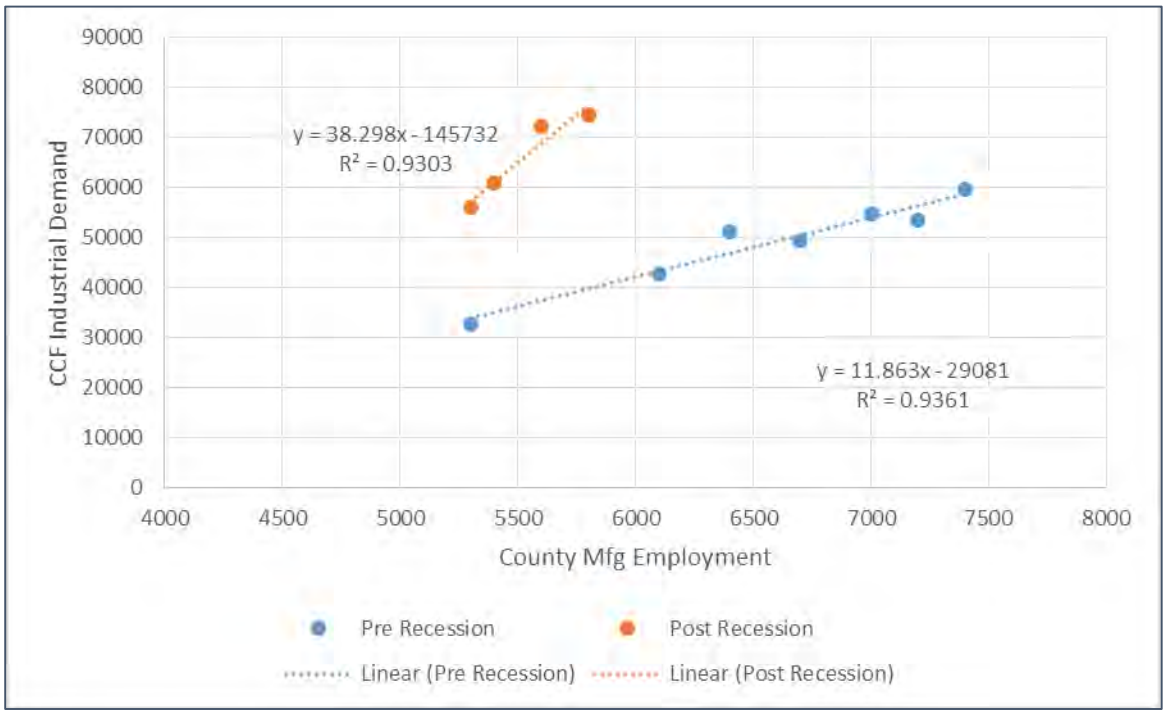
| | 2013 1/ | 2020 | 2025 | 2030 | 2035 |
|---|---|---|---|---|---|
| Mfg Employment Forecast | | | | | |
| Cal Trans | | 5,900 | 6,200 | 6,400 | 6,500 |
| Industrial Water Demand (MG) | | | | | |
| Low | 56 | 56 | 58 | 59 | 60 |
| Primary | 56 | 57 | 59 | 61 | 62 |
| High | 56 | 57 | 60 | 63 | 64 |

Notes

1/ Actual per Water Department billing records.

[23] The 95% confidence interval is [8.4, 15.3]. The data and model output are provided in Attachment 10.

*Figure 4. Industrial Demand vs County Manufacturing Employment*




The forecast of UCSC demand is the same as in the interim WSAC demand forecast. The interim forecast was based on a linear projection of the UCSC demand requirement under its LRDP, assuming two alternative buildout dates. In both cases, buildout demand is 349 MGY. In the lower bound forecast, buildout occurs in 2050. In the upper bound forecast it occurs in 2035. The primary forecast is the midpoint between the lower and upper bound forecasts. The forecast of UCSC demand is given in Table 19. The primary forecast almost exactly replicates a forecast based on projected enrollment and average rates of water use per student.[24]

*Table 19. UCSC Water Demand Forecast*

| | **2013** [1/] | **2020** | **2025** | **2030** | **2035** |
|---|---|---|---|---|---|
| Low | 182 | 186 | 213 | 240 | 268 |
| Primary | 182 | 196 | 234 | 271 | 308 |
| High | 182 | 207 | 254 | 302 | 349 |

Notes

1/ Actual per Water Department billing records.

[24] The enrollment-based approach yields a 2035 demand of 304 MG, which differs from the primary forecast by less than 2%.

### 4.1.3 System Production

System production is calculated as the sum of the demand forecasts plus miscellaneous uses and system losses, which are estimated at 7.5% of total production. The 7.5% rate of system loss and miscellaneous use is based on historical rates of system loss.

## 4.2 Class Demands and System Production Forecasts

Complete summaries of the primary, lower, and, upper bound forecasts of class demands and system production are provided in Tables 20, 21, and 22, respectively.

*Table 20. Primary Forecast of Class Demands and System Production*

| **YEAR** | | **2020** | **2025** | **2030** | **2035** |
|---|---|---|---|---|---|
| | | Forecast | Forecast | Forecast | Forecast |
| **Service Units** | **Units** | | | | |
| SFR | Housing Units | 19,456 | 19,854 | 20,260 | 20,636 |
| MFR | Housing Units | 18,867 | 19,430 | 20,416 | 21,174 |
| BUS | Services | 1,948 | 1,971 | 2,008 | 2,055 |
| IND | NA | NA | NA | NA | NA |
| MUN | Services | 218 | 218 | 218 | 218 |
| IRR | Services | 651 | 723 | 845 | 951 |
| GOLF | Acres | 119 | 109 | 99 | 99 |
| UC | NA | NA | NA | NA | NA |
| **Avg Demand** | **Units** | | | | |
| SFR | CCF | 86 | 83 | 80 | 78 |
| MFR | CCF | 56 | 52 | 50 | 49 |
| BUS | CCF | 400 | 389 | 382 | 377 |
| IND | NA | NA | NA | NA | NA |
| MUN | CCF | 296 | 290 | 283 | 277 |
| IRR | CCF | 286 | 271 | 257 | 244 |
| GOLF | CCF | 671 | 641 | 606 | 593 |
| UC | NA | NA | NA | NA | NA |
| **Annual Demand** | **Units** | | | | |
| SFR | MG | 1,256 | 1,228 | 1,208 | 1,196 |
| MFR | MG | 792 | 759 | 766 | 775 |
| BUS | MG | 583 | 573 | 575 | 580 |
| IND | MG | 57 | 59 | 61 | 62 |
| MUN | MG | 48 | 47 | 46 | 45 |
| IRR | MG | 139 | 147 | 163 | 174 |
| GOLF | MG | 60 | 52 | 45 | 44 |
| UC | MG | 196 | 234 | 271 | 308 |
| **Total Demand** | **MG** | **3,131** | **3,099** | **3,134** | **3,184** |
| MISC/LOSS | MG | 254 | 251 | 254 | 258 |
| **Total Production** | **MG** | **3,385** | **3,351** | **3,388** | **3,442** |
| **Rounded** | **MG** | **3,400** | **3,400** | **3,400** | **3,400** |

*Table 21. Lower Bound Forecast of Class Demands and System Production*

| **YEAR** | | **2020** | **2025** | **2030** | **2035** |
|---|---|---|---|---|---|
| | | Forecast | Forecast | Forecast | Forecast |
| **Service Units** | **Units** | | | | |
| SFR | Housing Units | 19,456 | 19,854 | 20,260 | 20,636 |
| MFR | Housing Units | 18,867 | 19,430 | 20,416 | 21,174 |
| BUS | Services | 1,948 | 1,971 | 2,008 | 2,055 |
| IND | NA | NA | NA | NA | NA |
| MUN | Services | 218 | 218 | 218 | 218 |
| IRR | Services | 651 | 723 | 845 | 951 |
| GOLF | Acres | 119 | 109 | 99 | 99 |
| UC | NA | NA | NA | NA | NA |
| **Avg Demand** | **Units** | | | | |
| SFR | CCF | 83 | 79 | 76 | 74 |
| MFR | CCF | 54 | 50 | 48 | 46 |
| BUS | CCF | 389 | 377 | 370 | 364 |
| IND | NA | NA | NA | NA | NA |
| MUN | CCF | 271 | 264 | 256 | 248 |
| IRR | CCF | 260 | 245 | 231 | 218 |
| GOLF | CCF | 553 | 521 | 485 | 466 |
| UC | NA | NA | NA | NA | NA |
| **Annual Demand** | **Units** | | | | |
| SFR | MG | 1,208 | 1,178 | 1,155 | 1,142 |
| MFR | MG | 764 | 728 | 731 | 736 |
| BUS | MG | 567 | 556 | 556 | 560 |
| IND | MG | 56 | 58 | 59 | 60 |
| MUN | MG | 44 | 43 | 42 | 40 |
| IRR | MG | 126 | 133 | 146 | 155 |
| GOLF | MG | 49 | 42 | 36 | 35 |
| UC | MG | 186 | 213 | 240 | 268 |
| **Total Demand** | **MG** | **3,001** | **2,951** | **2,965** | **2,995** |
| MISC/LOSS | MG | 243 | 239 | 240 | 243 |
| **Total Production** | **MG** | **3,244** | **3,190** | **3,206** | **3,238** |
| **Rounded** | **MG** | **3,200** | **3,200** | **3,200** | **3,200** |

*Table 22. Upper Bound Forecast of Class Demands and System Production*

| **YEAR** | | **2020** | **2025** | **2030** | **2035** |
|---|---|---|---|---|---|
| | | Forecast | Forecast | Forecast | Forecast |
| **Service Units** | **Units** | | | | |
| SFR | Housing Units | 19,456 | 19,854 | 20,260 | 20,636 |
| MFR | Housing Units | 18,867 | 19,430 | 20,416 | 21,174 |
| BUS | Services | 1,948 | 1,971 | 2,008 | 2,055 |
| IND | NA | NA | NA | NA | NA |
| MUN | Services | 218 | 218 | 218 | 218 |
| IRR | Services | 651 | 723 | 845 | 951 |
| GOLF | Acres | 119 | 109 | 99 | 99 |
| UC | NA | NA | NA | NA | NA |
| **Avg Demand** | **Units** | | | | |
| SFR | CCF | 90 | 86 | 83 | 81 |
| MFR | CCF | 58 | 54 | 53 | 52 |
| BUS | CCF | 412 | 401 | 395 | 391 |
| IND | NA | NA | NA | NA | NA |
| MUN | CCF | 323 | 318 | 313 | 308 |
| IRR | CCF | 315 | 300 | 287 | 274 |
| GOLF | CCF | 814 | 790 | 758 | 754 |
| UC | NA | NA | NA | NA | NA |
| **Annual Demand** | **Units** | | | | |
| SFR | MG | 1,305 | 1,280 | 1,262 | 1,253 |
| MFR | MG | 820 | 792 | 803 | 816 |
| BUS | MG | 601 | 591 | 594 | 601 |
| IND | MG | 57 | 60 | 63 | 64 |
| MUN | MG | 53 | 52 | 51 | 50 |
| IRR | MG | 153 | 162 | 181 | 195 |
| GOLF | MG | 72 | 64 | 56 | 56 |
| UC | MG | 207 | 254 | 302 | 349 |
| **Total Demand** | **MG** | **3,268** | **3,255** | **3,311** | **3,383** |
| MISC/LOSS | MG | 265 | 264 | 268 | 274 |
| **Total Production** | **MG** | **3,533** | **3,519** | **3,580** | **3,658** |
| **Rounded** | **MG** | **3,500** | **3,500** | **3,600** | **3,700** |

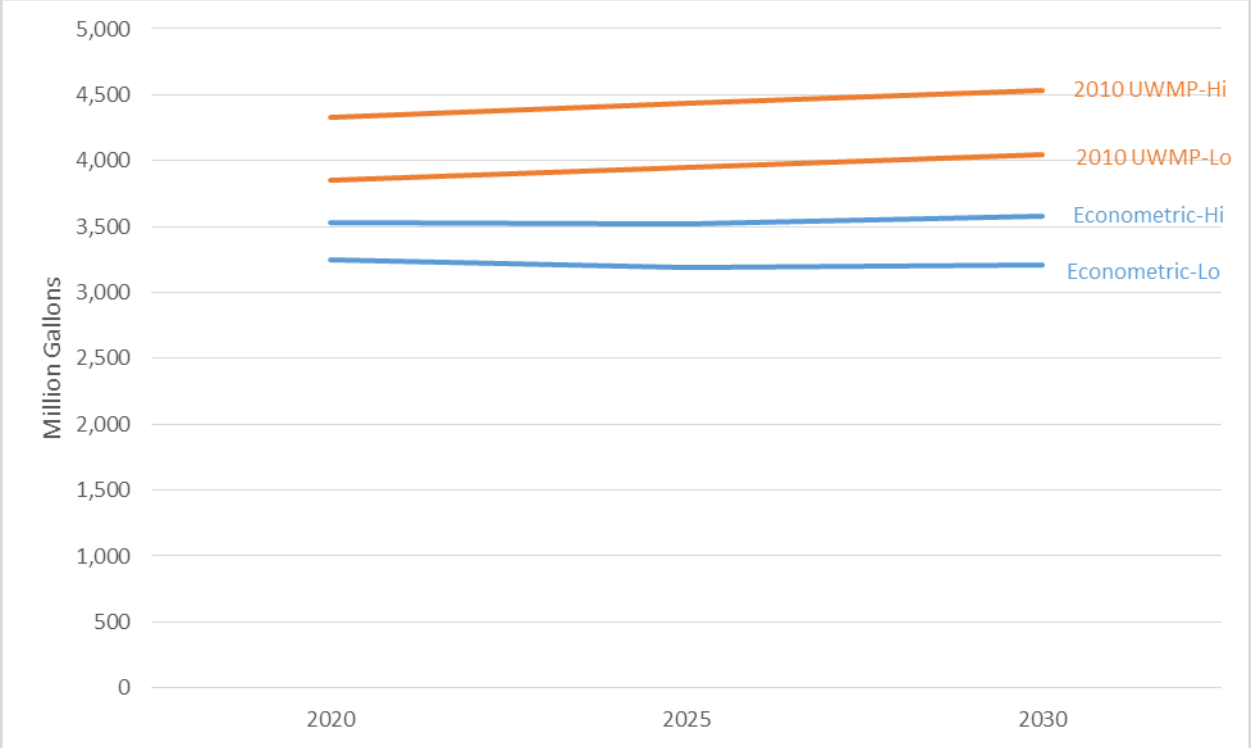
# 5 Comparison with Previous Forecasts and Historical Production

## 5.1 2010 UWMP Forecast

The 2010 UWMP included two water demand forecast scenarios that run to 2030. The lower scenario is based on class-level average water use for 2007-08. The higher scenario is based on class-level average water use for 1999-2004. Neither scenario makes adjustments for future effects of conservation or other economic factors on average water use. Each scenario uses the same service growth assumptions, which are tied to the City's General Plan 2030 buildout analysis and AMBAG's regional population forecasts. Importantly, both scenarios assume UCSC demands reach their buildout level of 349 MG by 2030, five years sooner than we assume in the upper bound forecast and 20 years sooner than we assume in the lower bound forecast.

Predicted future demand in both scenarios is significantly higher than the forecast presented in this report, as illustrated in Figure 5. The primary reasons for this are stated above: (1) not including adjustments for the effects of passive and active conservation and higher water rates on future water use and (2) the higher UCSC forecast. As shown in this report, future conservation and price effects are expected to be significant. Indeed, the econometric analysis shows that the effects of conservation and higher water rates have been working to reduce average demand for some time. These trends are predicted to continue. This plus the lower UCSC forecast explain the report's lower forecast compared to the 2010 UWMP forecast.

*Figure 5. Comparison of Demand Forecast with 2010 UWMP Forecast*

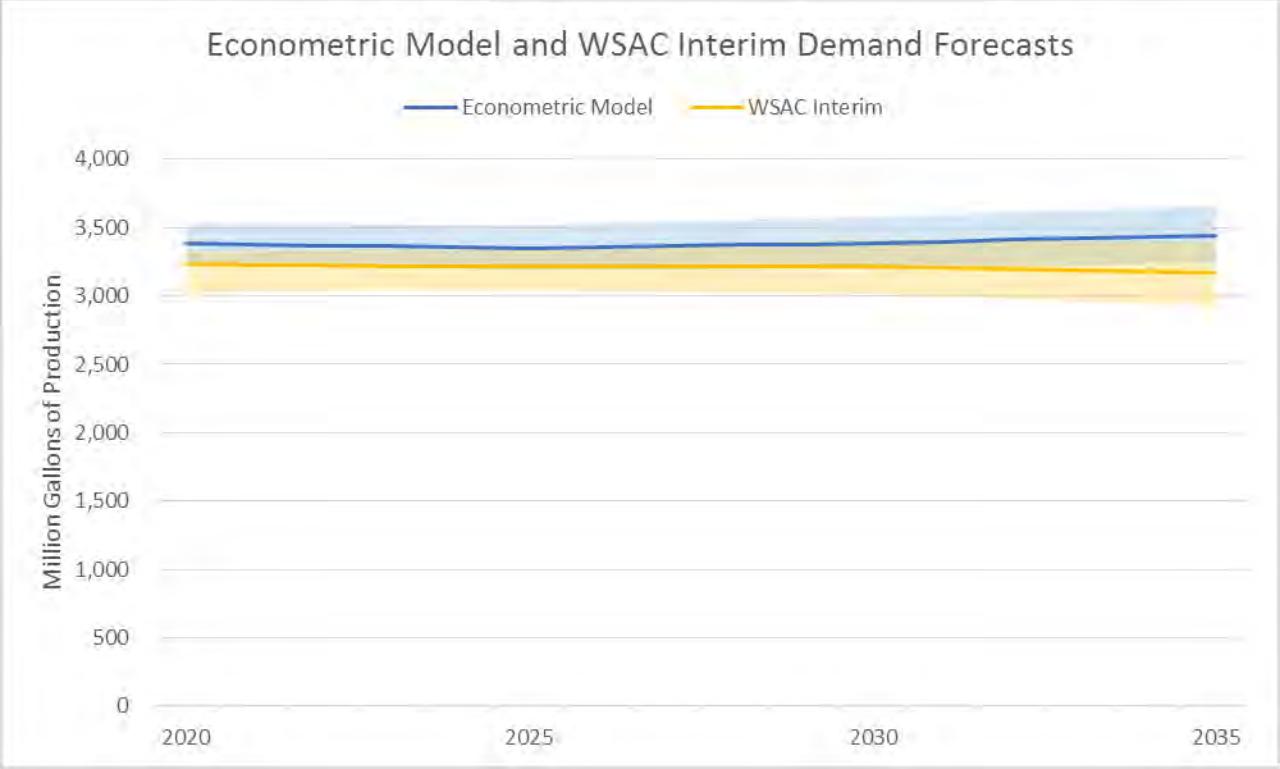


## 5.2 INTERIM WSAC DEMAND FORECAST

The WSAC interim demand forecast (M.Cubed, 2015b) was developed from the 2010 UWMP demand forecast by adjusting that forecast for future conservation and other economic effects and by replacing the UCSC demand forecast with the one in Table 19.

The WSAC Interim and econometric demand forecasts are compared in Figure 6. On average, the econometric demand forecast is approximately five and a half percent greater than the WSAC interim forecast. Figure 6 also shows the uncertainty band around each forecast – light blue for the econometric model forecast and light yellow for the WSAC interim forecast. The uncertainty band on the econometric forecast is based on the 95% confidence intervals for the class-level average use per service forecasts developed with the econometric models. The uncertainty band on the WSAC interim forecast is the range between the low and high interim forecasts. From Figure 6 it is seen that the econometric forecast represented by the dark blue line essentially tracks the upper-bound of the WSAC interim forecast while the WSAC interim forecast represented by the dark yellow line essentially tracks the lower-bound of the corrected econometric forecast. Between these two lines, the forecasts overlap. Future production in the range of 3,200 to 3,400 MGY is consistent with both forecasts.[25]

*Figure 6. Comparison of Demand Forecast with Interim WSAC Demand Forecast*

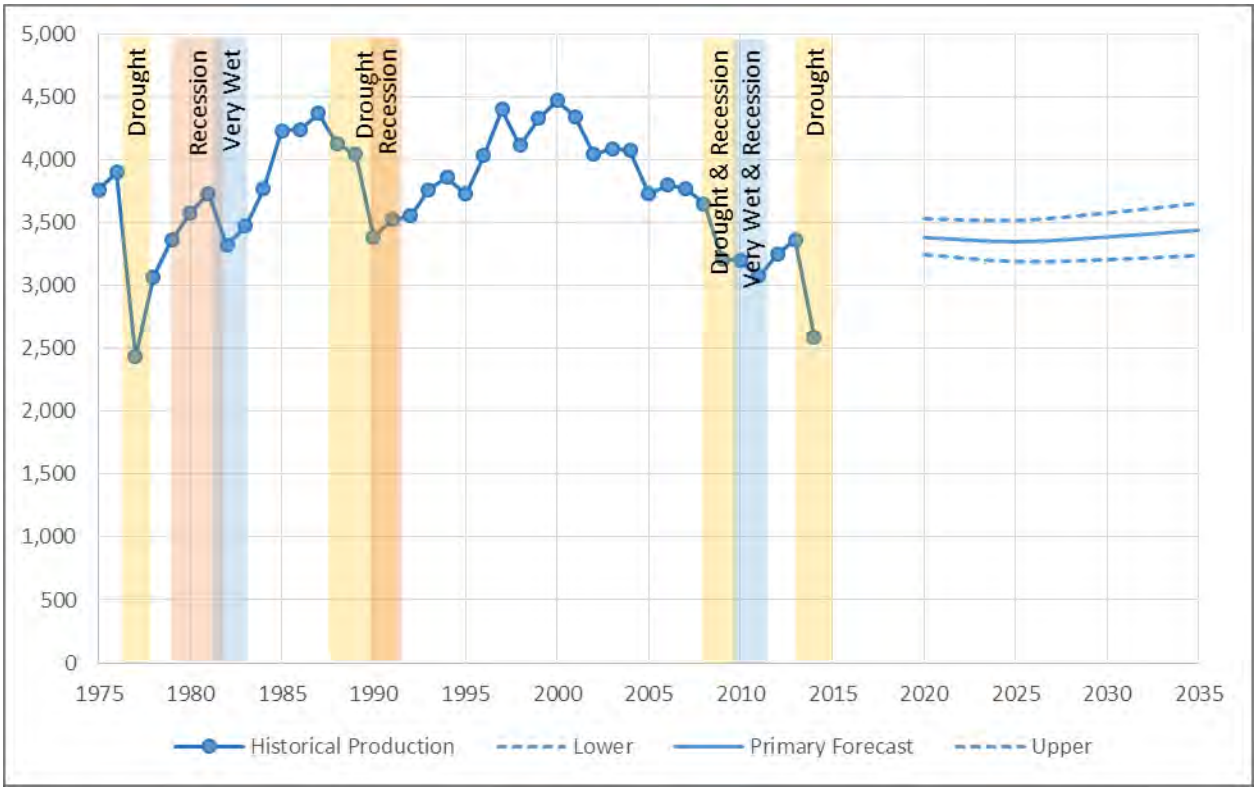



[25] A more conservative uncertainty band obtained by taking the union of the two forecasts suggests future production in the range of 3,000 to 3,500 MGY over most of the forecast period, with a slightly wider band in the last five years of the forecast.

## 5.3 HISTORICAL PRODUCTION

Figure 7 shows a comparison of historical production and the primary, lower, and upper bound forecasts. It is interesting to see how historical production has been influenced by weather and economic events. The forecast does not exhibit a similar degree of variability because it is based on average weather and normal economic conditions. In other words, it is a forecast of *expected future demand*. Realized future demand will certainly not be smooth like the forecast. It will vary about the expected value depending on year-to-year variation in future weather and economic conditions. The forecast, however, provides the baseline around which this variability is likely to occur.

*Figure 7. Historical and Forecast Production in Millions of Gallons*



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# ATTACHMENT 1 MONTHLY ALLOCATION PERCENTAGES FOR AGGREGATED METER READ DATA

The customer class seasonal use indices in the following table were used to weight the monthly allocation percentages that were used to distribute the aggregated meter read data into consumption months. The season indices were taken from Weber Analytical (2010).

**Seaonal Use Indices**

| Month | SFR | MFR | BUS | IRR/GOLF | MUNI |
|---|---|---|---|---|---|
| Jan | 0.74 | 0.90 | 0.84 | 0.24 | 0.34 |
| Feb | 0.80 | 0.97 | 0.91 | 0.24 | 0.31 |
| Mar | 0.78 | 0.92 | 0.89 | 0.34 | 0.39 |
| Apr | 0.82 | 0.92 | 0.89 | 0.53 | 0.65 |
| May | 1.05 | 1.04 | 1.04 | 1.21 | 1.13 |
| Jun | 1.25 | 1.02 | 1.16 | 1.57 | 1.60 |
| Jul | 1.28 | 1.11 | 1.16 | 1.80 | 1.70 |
| Aug | 1.29 | 1.14 | 1.24 | 1.83 | 1.91 |
| Sep | 1.22 | 1.08 | 1.11 | 1.65 | 1.79 |
| Oct | 1.07 | 1.04 | 1.03 | 1.35 | 1.06 |
| Nov | 0.89 | 0.94 | 0.89 | 0.71 | 0.75 |
| Dec | 0.81 | 0.91 | 0.85 | 0.53 | 0.38 |
| Total | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 |

The next two tables provide the monthly allocation percentages for aggregated meter read data from bi-monthly billing cycles.

| | SFR | | | MFR | | | BUS | | |
|---|---|---|---|---|---|---|---|---|---|
| | % Allocated to Month | | | % Allocated to Month | | | % Allocated to Month | | |
| Read Month (t) | t-2 | t-1 | t | t-2 | t-1 | t | t-2 | t-1 | t |
| Jan | 26% | 52% | 23% | 24% | 51% | 25% | 24% | 51% | 25% |
| Feb | 25% | 49% | 26% | 23% | 51% | 26% | 23% | 50% | 26% |
| Mar | 27% | 48% | 25% | 27% | 48% | 24% | 27% | 48% | 25% |
| Apr | 23% | 51% | 26% | 24% | 51% | 25% | 24% | 51% | 25% |
| May | 22% | 47% | 30% | 24% | 48% | 27% | 24% | 48% | 28% |
| Jun | 18% | 52% | 30% | 21% | 53% | 25% | 20% | 52% | 28% |
| Jul | 22% | 52% | 27% | 25% | 49% | 27% | 23% | 51% | 26% |
| Aug | 23% | 52% | 25% | 22% | 52% | 26% | 23% | 51% | 26% |
| Sep | 24% | 52% | 24% | 23% | 53% | 24% | 23% | 54% | 23% |
| Oct | 27% | 51% | 22% | 26% | 50% | 24% | 28% | 50% | 23% |
| Nov | 27% | 52% | 21% | 25% | 52% | 23% | 26% | 52% | 22% |
| Dec | 29% | 49% | 22% | 27% | 49% | 24% | 28% | 49% | 23% |

| | IRR/GOLF | | | MUNI | | |
|---|---|---|---|---|---|---|
| | % Allocated to Month | | | % Allocated to Month | | |
| Read Month (t) | t-2 | t-1 | t | t-2 | t-1 | t |
| Jan | 33% | 55% | 12% | 38% | 43% | 19% |
| Feb | 40% | 40% | 20% | 26% | 51% | 23% |
| Mar | 26% | 42% | 32% | 28% | 43% | 29% |
| Apr | 15% | 49% | 36% | 17% | 46% | 37% |
| May | 13% | 41% | 46% | 14% | 46% | 40% |
| Jun | 11% | 55% | 34% | 13% | 52% | 35% |
| Jul | 20% | 51% | 29% | 19% | 53% | 28% |
| Aug | 21% | 53% | 26% | 22% | 51% | 28% |
| Sep | 24% | 53% | 23% | 22% | 54% | 24% |
| Oct | 28% | 51% | 21% | 29% | 55% | 16% |
| Nov | 31% | 55% | 14% | 36% | 48% | 16% |
| Dec | 41% | 43% | 16% | 36% | 51% | 13% |

The next two tables provide the monthly allocation percentages for aggregated meter read data from monthly billing cycles.

| | SFR | | MFR | | BUS | |
|---|---|---|---|---|---|---|
| Read Month (t) | t-1 | t | t-1 | t | t-1 | t |
| Jan | 52% | 48% | 50% | 50% | 50% | 50% |
| Feb | 48% | 52% | 48% | 52% | 48% | 52% |
| Mar | 51% | 49% | 51% | 49% | 51% | 49% |
| Apr | 49% | 51% | 50% | 50% | 50% | 50% |
| May | 44% | 56% | 47% | 53% | 46% | 54% |
| Jun | 46% | 54% | 51% | 49% | 47% | 53% |
| Jul | 49% | 51% | 48% | 52% | 50% | 50% |
| Aug | 50% | 50% | 49% | 51% | 48% | 52% |
| Sep | 51% | 49% | 51% | 49% | 53% | 47% |
| Oct | 53% | 47% | 51% | 49% | 52% | 48% |
| Nov | 55% | 45% | 52% | 48% | 54% | 46% |
| Dec | 52% | 48% | 51% | 49% | 51% | 49% |

| | IRR/GOLF | | MUNI | |
|---|---|---|---|---|
| Read Month (t) | t-1 | t | t-1 | t |
| Jan | 69% | 31% | 53% | 47% |
| Feb | 50% | 50% | 52% | 48% |
| Mar | 41% | 59% | 45% | 55% |
| Apr | 39% | 61% | 38% | 62% |
| May | 30% | 70% | 36% | 64% |
| Jun | 44% | 56% | 42% | 58% |
| Jul | 47% | 53% | 48% | 52% |
| Aug | 50% | 50% | 47% | 53% |
| Sep | 53% | 47% | 52% | 48% |
| Oct | 55% | 45% | 63% | 37% |
| Nov | 66% | 34% | 59% | 41% |
| Dec | 57% | 43% | 66% | 34% |

# ATTACHMENT 2 WEATHER DATA

The weather data are from CIMIS Station 104 (DeLaveaga)

**Average maximum daily air temperature (F)**

| | Month | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Year** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** |
| **1990** | | | | | | | | | | 75.0 | 67.0 | 58.0 |
| **1991** | 59.5 | 65.6 | 57.0 | 66.9 | 66.3 | 66.9 | 68.6 | 74.8 | 71.0 | 72.8 | 68.3 | 61.3 |
| **1992** | 61.8 | 63.8 | 62.9 | 71.7 | 69.6 | 69.3 | 77.2 | 75.9 | 74.6 | 73.8 | 67.7 | 58.1 |
| **1993** | 59.1 | 59.2 | 66.2 | 68.8 | 69.2 | 76.0 | 70.1 | 74.2 | 73.9 | 72.8 | 66.4 | 60.9 |
| **1994** | 62.8 | 58.6 | 65.8 | 66.3 | 67.1 | 75.3 | 66.8 | 74.4 | 72.8 | 71.0 | 58.8 | 57.7 |
| **1995** | 58.4 | 63.9 | 62.2 | 64.7 | 64.4 | 71.4 | 76.6 | 75.4 | 75.2 | 72.9 | 70.1 | 61.0 |
| **1996** | 61.1 | 64.2 | 69.5 | 75.8 | 78.0 | 84.5 | 88.2 | 93.4 | 78.3 | 71.0 | 63.9 | 59.9 |
| **1997** | 58.8 | 63.1 | 66.2 | 69.2 | 76.8 | 72.5 | 71.1 | 77.5 | 81.4 | 73.7 | 65.8 | 61.4 |
| **1998** | 59.6 | 58.3 | 62.1 | 64.0 | 64.5 | 68.8 | 73.3 | 76.3 | 72.7 | 71.5 | 62.4 | 58.5 |
| **1999** | 60.8 | 58.4 | 57.9 | 63.6 | 65.1 | 67.8 | 72.2 | 74.1 | 70.1 | 73.5 | 63.2 | 62.5 |
| **2000** | 57.7 | 60.3 | 63.2 | 67.8 | 71.5 | 70.5 | 72.1 | 72.6 | 74.9 | 66.5 | 61.2 | 63.7 |
| **2001** | 58.7 | 57.7 | 63.9 | 63.3 | 73.0 | 77.0 | 69.7 | 73.9 | 70.6 | 69.1 | 63.7 | 57.3 |
| **2002** | 56.8 | 63.2 | 61.3 | 63.3 | 68.2 | 73.4 | 71.6 | 72.1 | 75.4 | 68.8 | 68.5 | 59.0 |
| **2003** | 64.8 | 61.3 | 65.0 | 61.0 | 70.4 | 71.6 | 74.7 | 76.9 | 76.8 | 76.6 | 61.4 | 58.1 |
| **2004** | 57.5 | 58.3 | 70.4 | 68.2 | 72.4 | 72.4 | 72.0 | 74.3 | 78.2 | 68.3 | 61.6 | 60.5 |
| **2005** | 59.4 | 61.6 | 64.2 | 65.9 | 69.9 | 70.4 | 71.9 | 71.0 | 70.3 | 69.0 | 65.7 | 55.2 |
| **2006** | 56.8 | 63.7 | 56.1 | 60.7 | 68.4 | 72.9 | 76.8 | 70.0 | 71.4 | 70.5 | 64.7 | 60.2 |
| **2007** | 57.9 | 59.7 | 66.9 | 66.7 | 68.8 | 73.3 | 75.2 | 75.0 | 73.9 | 70.3 | 66.0 | 56.6 |
| **2008** | 55.9 | 60.3 | 65.5 | 67.7 | 68.5 | 74.8 | 73.0 | 73.6 | 75.0 | 75.2 | 66.6 | 57.9 |
| **2009** | 65.2 | 58.9 | 62.9 | 66.6 | 68.1 | 70.2 | 73.4 | 74.7 | 77.2 | 69.1 | 66.5 | 57.5 |
| **2010** | 60.0 | 60.0 | 63.2 | 62.5 | 67.5 | 73.2 | 68.3 | 70.4 | 76.6 | 68.7 | 63.6 | 57.9 |
| **2011** | 62.9 | 58.9 | 61.1 | 65.7 | 67.5 | 67.5 | 71.4 | 69.9 | 72.4 | 72.0 | 62.1 | 60.3 |
| **2012** | 62.5 | 62.2 | 59.4 | 65.4 | 69.8 | 72.5 | 70.2 | 73.7 | 71.2 | 72.8 | 66.7 | 56.6 |
| **2013** | 60.6 | 61.4 | 65.4 | 68.7 | 73.2 | 73.1 | 69.6 | 75.3 | 77.6 | 70.3 | 67.1 | 64.2 |
| **2014** | 68.5 | 61.4 | 66.5 | 68.4 | 75.6 | 71.5 | 72.9 | 72.8 | 74.3 | 77.2 | 66.4 | 60.1 |
| **2015** | 66.9 | 66.2 | 71.7 | 68.0 | | | | | | | | |
| **Avg** | **60.6** | **61.2** | **63.9** | **66.4** | **69.7** | **72.4** | **72.8** | **74.7** | **74.4** | **71.7** | **65.0** | **59.4** |

**Monthly total precipitation (in)**

| | Month | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Year** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** |
| **1990** | | | | | | | | | | 4.8 | 0.6 | 1.6 |
| **1991** | 0.8 | 4.9 | 11.6 | 0.8 | 0.1 | 0.3 | 0.0 | 0.1 | 0.1 | 2.4 | 1.5 | 4.2 |
| **1992** | 3.2 | 11.3 | 4.1 | 0.3 | 0.0 | 0.7 | 0.0 | 0.5 | 0.4 | 1.5 | 0.3 | 7.9 |
| **1993** | 14.8 | 8.7 | 3.8 | 1.5 | 1.5 | 1.1 | 0.6 | 0.5 | 0.3 | 0.7 | 2.0 | 3.9 |
| **1994** | 2.6 | 8.0 | 0.0 | 2.1 | 2.3 | 0.6 | 0.5 | 0.6 | 0.4 | 1.0 | 5.1 | 3.3 |
| **1995** | 18.6 | 0.5 | 9.6 | 5.0 | 1.2 | 2.5 | 0.0 | 0.0 | 0.7 | 1.5 | 0.0 | 0.7 |
| **1996** | 10.3 | 8.6 | 4.1 | 2.2 | 3.5 | 0.0 | 0.0 | 0.0 | 0.2 | 2.5 | 6.8 | 15.2 |
| **1997** | 10.1 | 0.3 | 1.4 | 0.8 | 0.1 | 0.1 | 0.0 | 0.5 | 0.2 | 0.5 | 8.9 | 3.6 |
| **1998** | 15.0 | 18.7 | 4.3 | 3.1 | 3.3 | 0.1 | 0.0 | 0.0 | 0.1 | 0.9 | 6.0 | 1.4 |
| **1999** | 7.9 | 10.3 | 3.6 | 2.8 | 0.0 | 0.3 | 0.0 | 0.0 | 0.1 | 0.3 | 3.7 | 0.5 |
| **2000** | 11.4 | 9.9 | 2.3 | 1.7 | 1.4 | 0.2 | 0.0 | 0.2 | 0.5 | 4.6 | 1.2 | 1.1 |
| **2001** | 5.7 | 7.0 | 3.4 | 1.9 | 0.0 | 0.1 | 0.0 | 0.0 | 0.2 | 0.8 | 6.2 | 11.3 |
| **2002** | 3.7 | 2.3 | 4.0 | 0.4 | 0.8 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4.4 | 5.7 |
| **2003** | 2.0 | 1.9 | 1.6 | 0.5 | 1.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 1.8 | 9.4 |
| **2004** | 3.2 | 5.9 | 1.4 | 0.8 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 5.3 | 2.9 | 10.5 |
| **2005** | 5.7 | 5.9 | 7.5 | 2.9 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 2.0 | 13.4 |
| **2006** | 6.2 | 2.7 | 11.1 | 6.9 | 0.8 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2.0 | 4.9 |
| **2007** | 0.8 | 6.2 | 0.3 | 1.7 | 0.6 | 0.0 | 0.0 | 0.0 | 0.0 | 1.1 | 0.6 | 1.5 |
| **2008** | 12.6 | 6.5 | 0.5 | 0.6 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 1.0 | 2.1 | 3.0 |
| **2009** | 1.8 | 11.3 | 2.0 | 0.6 | 1.7 | 0.0 | 0.0 | 0.0 | 0.0 | 4.7 | 0.3 | 4.4 |
| **2010** | 9.4 | 6.5 | 4.0 | 4.6 | 0.8 | 0.0 | 0.0 | 0.2 | 0.0 | 3.4 | 4.2 | 10.2 |
| **2011** | 2.2 | 6.3 | 11.9 | 0.7 | 1.8 | 2.5 | 0.1 | 0.1 | 0.1 | 2.7 | 2.6 | 0.1 |
| **2012** | 3.7 | 1.0 | 7.3 | 3.0 | 0.1 | 0.3 | 0.0 | 0.0 | 0.0 | 0.1 | 6.0 | 9.0 |
| **2013** | 0.9 | 0.3 | 1.7 | 0.9 | 0.0 | 0.1 | 0.0 | 0.1 | 0.1 | 0.1 | 0.3 | 0.1 |
| **2014** | 0.0 | 3.2 | 1.4 | 0.5 | 0.0 | 0.1 | 0.2 | 0.0 | 1.0 | 0.0 | 3.2 | 11.8 |
| **2015** | 0.0 | 0.0 | 0.0 | 0.0 | | | | | | | | |
| **Avg** | **6.1** | **5.9** | **4.1** | **1.8** | **0.9** | **0.4** | **0.1** | **0.1** | **0.2** | **1.6** | **3.0** | **5.5** |

**Monthly total ETo (in)**

| | Month | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Year** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** |
| **1990** | | | | | | | | | | 3.4 | 2.2 | 1.7 |
| **1991** | 1.7 | 2.1 | 2.3 | 4.5 | 4.6 | 4.7 | 4.5 | 4.3 | 3.3 | 2.8 | 2.1 | 1.5 |
| **1992** | 1.8 | 1.9 | 2.8 | 4.9 | 5.1 | 5.0 | 5.7 | 5.1 | 4.1 | 2.8 | 1.9 | 1.1 |
| **1993** | 1.2 | 1.6 | 3.5 | 4.9 | 4.9 | 6.1 | 4.8 | 4.8 | 3.7 | 2.8 | 2.1 | 1.4 |
| **1994** | 1.9 | 1.9 | 3.9 | 4.1 | 4.7 | 6.3 | 4.2 | 5.2 | 3.9 | 2.8 | 1.3 | 0.9 |
| **1995** | 0.9 | 1.9 | 2.8 | 3.7 | 3.0 | 5.3 | 5.9 | 5.3 | 4.1 | 3.2 | 2.0 | 1.2 |
| **1996** | 1.5 | 1.7 | 3.9 | 4.7 | 5.4 | 5.6 | 5.6 | 5.3 | 3.9 | 3.1 | 1.5 | 1.1 |
| **1997** | 1.3 | 2.7 | 3.9 | 5.0 | 6.1 | 5.5 | 4.7 | 5.1 | 4.9 | 3.3 | 1.6 | 1.6 |
| **1998** | 1.2 | 1.4 | 3.2 | 4.2 | 4.2 | 4.5 | 5.2 | 5.3 | 3.4 | 3.1 | 1.6 | 1.5 |
| **1999** | 1.6 | 1.9 | 3.3 | 4.4 | 5.1 | 5.3 | 5.5 | 4.8 | 3.3 | 3.4 | 1.6 | 1.8 |
| **2000** | 1.1 | 1.6 | 4.0 | 4.7 | 5.4 | 5.4 | 5.3 | 4.7 | 3.9 | 2.4 | 1.8 | 1.6 |
| **2001** | 1.7 | 2.1 | 3.6 | 4.4 | 6.0 | 6.4 | 4.9 | 4.9 | 3.6 | 2.8 | 1.5 | 1.0 |
| **2002** | 1.6 | 2.4 | 3.7 | 3.6 | 5.4 | 5.9 | 5.2 | 4.5 | 4.3 | 2.8 | 2.1 | 1.7 |
| **2003** | 1.8 | 2.2 | 3.9 | 3.9 | 5.3 | 5.0 | 5.6 | 5.3 | 4.2 | 3.5 | 1.6 | 1.0 |
| **2004** | 1.5 | 1.9 | 4.3 | 4.9 | 5.9 | 5.6 | 4.6 | 4.6 | 4.3 | 2.7 | 1.8 | 1.4 |
| **2005** | 1.5 | 1.9 | 3.3 | 4.2 | 4.7 | 4.9 | 4.7 | 3.9 | 3.2 | 2.6 | 1.9 | 1.0 |
| **2006** | 1.4 | 2.2 | 2.6 | 2.7 | 4.9 | 5.0 | 5.3 | 4.1 | 3.4 | 2.9 | 1.6 | 1.3 |
| **2007** | 2.0 | 1.7 | 4.1 | 4.5 | 5.4 | 5.9 | 5.5 | 5.3 | 4.0 | 3.1 | 2.0 | 1.4 |
| **2008** | 1.3 | 2.3 | 4.1 | 5.4 | 5.6 | 6.0 | 5.9 | 5.6 | 4.6 | 3.8 | 1.9 | 1.5 |
| **2009** | 2.0 | 2.0 | 4.0 | 4.7 | 4.7 | 5.4 | 5.5 | 5.1 | 4.4 | 3.0 | 2.0 | 1.2 |
| **2010** | 1.3 | 1.7 | 3.7 | 3.9 | 5.2 | 6.1 | 4.7 | 4.6 | 4.2 | 2.5 | 1.9 | 0.9 |
| **2011** | 1.9 | 2.3 | 3.1 | 4.5 | 5.3 | 4.9 | 5.4 | 4.2 | 3.7 | 2.8 | 1.8 | 1.8 |
| **2012** | 2.0 | 2.6 | 3.0 | 4.5 | 5.6 | 6.0 | 5.1 | 4.8 | 3.9 | 2.8 | 1.7 | 1.1 |
| **2013** | 2.0 | 2.5 | 3.8 | 4.9 | 5.9 | 5.3 | 5.0 | 5.0 | 4.4 | 3.2 | 2.1 | 2.1 |
| **2014** | 2.4 | 1.9 | 3.7 | 4.7 | 6.2 | 5.5 | 5.1 | 4.6 | 3.7 | 2.9 | 1.7 | 1.1 |
| **2015** | 2.2 | 2.4 | 4.5 | 4.7 | | | | | | | | |
| **Avg** | **1.6** | **2.0** | **3.6** | **4.4** | **5.2** | **5.5** | **5.2** | **4.8** | **3.9** | **3.0** | **1.8** | **1.4** |

# ATTACHMENT 3 ECONOMIC DATA

**Inside city water rate per unit (100 cubic feet = 748 gallons = 1 billing unit)**

| | | | SFR and duplex* customers, In City | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Year | Billing cycle | Effective date | Units 1-4 | Units 5-8 | Unit 9 | Units 10-14 | Units 15-18 | Units 19-40 | Units 40+ | MFR and CII |
| 1999 | Bi-monthly | | 0.76 | 0.76 | 1.81 | 1.81 | 1.81 | 1.81 | 3.31 | 1.81 |
| 2000 | Bi-monthly | | 0.76 | 0.76 | 1.81 | 1.81 | 1.81 | 1.81 | 3.31 | 1.81 |
| 2001 | Bi-monthly | | 0.76 | 0.76 | 1.81 | 1.81 | 1.81 | 1.81 | 3.31 | 1.81 |
| 2002 | Bi-monthly | | 0.76 | 0.76 | 1.81 | 1.81 | 1.81 | 1.81 | 3.31 | 1.81 |
| 2003 | Bi-monthly | | 0.76 | 0.76 | 1.81 | 1.81 | 1.81 | 1.81 | 3.31 | 1.81 |
| 2004 | Bi-monthly | 6/9/2004 | 0.90 | 2.30 | 2.30 | 2.95 | 4.05 | 5.05 | 5.05 | 2.30 |
| 2005 | Monthly | 1/1/2005 | 1.08 | 2.76 | 2.76 | 3.54 | 4.86 | 6.06 | 6.06 | 2.76 |
| 2005 | Monthly | 9/1/2005 | 1.05 | 2.68 | 2.68 | 3.44 | 4.72 | 5.88 | 5.88 | 2.68 |
| 2006 | Monthly | 1/1/2006 | 1.21 | 3.08 | 3.08 | 3.95 | 5.43 | 6.77 | 6.77 | 3.08 |
| 2007 | Monthly | 1/1/2007 | 1.36 | 3.47 | 3.47 | 4.45 | 6.10 | 7.61 | 7.61 | 3.47 |
| 2008 | Monthly | 1/1/2008 | 1.49 | 3.81 | 3.81 | 4.89 | 6.71 | 8.37 | 8.37 | 3.81 |
| 2009 | Monthly | | 1.49 | 3.81 | 3.81 | 4.89 | 6.71 | 8.37 | 8.37 | 3.81 |
| 2010 | Monthly | | 1.49 | 3.81 | 3.81 | 4.89 | 6.71 | 8.37 | 8.37 | 3.81 |
| 2011 | Monthly | 1/1/2011 | 1.57 | 4.00 | 4.00 | 5.14 | 7.05 | 8.79 | 8.79 | 4.00 |
| 2012 | Monthly | | 1.57 | 4.00 | 4.00 | 5.14 | 7.05 | 8.79 | 8.79 | 4.00 |
| 2013 | Monthly | | 1.57 | 4.00 | 4.00 | 5.14 | 7.05 | 8.79 | 8.79 | 4.00 |
| 2014 | Monthly | 1/1/2014 | 1.73 | 4.40 | 4.40 | 5.66 | 7.76 | 9.67 | 9.67 | 4.40 |

**Outside city water rate per unit (100 cubic feet = 748 gallons = 1 billing unit)**

| | | | SFR and duplex* customers | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Year | Billing cycle | Effective date | Units 1-4 | Units 5-8 | Unit 9 | Units 10-14 | Units 15-18 | Units 19-40 | Units 40+ | MFR and CII |
| 1999 | Bi-monthly | | 0.97 | 0.97 | 2.29 | 2.29 | 2.29 | 2.29 | 3.79 | 2.29 |
| 2000 | Bi-monthly | | 0.97 | 0.97 | 2.29 | 2.29 | 2.29 | 2.29 | 3.79 | 2.29 |
| 2001 | Bi-monthly | | 0.97 | 0.97 | 2.29 | 2.29 | 2.29 | 2.29 | 3.79 | 2.29 |
| 2002 | Bi-monthly | | 0.97 | 0.97 | 2.29 | 2.29 | 2.29 | 2.29 | 3.79 | 2.29 |
| 2003 | Bi-monthly | | 0.97 | 0.97 | 2.29 | 2.29 | 2.29 | 2.29 | 3.79 | 2.29 |
| 2004 | Bi-monthly | 6/9/2004 | 1.15 | 2.93 | 2.93 | 3.76 | 5.16 | 6.44 | 6.44 | 2.93 |
| 2005 | Bi-monthly | 1/1/2005 | 1.38 | 3.52 | 3.52 | 4.51 | 6.19 | 7.73 | 7.73 | 3.52 |
| 2005 | Bi-monthly | 9/1/2005 | 1.34 | 3.42 | 3.42 | 4.38 | 6.01 | 7.50 | 7.50 | 3.42 |
| 2006 | Bi-monthly | 1/1/2006 | 1.54 | 3.93 | 3.93 | 5.04 | 6.91 | 8.63 | 8.63 | 3.93 |
| 2007 | Bi-monthly | 1/1/2007 | 1.73 | 4.42 | 4.42 | 5.67 | 7.78 | 9.71 | 9.71 | 4.42 |
| 2008 | Bi-monthly | 1/1/2008 | 1.91 | 4.86 | 4.86 | 6.23 | 8.56 | 10.68 | 10.68 | 4.86 |
| 2009 | Bi-monthly | | 1.91 | 4.86 | 4.86 | 6.23 | 8.56 | 10.68 | 10.68 | 4.86 |
| 2010 | Bi-monthly | | 1.91 | 4.86 | 4.86 | 6.23 | 8.56 | 10.68 | 10.68 | 4.86 |
| 2011 | Bi-monthly | 1/1/2011 | 2.00 | 5.10 | 5.10 | 6.55 | 8.98 | 11.21 | 11.21 | 5.10 |
| 2012 | Bi-monthly | | 2.00 | 5.10 | 5.10 | 6.55 | 8.98 | 11.21 | 11.21 | 5.10 |
| 2013 | Bi-monthly | | 2.00 | 5.10 | 5.10 | 6.55 | 8.98 | 11.21 | 11.21 | 5.10 |
| 2014 | Monthly | 1/1/2014 | 2.20 | 5.61 | 5.61 | 7.21 | 9.88 | 12.34 | 12.34 | 5.61 |

**Per capita and median household income (2013 dollars)**

| | | Per Capita | | | Median Household | | |
|---|---|---|---|---|---|---|---|
| **Year** | **Source** | **County** | **Inside City** | **Outside City** | **County** | **Inside City** | **Outside City** |
| 1999 | Census | 37,605 | 36,696 | 40,980 | 76,688 | 71,845 | 76,369 |
| 2000 | imputed | 42,919 | 35,797 | 48,603 | 87,525 | 70,681 | 89,610 |
| 2001 | imputed | 33,542 | 42,936 | 50,199 | 68,402 | 84,777 | 92,552 |
| 2002 | imputed | 31,937 | 33,580 | 42,814 | 65,129 | 66,302 | 78,936 |
| 2003 | imputed | 32,876 | 31,349 | 39,566 | 67,044 | 61,898 | 72,948 |
| 2004 | imputed | 34,384 | 32,439 | 40,287 | 70,120 | 64,050 | 74,278 |
| 2005 | imputed | 39,701 | 35,403 | 41,088 | 71,081 | 69,901 | 75,755 |
| 2006 | imputed | 37,448 | 36,600 | 42,144 | 73,033 | 72,265 | 77,700 |
| 2007 | imputed | 38,394 | 35,945 | 44,607 | 72,534 | 67,295 | 82,242 |
| 2008 | imputed | 38,512 | 37,986 | 44,979 | 74,414 | 69,710 | 82,928 |
| 2009 | ACS | 32,865 | 36,359 | 40,101 | 67,341 | 65,474 | 73,816 |
| 2010 | ACS | 31,390 | 31,790 | 40,161 | 65,969 | 63,899 | 73,206 |
| 2011 | ACS | 32,026 | 29,917 | 39,611 | 65,813 | 62,507 | 72,032 |
| 2012 | ACS | 34,279 | 29,949 | 38,713 | 69,483 | 64,215 | 73,334 |
| 2013 | ACS | 31,609 | 29,604 | 37,847 | 68,630 | 62,756 | 68,983 |
| 2014 | imputed | 31,812 | 29,793 | 38,090 | 69,069 | 63,157 | 69,425 |

**California Department of Finance Report E-8**
**Housing Vacancy Rates**

| Year | Date | Santa Cruz | Capitola | County |
|---|---|---|---|---|
| 1991 | 1/1/1991 | 6.3 | 11.4 | 3.6 |
| 1992 | 1/1/1992 | 6.1 | 11.4 | 3.4 |
| 1993 | 1/1/1993 | 6.0 | 11.5 | 3.3 |
| 1994 | 1/1/1994 | 5.8 | 11.5 | 3.1 |
| 1995 | 1/1/1995 | 5.7 | 11.5 | 3.0 |
| 1996 | 1/1/1996 | 5.5 | 11.5 | 2.8 |
| 1997 | 1/1/1997 | 5.4 | 11.6 | 2.8 |
| 1998 | 1/1/1998 | 5.2 | 11.6 | 2.6 |
| 1999 | 1/1/1999 | 5.1 | 11.6 | 2.5 |
| 2000 | 1/1/2000 | 5.0 | 11.6 | 2.4 |
| 2001 | 1/1/2001 | 5.1 | 12.0 | 2.5 |
| 2002 | 1/1/2002 | 5.3 | 12.5 | 2.7 |
| 2003 | 1/1/2003 | 5.4 | 13.0 | 2.9 |
| 2004 | 1/1/2004 | 5.6 | 13.5 | 3.1 |
| 2005 | 1/1/2005 | 6.9 | 13.9 | 3.3 |
| 2006 | 1/1/2006 | 6.6 | 14.4 | 3.6 |
| 2007 | 1/1/2007 | 6.7 | 14.9 | 3.8 |
| 2008 | 1/1/2008 | 6.9 | 15.3 | 3.9 |
| 2009 | 1/1/2009 | 6.9 | 15.8 | 4.1 |
| 2010 | 1/1/2010 | 7.1 | 16.3 | 4.3 |
| 2011 | 1/1/2011 | 7.1 | 16.4 | 9.6 |
| 2012 | 1/1/2012 | 7.0 | 16.4 | 9.5 |
| 2013 | 1/1/2013 | 7.0 | 16.4 | 9.4 |
| 2014 | 1/1/2014 | 6.8 | 16.3 | 9.2 |

**California Employment Development Department**
**Unemployment Rates**

| Year | County | Santa Cruz |
|---|---|---|
| 1990 | 7.2 | |
| 1991 | 8.8 | |
| 1992 | 9.7 | |
| 1993 | 10.4 | |
| 1994 | 9.7 | |
| 1995 | 9.3 | |
| 1996 | 8.5 | |
| 1997 | 7.9 | |
| 1998 | 7.3 | |
| 1999 | 6.4 | |
| 2000 | 5.1 | 4.2 |
| 2001 | 5.7 | 4.7 |
| 2002 | 7.3 | 6.1 |
| 2003 | 7.7 | 6.4 |
| 2004 | 7 | 5.8 |
| 2005 | 6.3 | 5.2 |
| 2006 | 5.6 | 4.6 |
| 2007 | 5.9 | 4.9 |
| 2008 | 7.4 | 6.1 |
| 2009 | 11.1 | 9.4 |
| 2010 | 13.3 | 11.9 |
| 2011 | 13.1 | 11.7 |
| 2012 | 11.8 | 10.6 |
| 2013 | 10.3 | 9.2 |
| 2014 | 8.7 | 7.8 |

# ATTACHMENT 4 CONSERVATION ADJUSTMENT DATA

**SFR Inside City Plumbing Code Water Savings Since 2000 (MG)**

| | Month | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Year** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **Annual** |
| **2000** | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| **2001** | 0.1 | 0.2 | 0.3 | 0.4 | 0.5 | 0.6 | 0.7 | 0.8 | 0.9 | 1.0 | 1.1 | 1.2 | 8.1 |
| **2002** | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.4 | 1.4 | 15.7 |
| **2003** | 1.4 | 1.5 | 1.6 | 1.7 | 1.8 | 1.9 | 1.9 | 2.0 | 2.1 | 2.2 | 2.3 | 2.4 | 22.8 |
| **2004** | 2.4 | 2.4 | 2.4 | 2.4 | 2.4 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.6 | 29.6 |
| **2005** | 2.6 | 2.7 | 2.8 | 2.8 | 2.9 | 3.0 | 3.0 | 3.1 | 3.2 | 3.2 | 3.3 | 3.4 | 36.0 |
| **2006** | 3.4 | 3.4 | 3.4 | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 | 3.6 | 3.6 | 3.6 | 41.9 |
| **2007** | 3.6 | 3.7 | 3.8 | 3.8 | 3.9 | 3.9 | 4.0 | 4.0 | 4.1 | 4.2 | 4.2 | 4.3 | 47.5 |
| **2008** | 4.3 | 4.3 | 4.3 | 4.4 | 4.4 | 4.4 | 4.4 | 4.4 | 4.5 | 4.5 | 4.5 | 4.5 | 52.8 |
| **2009** | 4.6 | 4.6 | 4.7 | 4.7 | 4.8 | 4.8 | 4.8 | 4.9 | 4.9 | 5.0 | 5.0 | 5.1 | 57.9 |
| **2010** | 5.1 | 5.1 | 5.2 | 5.2 | 5.2 | 5.2 | 5.2 | 5.3 | 5.3 | 5.3 | 5.3 | 5.3 | 62.7 |
| **2011** | 5.4 | 5.4 | 5.5 | 5.5 | 5.5 | 5.6 | 5.6 | 5.7 | 5.7 | 5.8 | 5.8 | 5.8 | 67.3 |
| **2012** | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 6.0 | 6.0 | 6.0 | 6.0 | 6.1 | 6.1 | 6.1 | 71.8 |
| **2013** | 6.1 | 6.2 | 6.2 | 6.2 | 6.3 | 6.3 | 6.4 | 6.4 | 6.4 | 6.5 | 6.5 | 6.5 | 76.0 |
| **2014** | 6.6 | 6.6 | 6.7 | 6.7 | 6.8 | 6.8 | 6.9 | 6.9 | 7.0 | 7.0 | 7.0 | | 74.9 |

**SFR Outside City Plumbing Code Water Savings Since 2000 (MG)**

| | Month | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Year** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **Annual** |
| **2000** | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| **2001** | 0.1 | 0.1 | 0.2 | 0.2 | 0.3 | 0.3 | 0.4 | 0.5 | 0.5 | 0.6 | 0.6 | 0.7 | 4.5 |
| **2002** | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.8 | 0.8 | 0.8 | 8.8 |
| **2003** | 0.8 | 0.9 | 0.9 | 1.0 | 1.0 | 1.0 | 1.1 | 1.1 | 1.2 | 1.2 | 1.3 | 1.3 | 12.8 |
| **2004** | 1.3 | 1.3 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 16.7 |
| **2005** | 1.5 | 1.5 | 1.6 | 1.6 | 1.6 | 1.7 | 1.7 | 1.7 | 1.8 | 1.8 | 1.9 | 1.9 | 20.3 |
| **2006** | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 23.6 |
| **2007** | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.2 | 2.2 | 2.3 | 2.3 | 2.3 | 2.4 | 2.4 | 26.7 |
| **2008** | 2.4 | 2.4 | 2.4 | 2.4 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 29.7 |
| **2009** | 2.6 | 2.6 | 2.6 | 2.6 | 2.7 | 2.7 | 2.7 | 2.8 | 2.8 | 2.8 | 2.8 | 2.9 | 32.6 |
| **2010** | 2.9 | 2.9 | 2.9 | 2.9 | 2.9 | 2.9 | 2.9 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 35.3 |
| **2011** | 3.0 | 3.1 | 3.1 | 3.1 | 3.1 | 3.1 | 3.2 | 3.2 | 3.2 | 3.2 | 3.3 | 3.3 | 37.9 |
| **2012** | 3.3 | 3.3 | 3.3 | 3.3 | 3.3 | 3.4 | 3.4 | 3.4 | 3.4 | 3.4 | 3.4 | 3.4 | 40.4 |
| **2013** | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 | 3.6 | 3.6 | 3.6 | 3.6 | 3.6 | 3.7 | 3.7 | 42.7 |
| **2014** | 3.7 | 3.7 | 3.8 | 3.8 | 3.8 | 3.8 | 3.9 | 3.9 | 3.9 | 3.9 | 4.0 | | 42.1 |

**SFR Inside City Housing Units**

| | Month | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Year** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** |
| **2000** | 11,516 | 11,519 | 11,523 | 11,526 | 11,530 | 11,533 | 11,537 | 11,540 | 11,544 | 11,547 | 11,551 | 11,554 |
| **2001** | 11,559 | 11,564 | 11,569 | 11,574 | 11,579 | 11,584 | 11,588 | 11,593 | 11,598 | 11,603 | 11,608 | 11,613 |
| **2002** | 11,624 | 11,634 | 11,645 | 11,656 | 11,666 | 11,677 | 11,688 | 11,698 | 11,709 | 11,720 | 11,730 | 11,741 |
| **2003** | 11,748 | 11,755 | 11,762 | 11,769 | 11,776 | 11,783 | 11,789 | 11,796 | 11,803 | 11,810 | 11,817 | 11,824 |
| **2004** | 11,827 | 11,829 | 11,832 | 11,835 | 11,837 | 11,840 | 11,843 | 11,845 | 11,848 | 11,851 | 11,853 | 11,856 |
| **2005** | 11,859 | 11,862 | 11,865 | 11,867 | 11,870 | 11,873 | 11,876 | 11,879 | 11,882 | 11,884 | 11,887 | 11,890 |
| **2006** | 11,896 | 11,903 | 11,909 | 11,915 | 11,922 | 11,928 | 11,934 | 11,941 | 11,947 | 11,953 | 11,960 | 11,966 |
| **2007** | 11,972 | 11,978 | 11,984 | 11,990 | 11,996 | 12,003 | 12,009 | 12,015 | 12,021 | 12,027 | 12,033 | 12,039 |
| **2008** | 12,039 | 12,039 | 12,039 | 12,039 | 12,039 | 12,039 | 12,038 | 12,038 | 12,038 | 12,038 | 12,038 | 12,038 |
| **2009** | 12,042 | 12,045 | 12,049 | 12,052 | 12,056 | 12,060 | 12,063 | 12,067 | 12,070 | 12,074 | 12,077 | 12,081 |
| **2010** | 12,084 | 12,088 | 12,091 | 12,095 | 12,098 | 12,102 | 12,105 | 12,108 | 12,112 | 12,115 | 12,119 | 12,122 |
| **2011** | 12,123 | 12,125 | 12,126 | 12,127 | 12,129 | 12,130 | 12,131 | 12,133 | 12,134 | 12,135 | 12,137 | 12,138 |
| **2012** | 12,141 | 12,144 | 12,147 | 12,149 | 12,152 | 12,155 | 12,158 | 12,161 | 12,164 | 12,166 | 12,169 | 12,172 |
| **2013** | 12,175 | 12,178 | 12,181 | 12,184 | 12,187 | 12,190 | 12,192 | 12,195 | 12,198 | 12,201 | 12,204 | 12,207 |
| **2014** | 12,210 | 12,214 | 12,217 | 12,220 | 12,223 | 12,227 | 12,230 | 12,233 | 12,236 | 12,240 | 12,243 | |

**SFR Outside City Housing Units**

| | Month | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Year** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** |
| **2000** | 6,257 | 6,263 | 6,268 | 6,273 | 6,279 | 6,284 | 6,289 | 6,295 | 6,300 | 6,305 | 6,311 | 6,316 |
| **2001** | 6,321 | 6,325 | 6,330 | 6,334 | 6,339 | 6,344 | 6,348 | 6,353 | 6,357 | 6,362 | 6,366 | 6,371 |
| **2002** | 6,377 | 6,383 | 6,389 | 6,394 | 6,400 | 6,406 | 6,412 | 6,418 | 6,424 | 6,429 | 6,435 | 6,441 |
| **2003** | 6,443 | 6,445 | 6,447 | 6,449 | 6,451 | 6,454 | 6,456 | 6,458 | 6,460 | 6,462 | 6,464 | 6,466 |
| **2004** | 6,469 | 6,471 | 6,474 | 6,476 | 6,479 | 6,481 | 6,484 | 6,486 | 6,489 | 6,491 | 6,494 | 6,496 |
| **2005** | 6,501 | 6,506 | 6,510 | 6,515 | 6,520 | 6,525 | 6,529 | 6,534 | 6,539 | 6,544 | 6,548 | 6,553 |
| **2006** | 6,557 | 6,561 | 6,565 | 6,569 | 6,573 | 6,577 | 6,580 | 6,584 | 6,588 | 6,592 | 6,596 | 6,600 |
| **2007** | 6,609 | 6,618 | 6,627 | 6,636 | 6,645 | 6,654 | 6,662 | 6,671 | 6,680 | 6,689 | 6,698 | 6,707 |
| **2008** | 6,708 | 6,709 | 6,711 | 6,712 | 6,713 | 6,714 | 6,715 | 6,716 | 6,718 | 6,719 | 6,720 | 6,721 |
| **2009** | 6,722 | 6,723 | 6,725 | 6,726 | 6,727 | 6,728 | 6,729 | 6,730 | 6,732 | 6,733 | 6,734 | 6,735 |
| **2010** | 6,735 | 6,736 | 6,736 | 6,737 | 6,737 | 6,738 | 6,738 | 6,738 | 6,739 | 6,739 | 6,740 | 6,740 |
| **2011** | 6,741 | 6,741 | 6,742 | 6,742 | 6,743 | 6,743 | 6,744 | 6,744 | 6,745 | 6,745 | 6,746 | 6,746 |
| **2012** | 6,747 | 6,748 | 6,748 | 6,749 | 6,750 | 6,751 | 6,751 | 6,752 | 6,753 | 6,754 | 6,754 | 6,755 |
| **2013** | 6,754 | 6,754 | 6,753 | 6,752 | 6,751 | 6,751 | 6,750 | 6,749 | 6,748 | 6,748 | 6,747 | 6,746 |
| **2014** | 6,746 | 6,746 | 6,745 | 6,745 | 6,745 | 6,745 | 6,744 | 6,744 | 6,744 | 6,744 | 6,743 | |

**SFR Inside City Plumbing Code Water Savings Since 2000 (CCF/Housing Unit)**

| | Month | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Year** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **Annual** |
| **2000** | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| **2001** | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.9 |
| **2002** | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 1.8 |
| **2003** | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.3 | 0.3 | 2.6 |
| **2004** | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 3.3 |
| **2005** | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.4 | 0.4 | 0.4 | 0.4 | 4.1 |
| **2006** | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 4.7 |
| **2007** | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 5.3 |
| **2008** | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 5.9 |
| **2009** | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.6 | 0.6 | 0.6 | 6.4 |
| **2010** | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 6.9 |
| **2011** | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 7.4 |
| **2012** | 0.6 | 0.6 | 0.6 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 7.9 |
| **2013** | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 8.3 |
| **2014** | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.8 | 0.8 | 0.8 | 0.8 | | 8.2 |

**SFR Outside City Plumbing Code Water Savings Since 2000 (CCF/Housing Unit)**

| | Month | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Year** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **Annual** |
| **2000** | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| **2001** | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 1.0 |
| **2002** | 0.1 | 0.1 | 0.1 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 1.8 |
| **2003** | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.3 | 0.3 | 0.3 | 2.7 |
| **2004** | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 3.4 |
| **2005** | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 4.2 |
| **2006** | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 4.8 |
| **2007** | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 5.4 |
| **2008** | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 5.9 |
| **2009** | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.6 | 0.6 | 0.6 | 0.6 | 6.5 |
| **2010** | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 7.0 |
| **2011** | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.7 | 7.5 |
| **2012** | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 8.0 |
| **2013** | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 8.5 |
| **2014** | 0.7 | 0.7 | 0.7 | 0.7 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | | 8.4 |

**SFR Inside City Avg Use (CCF/Housing Unit)**

| | Month | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Year** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **Annual** |
| **2000** | 6.5 | 7.1 | 7.5 | 8.6 | 10.1 | 11.2 | 12.0 | 11.0 | 9.8 | 8.7 | 7.6 | 7.0 | 106.9 |
| **2001** | 6.8 | 7.0 | 7.1 | 8.1 | 10.1 | 11.3 | 11.3 | 11.6 | 10.9 | 8.8 | 7.7 | 7.2 | 108.1 |
| **2002** | 6.2 | 5.9 | 7.2 | 8.6 | 10.0 | 11.2 | 10.8 | 10.9 | 11.3 | 9.4 | 8.1 | 7.1 | 106.7 |
| **2003** | 6.5 | 6.5 | 6.7 | 7.9 | 9.5 | 10.4 | 11.5 | 12.1 | 11.2 | 9.2 | 7.6 | 6.8 | 105.7 |
| **2004** | 6.5 | 6.8 | 7.6 | 8.9 | 10.9 | 12.0 | 11.2 | 11.0 | 9.6 | 8.0 | 7.4 | 7.6 | 107.7 |
| **2005** | 7.7 | 7.0 | 6.0 | 6.5 | 8.3 | 9.6 | 10.7 | 10.7 | 10.0 | 8.7 | 7.6 | 6.8 | 99.6 |
| **2006** | 5.6 | 6.1 | 6.0 | 5.8 | 8.3 | 9.9 | 11.2 | 10.6 | 9.2 | 8.4 | 6.9 | 6.3 | 94.2 |
| **2007** | 6.1 | 6.4 | 6.3 | 6.9 | 8.2 | 9.8 | 10.9 | 10.4 | 9.4 | 7.7 | 5.9 | 6.2 | 94.1 |
| **2008** | 6.1 | 6.3 | 7.3 | 8.0 | 8.8 | 9.7 | 10.3 | 9.2 | 8.5 | 7.8 | 6.5 | 6.0 | 94.6 |
| **2009** | 5.8 | 5.3 | 5.8 | 6.7 | 7.4 | 8.1 | 8.7 | 8.7 | 8.1 | 7.0 | 5.8 | 5.6 | 83.0 |
| **2010** | 5.9 | 5.4 | 5.1 | 5.7 | 6.8 | 8.2 | 8.7 | 8.9 | 8.4 | 7.1 | 5.8 | 5.3 | 81.3 |
| **2011** | 5.5 | 5.2 | 5.1 | 6.1 | 6.9 | 7.3 | 8.3 | 8.4 | 7.6 | 6.7 | 5.9 | 5.6 | 78.6 |
| **2012** | 5.8 | 5.6 | 5.5 | 5.8 | 7.0 | 8.4 | 8.8 | 8.4 | 7.7 | 7.1 | 6.0 | 5.5 | 81.6 |
| **2013** | 5.4 | 5.2 | 5.6 | 6.4 | 7.6 | 8.5 | 8.5 | 8.4 | 7.9 | 7.6 | 6.7 | 6.2 | 84.1 |
| **2014** | 6.0 | 5.1 | 4.9 | 5.3 | 5.4 | 5.6 | 5.5 | 5.3 | 5.1 | 4.8 | 4.3 | | 57.3 |

**SFR Outside City Avg Use (CCF/Housing Unit)**

| | Month | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Year** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **Annual** |
| **2000** | 7.1 | 7.2 | 7.7 | 9.2 | 10.4 | 11.4 | 12.9 | 11.9 | 11.7 | 9.5 | 8.4 | 7.7 | 115.1 |
| **2001** | 7.4 | 7.0 | 6.8 | 8.8 | 10.6 | 11.7 | 12.8 | 11.8 | 11.6 | 9.9 | 8.8 | 7.5 | 114.6 |
| **2002** | 6.9 | 6.9 | 7.1 | 8.7 | 10.3 | 11.6 | 13.3 | 12.5 | 12.6 | 10.2 | 8.8 | 7.6 | 116.4 |
| **2003** | 7.0 | 7.1 | 7.2 | 8.1 | 9.0 | 11.0 | 13.9 | 13.0 | 12.8 | 10.4 | 9.0 | 7.6 | 116.1 |
| **2004** | 6.9 | 7.0 | 7.6 | 9.6 | 11.2 | 12.0 | 13.3 | 12.6 | 12.6 | 9.9 | 8.4 | 7.7 | 118.8 |
| **2005** | 7.4 | 6.7 | 6.1 | 7.4 | 8.7 | 10.2 | 12.5 | 11.5 | 11.3 | 9.4 | 8.5 | 7.2 | 107.0 |
| **2006** | 6.4 | 6.2 | 5.9 | 7.0 | 8.3 | 10.0 | 12.2 | 11.3 | 11.2 | 9.4 | 8.3 | 7.3 | 103.5 |
| **2007** | 6.8 | 6.8 | 6.7 | 7.9 | 8.9 | 10.0 | 11.5 | 10.4 | 10.3 | 8.6 | 7.9 | 7.0 | 102.9 |
| **2008** | 6.3 | 6.0 | 5.9 | 7.7 | 11.0 | 12.7 | 9.0 | 8.4 | 13.0 | 11.5 | 7.4 | 6.5 | 105.5 |
| **2009** | 6.0 | 5.6 | 6.5 | 7.6 | 8.6 | 9.4 | 9.6 | 9.8 | 8.6 | 7.5 | 6.4 | 5.9 | 91.5 |
| **2010** | 5.6 | 5.5 | 5.8 | 6.4 | 7.7 | 9.1 | 9.5 | 9.8 | 8.8 | 7.4 | 6.1 | 5.7 | 87.6 |
| **2011** | 5.5 | 5.4 | 6.0 | 6.8 | 7.8 | 8.6 | 8.9 | 9.2 | 8.0 | 7.0 | 6.3 | 6.2 | 85.6 |
| **2012** | 5.9 | 5.7 | 6.1 | 6.7 | 8.1 | 9.4 | 9.4 | 9.3 | 8.3 | 7.3 | 6.2 | 5.8 | 88.3 |
| **2013** | 5.6 | 5.7 | 6.4 | 7.4 | 8.5 | 9.3 | 9.3 | 9.4 | 8.7 | 8.1 | 7.2 | 6.7 | 92.2 |
| **2014** | 6.5 | 6.8 | 7.1 | 5.7 | 6.0 | 6.3 | 6.2 | 5.9 | 5.5 | 5.1 | 4.5 | | 65.6 |

**SFR Inside City Adjusted Avg Use (CCF/Housing Unit)**

| | Month | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Year** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **Annual** |
| **2000** | 6.5 | 7.1 | 7.5 | 8.6 | 10.1 | 11.2 | 12.0 | 11.0 | 9.8 | 8.7 | 7.6 | 7.0 | 106.9 |
| **2001** | 6.8 | 7.0 | 7.2 | 8.1 | 10.1 | 11.4 | 11.4 | 11.7 | 11.0 | 9.0 | 7.9 | 7.4 | 109.0 |
| **2002** | 6.4 | 6.1 | 7.3 | 8.7 | 10.2 | 11.4 | 11.0 | 11.0 | 11.5 | 9.5 | 8.2 | 7.2 | 108.5 |
| **2003** | 6.7 | 6.7 | 6.9 | 8.1 | 9.7 | 10.6 | 11.7 | 12.3 | 11.4 | 9.4 | 7.9 | 7.1 | 108.3 |
| **2004** | 6.8 | 7.1 | 7.9 | 9.2 | 11.2 | 12.3 | 11.5 | 11.3 | 9.9 | 8.3 | 7.7 | 7.9 | 111.0 |
| **2005** | 8.0 | 7.3 | 6.3 | 6.8 | 8.6 | 9.9 | 11.0 | 11.1 | 10.4 | 9.1 | 7.9 | 7.2 | 103.6 |
| **2006** | 6.0 | 6.5 | 6.4 | 6.2 | 8.7 | 10.3 | 11.6 | 11.0 | 9.6 | 8.8 | 7.3 | 6.7 | 98.9 |
| **2007** | 6.5 | 6.8 | 6.7 | 7.3 | 8.6 | 10.2 | 11.3 | 10.8 | 9.8 | 8.2 | 6.4 | 6.7 | 99.4 |
| **2008** | 6.6 | 6.8 | 7.8 | 8.5 | 9.3 | 10.2 | 10.8 | 9.7 | 9.0 | 8.2 | 7.0 | 6.5 | 100.5 |
| **2009** | 6.3 | 5.8 | 6.3 | 7.2 | 8.0 | 8.7 | 9.2 | 9.2 | 8.6 | 7.6 | 6.4 | 6.2 | 89.4 |
| **2010** | 6.4 | 5.9 | 5.6 | 6.3 | 7.4 | 8.7 | 9.3 | 9.4 | 9.0 | 7.7 | 6.4 | 5.9 | 88.2 |
| **2011** | 6.1 | 5.8 | 5.7 | 6.7 | 7.5 | 7.9 | 8.9 | 9.1 | 8.2 | 7.4 | 6.5 | 6.3 | 86.0 |
| **2012** | 6.4 | 6.3 | 6.2 | 6.5 | 7.6 | 9.0 | 9.4 | 9.0 | 8.4 | 7.8 | 6.7 | 6.2 | 89.5 |
| **2013** | 6.1 | 5.9 | 6.3 | 7.1 | 8.3 | 9.2 | 9.2 | 9.1 | 8.6 | 8.3 | 7.4 | 6.9 | 92.4 |
| **2014** | 6.7 | 5.9 | 5.6 | 6.0 | 6.2 | 6.3 | 6.2 | 6.0 | 5.9 | 5.5 | 5.0 | | 65.4 |

**SFR Outside City Adjusted Avg Use (CCF/Housing Unit)**

| | Month | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Year** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **Annual** |
| **2000** | 7.1 | 7.2 | 7.7 | 9.2 | 10.4 | 11.4 | 12.9 | 11.9 | 11.7 | 9.5 | 8.4 | 7.7 | 115.1 |
| **2001** | 7.4 | 7.0 | 6.8 | 8.8 | 10.7 | 11.7 | 12.9 | 11.9 | 11.8 | 10.0 | 8.9 | 7.6 | 115.6 |
| **2002** | 7.0 | 7.0 | 7.2 | 8.9 | 10.4 | 11.7 | 13.5 | 12.7 | 12.8 | 10.4 | 8.9 | 7.8 | 118.3 |
| **2003** | 7.2 | 7.3 | 7.4 | 8.3 | 9.2 | 11.2 | 14.1 | 13.2 | 13.1 | 10.7 | 9.2 | 7.9 | 118.7 |
| **2004** | 7.1 | 7.3 | 7.9 | 9.9 | 11.5 | 12.3 | 13.6 | 12.8 | 12.9 | 10.2 | 8.7 | 8.0 | 122.2 |
| **2005** | 7.7 | 7.0 | 6.4 | 7.7 | 9.1 | 10.5 | 12.8 | 11.9 | 11.7 | 9.8 | 8.9 | 7.6 | 111.1 |
| **2006** | 6.8 | 6.6 | 6.3 | 7.4 | 8.7 | 10.4 | 12.6 | 11.7 | 11.6 | 9.8 | 8.7 | 7.7 | 108.3 |
| **2007** | 7.2 | 7.2 | 7.2 | 8.4 | 9.4 | 10.4 | 12.0 | 10.9 | 10.7 | 9.1 | 8.4 | 7.5 | 108.2 |
| **2008** | 6.8 | 6.5 | 6.4 | 8.2 | 11.5 | 13.2 | 9.5 | 8.9 | 13.5 | 12.0 | 7.9 | 7.0 | 111.4 |
| **2009** | 6.5 | 6.1 | 7.0 | 8.1 | 9.2 | 10.0 | 10.1 | 10.3 | 9.1 | 8.0 | 7.0 | 6.5 | 98.0 |
| **2010** | 6.2 | 6.0 | 6.4 | 7.0 | 8.3 | 9.7 | 10.1 | 10.4 | 9.4 | 8.0 | 6.7 | 6.3 | 94.6 |
| **2011** | 6.1 | 6.0 | 6.6 | 7.4 | 8.4 | 9.2 | 9.5 | 9.8 | 8.7 | 7.6 | 6.9 | 6.8 | 93.1 |
| **2012** | 6.6 | 6.4 | 6.7 | 7.4 | 8.8 | 10.1 | 10.1 | 9.9 | 9.0 | 7.9 | 6.9 | 6.5 | 96.3 |
| **2013** | 6.3 | 6.3 | 7.1 | 8.1 | 9.2 | 10.0 | 10.0 | 10.1 | 9.4 | 8.8 | 7.9 | 7.5 | 100.7 |
| **2014** | 7.3 | 7.5 | 7.8 | 6.4 | 6.7 | 7.0 | 7.0 | 6.7 | 6.3 | 5.9 | 5.3 | | 74.0 |

**MFR Inside City Plumbing Code Water Savings Since 2000 (MG)**

| | Month | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Year** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **Annual** |
| **2000** | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| **2001** | 0.1 | 0.2 | 0.2 | 0.3 | 0.4 | 0.5 | 0.6 | 0.7 | 0.7 | 0.8 | 0.9 | 1.0 | 6.4 |
| **2002** | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.1 | 1.1 | 1.1 | 1.1 | 12.4 |
| **2003** | 1.1 | 1.2 | 1.3 | 1.3 | 1.4 | 1.5 | 1.5 | 1.6 | 1.7 | 1.7 | 1.8 | 1.9 | 18.2 |
| **2004** | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 23.7 |
| **2005** | 2.1 | 2.2 | 2.2 | 2.3 | 2.3 | 2.4 | 2.4 | 2.5 | 2.5 | 2.6 | 2.7 | 2.7 | 28.9 |
| **2006** | 2.7 | 2.7 | 2.8 | 2.8 | 2.8 | 2.8 | 2.8 | 2.8 | 2.9 | 2.9 | 2.9 | 2.9 | 33.8 |
| **2007** | 2.9 | 3.0 | 3.0 | 3.1 | 3.1 | 3.2 | 3.2 | 3.3 | 3.3 | 3.4 | 3.4 | 3.5 | 38.4 |
| **2008** | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 | 3.6 | 3.6 | 3.6 | 3.6 | 3.6 | 3.7 | 3.7 | 42.9 |
| **2009** | 3.7 | 3.8 | 3.8 | 3.8 | 3.9 | 3.9 | 3.9 | 4.0 | 4.0 | 4.1 | 4.1 | 4.1 | 47.2 |
| **2010** | 4.2 | 4.2 | 4.2 | 4.2 | 4.2 | 4.3 | 4.3 | 4.3 | 4.3 | 4.3 | 4.4 | 4.4 | 51.2 |
| **2011** | 4.4 | 4.5 | 4.5 | 4.5 | 4.6 | 4.6 | 4.7 | 4.7 | 4.8 | 4.8 | 4.8 | 4.9 | 55.7 |
| **2012** | 4.9 | 4.9 | 4.9 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.1 | 5.1 | 5.1 | 5.1 | 60.1 |
| **2013** | 5.2 | 5.2 | 5.2 | 5.3 | 5.3 | 5.3 | 5.4 | 5.4 | 5.4 | 5.5 | 5.5 | 5.6 | 64.3 |
| **2014** | 5.6 | 5.6 | 5.7 | 5.7 | 5.8 | 5.8 | 5.9 | 5.9 | 5.9 | 6.0 | 6.0 | | 64.0 |

**MFR Outside City Plumbing Code Water Savings Since 2000 (MG)**

| | Month | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Year** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **Annual** |
| **2000** | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| **2001** | 0.1 | 0.1 | 0.2 | 0.3 | 0.4 | 0.4 | 0.5 | 0.6 | 0.7 | 0.7 | 0.8 | 0.9 | 5.6 |
| **2002** | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 1.0 | 1.0 | 11.0 |
| **2003** | 1.0 | 1.1 | 1.1 | 1.2 | 1.3 | 1.3 | 1.4 | 1.4 | 1.5 | 1.6 | 1.6 | 1.7 | 16.1 |
| **2004** | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 21.0 |
| **2005** | 1.9 | 1.9 | 2.0 | 2.0 | 2.1 | 2.1 | 2.2 | 2.2 | 2.3 | 2.3 | 2.4 | 2.4 | 25.6 |
| **2006** | 2.4 | 2.4 | 2.4 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.6 | 2.6 | 30.0 |
| **2007** | 2.6 | 2.7 | 2.7 | 2.7 | 2.8 | 2.8 | 2.9 | 2.9 | 2.9 | 3.0 | 3.0 | 3.1 | 34.1 |
| **2008** | 3.1 | 3.1 | 3.1 | 3.1 | 3.1 | 3.2 | 3.2 | 3.2 | 3.2 | 3.2 | 3.2 | 3.3 | 38.0 |
| **2009** | 3.3 | 3.3 | 3.4 | 3.4 | 3.4 | 3.5 | 3.5 | 3.5 | 3.6 | 3.6 | 3.6 | 3.7 | 41.8 |
| **2010** | 3.7 | 3.7 | 3.7 | 3.7 | 3.8 | 3.8 | 3.8 | 3.8 | 3.8 | 3.8 | 3.9 | 3.9 | 45.4 |
| **2011** | 3.9 | 4.0 | 4.0 | 4.0 | 4.1 | 4.1 | 4.1 | 4.2 | 4.2 | 4.2 | 4.3 | 4.3 | 49.4 |
| **2012** | 4.3 | 4.4 | 4.4 | 4.4 | 4.4 | 4.4 | 4.4 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 53.3 |
| **2013** | 4.6 | 4.6 | 4.6 | 4.7 | 4.7 | 4.7 | 4.8 | 4.8 | 4.8 | 4.9 | 4.9 | 4.9 | 57.0 |
| **2014** | 5.0 | 5.0 | 5.0 | 5.1 | 5.1 | 5.2 | 5.2 | 5.2 | 5.3 | 5.3 | 5.4 | | 56.8 |

**MFR Inside City Housing Units**

| | Month | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Year** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** |
| **2000** | 8,667 | 8,668 | 8,669 | 8,670 | 8,671 | 8,672 | 8,673 | 8,674 | 8,675 | 8,675 | 8,676 | 8,677 |
| **2001** | 8,682 | 8,686 | 8,691 | 8,695 | 8,699 | 8,704 | 8,708 | 8,713 | 8,717 | 8,722 | 8,726 | 8,731 |
| **2002** | 8,732 | 8,733 | 8,735 | 8,736 | 8,737 | 8,739 | 8,740 | 8,741 | 8,743 | 8,744 | 8,745 | 8,747 |
| **2003** | 8,755 | 8,763 | 8,771 | 8,779 | 8,787 | 8,795 | 8,802 | 8,810 | 8,818 | 8,826 | 8,834 | 8,842 |
| **2004** | 8,858 | 8,873 | 8,888 | 8,903 | 8,918 | 8,933 | 8,948 | 8,963 | 8,978 | 8,993 | 9,009 | 9,024 |
| **2005** | 9,036 | 9,048 | 9,060 | 9,072 | 9,084 | 9,096 | 9,108 | 9,120 | 9,132 | 9,144 | 9,156 | 9,168 |
| **2006** | 9,170 | 9,172 | 9,174 | 9,176 | 9,179 | 9,181 | 9,183 | 9,185 | 9,188 | 9,190 | 9,192 | 9,194 |
| **2007** | 9,205 | 9,216 | 9,226 | 9,237 | 9,248 | 9,258 | 9,269 | 9,280 | 9,290 | 9,301 | 9,312 | 9,322 |
| **2008** | 9,325 | 9,328 | 9,331 | 9,335 | 9,338 | 9,341 | 9,344 | 9,347 | 9,350 | 9,353 | 9,356 | 9,359 |
| **2009** | 9,365 | 9,371 | 9,377 | 9,383 | 9,388 | 9,394 | 9,400 | 9,406 | 9,411 | 9,417 | 9,423 | 9,429 |
| **2010** | 9,434 | 9,439 | 9,443 | 9,448 | 9,453 | 9,458 | 9,463 | 9,468 | 9,473 | 9,478 | 9,483 | 9,487 |
| **2011** | 9,488 | 9,488 | 9,489 | 9,489 | 9,490 | 9,490 | 9,491 | 9,491 | 9,491 | 9,492 | 9,492 | 9,493 |
| **2012** | 9,493 | 9,493 | 9,493 | 9,493 | 9,493 | 9,493 | 9,493 | 9,493 | 9,493 | 9,493 | 9,493 | 9,493 |
| **2013** | 9,495 | 9,496 | 9,498 | 9,500 | 9,502 | 9,503 | 9,505 | 9,507 | 9,509 | 9,510 | 9,512 | 9,514 |
| **2014** | 9,518 | 9,523 | 9,527 | 9,532 | 9,536 | 9,541 | 9,545 | 9,550 | 9,554 | 9,558 | 9,563 | |

**MFR Outside City Housing Units**

| | Month | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Year** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** |
| **2000** | 7,940 | 7,938 | 7,935 | 7,932 | 7,929 | 7,926 | 7,924 | 7,921 | 7,918 | 7,915 | 7,912 | 7,910 |
| **2001** | 7,910 | 7,911 | 7,912 | 7,912 | 7,913 | 7,914 | 7,915 | 7,915 | 7,916 | 7,917 | 7,917 | 7,918 |
| **2002** | 7,915 | 7,912 | 7,910 | 7,907 | 7,904 | 7,901 | 7,898 | 7,896 | 7,893 | 7,890 | 7,887 | 7,885 |
| **2003** | 7,885 | 7,886 | 7,887 | 7,887 | 7,888 | 7,889 | 7,889 | 7,890 | 7,891 | 7,892 | 7,892 | 7,893 |
| **2004** | 7,893 | 7,893 | 7,893 | 7,893 | 7,893 | 7,893 | 7,893 | 7,893 | 7,893 | 7,893 | 7,893 | 7,893 |
| **2005** | 7,896 | 7,900 | 7,903 | 7,907 | 7,910 | 7,914 | 7,917 | 7,921 | 7,924 | 7,928 | 7,931 | 7,935 |
| **2006** | 7,936 | 7,938 | 7,939 | 7,940 | 7,942 | 7,943 | 7,945 | 7,946 | 7,947 | 7,949 | 7,950 | 7,952 |
| **2007** | 7,950 | 7,949 | 7,947 | 7,946 | 7,945 | 7,943 | 7,942 | 7,940 | 7,939 | 7,938 | 7,936 | 7,935 |
| **2008** | 7,933 | 7,932 | 7,931 | 7,929 | 7,928 | 7,926 | 7,925 | 7,924 | 7,922 | 7,921 | 7,919 | 7,918 |
| **2009** | 7,917 | 7,915 | 7,914 | 7,912 | 7,911 | 7,910 | 7,908 | 7,907 | 7,905 | 7,904 | 7,903 | 7,901 |
| **2010** | 7,903 | 7,904 | 7,905 | 7,907 | 7,908 | 7,910 | 7,911 | 7,912 | 7,914 | 7,915 | 7,917 | 7,918 |
| **2011** | 7,915 | 7,912 | 7,910 | 7,907 | 7,904 | 7,901 | 7,898 | 7,896 | 7,893 | 7,890 | 7,887 | 7,885 |
| **2012** | 7,885 | 7,886 | 7,887 | 7,887 | 7,888 | 7,889 | 7,889 | 7,890 | 7,891 | 7,892 | 7,892 | 7,893 |
| **2013** | 7,893 | 7,893 | 7,893 | 7,893 | 7,893 | 7,893 | 7,893 | 7,893 | 7,893 | 7,893 | 7,893 | 7,893 |
| **2014** | 7,894 | 7,894 | 7,895 | 7,896 | 7,896 | 7,897 | 7,898 | 7,898 | 7,899 | 7,900 | 7,901 | |

**MFR Inside City Plumbing Code Water Savings Since 2000 (CCF/Housing Unit)**

| | Month | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Year** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **Annual** |
| **2000** | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| **2001** | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.2 | 1.0 |
| **2002** | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 1.9 |
| **2003** | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.3 | 0.3 | 0.3 | 0.3 | 2.8 |
| **2004** | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 3.5 |
| **2005** | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 4.2 |
| **2006** | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 4.9 |
| **2007** | 0.4 | 0.4 | 0.4 | 0.4 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 5.5 |
| **2008** | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 6.1 |
| **2009** | 0.5 | 0.5 | 0.5 | 0.5 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 6.7 |
| **2010** | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 7.2 |
| **2011** | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 7.9 |
| **2012** | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 8.5 |
| **2013** | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 9.0 |
| **2014** | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | | 9.0 |

**MFR Outside City Plumbing Code Water Savings Since 2000 (CCF/Housing Unit)**

| | Month | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Year** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **Annual** |
| **2000** | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| **2001** | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 1.0 |
| **2002** | 0.1 | 0.1 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 1.9 |
| **2003** | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.3 | 0.3 | 0.3 | 0.3 | 2.7 |
| **2004** | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 3.6 |
| **2005** | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 4.3 |
| **2006** | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 5.0 |
| **2007** | 0.4 | 0.4 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 5.7 |
| **2008** | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.6 | 6.4 |
| **2009** | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 7.1 |
| **2010** | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.7 | 0.7 | 7.7 |
| **2011** | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 8.4 |
| **2012** | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 9.0 |
| **2013** | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 9.7 |
| **2014** | 0.8 | 0.8 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | | 9.6 |

**MFR Inside City Avg Use (CCF/Housing Unit)**

| | Month | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Year** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **Annual** |
| **2000** | 5.1 | 5.3 | 5.3 | 5.6 | 6.2 | 6.5 | 6.5 | 6.5 | 6.1 | 5.8 | 5.5 | 5.2 | 69.5 |
| **2001** | 5.2 | 5.3 | 5.0 | 5.3 | 6.1 | 6.5 | 6.2 | 6.2 | 6.1 | 5.8 | 5.4 | 5.1 | 68.2 |
| **2002** | 4.5 | 4.5 | 5.3 | 5.7 | 5.8 | 6.2 | 5.7 | 5.8 | 5.9 | 5.5 | 5.1 | 4.8 | 64.8 |
| **2003** | 4.6 | 4.6 | 4.7 | 5.0 | 5.6 | 5.8 | 5.9 | 6.3 | 6.0 | 5.3 | 4.8 | 4.7 | 63.2 |
| **2004** | 4.8 | 5.4 | 5.3 | 5.0 | 6.0 | 6.3 | 5.9 | 5.6 | 5.0 | 4.9 | 4.8 | 5.3 | 64.2 |
| **2005** | 5.9 | 5.6 | 4.4 | 4.3 | 5.3 | 5.3 | 5.6 | 5.6 | 5.3 | 5.0 | 4.8 | 4.6 | 61.6 |
| **2006** | 4.1 | 4.7 | 4.2 | 3.8 | 5.5 | 5.3 | 5.8 | 5.4 | 5.1 | 5.0 | 4.2 | 4.4 | 57.7 |
| **2007** | 4.2 | 4.7 | 4.2 | 4.1 | 4.7 | 5.3 | 6.0 | 5.6 | 5.2 | 4.8 | 3.8 | 4.1 | 56.7 |
| **2008** | 4.6 | 4.7 | 5.0 | 4.8 | 4.7 | 5.2 | 5.6 | 5.1 | 4.9 | 4.7 | 4.2 | 3.9 | 57.5 |
| **2009** | 4.0 | 3.9 | 4.0 | 4.3 | 4.6 | 4.7 | 4.8 | 4.8 | 4.6 | 4.5 | 4.1 | 3.9 | 52.2 |
| **2010** | 4.3 | 4.0 | 3.7 | 4.0 | 4.5 | 4.7 | 4.8 | 4.9 | 4.7 | 4.6 | 4.1 | 3.8 | 52.4 |
| **2011** | 4.0 | 3.9 | 3.7 | 4.2 | 4.5 | 4.5 | 4.7 | 4.8 | 4.5 | 4.2 | 4.0 | 3.8 | 51.0 |
| **2012** | 3.9 | 4.1 | 3.9 | 4.0 | 4.4 | 4.8 | 4.9 | 4.7 | 4.4 | 4.4 | 4.2 | 3.9 | 51.5 |
| **2013** | 3.9 | 3.7 | 3.9 | 4.1 | 4.5 | 4.7 | 4.6 | 4.6 | 4.5 | 4.6 | 4.3 | 4.0 | 51.6 |
| **2014** | 3.9 | 3.6 | 3.6 | 3.7 | 3.7 | 3.7 | 3.6 | 3.6 | 3.5 | 3.4 | 3.2 | | 39.7 |

**MFR Outside City Avg Use (CCF/Housing Unit)**

| | Month | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Year** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **Annual** |
| **2000** | 5.1 | 5.2 | 5.4 | 5.8 | 6.1 | 6.1 | 6.6 | 6.5 | 6.7 | 6.0 | 5.8 | 5.5 | 70.8 |
| **2001** | 5.3 | 4.9 | 4.9 | 5.8 | 6.4 | 6.4 | 6.6 | 6.4 | 6.6 | 6.0 | 5.8 | 5.5 | 70.5 |
| **2002** | 5.2 | 4.8 | 4.9 | 5.5 | 5.9 | 6.1 | 6.5 | 6.3 | 6.6 | 5.8 | 5.5 | 5.1 | 68.4 |
| **2003** | 4.9 | 4.9 | 5.0 | 5.2 | 5.5 | 6.0 | 6.6 | 6.3 | 6.4 | 5.7 | 5.3 | 4.9 | 66.8 |
| **2004** | 4.7 | 4.8 | 4.9 | 5.5 | 6.0 | 5.9 | 6.2 | 6.1 | 6.2 | 5.5 | 5.2 | 5.0 | 66.0 |
| **2005** | 5.1 | 4.6 | 4.3 | 4.8 | 5.4 | 5.6 | 5.9 | 5.7 | 5.9 | 5.4 | 5.1 | 4.7 | 62.4 |
| **2006** | 4.5 | 4.3 | 4.3 | 4.7 | 5.0 | 5.3 | 5.7 | 5.5 | 5.7 | 5.2 | 4.9 | 4.5 | 59.6 |
| **2007** | 4.3 | 4.2 | 4.2 | 4.6 | 4.9 | 5.0 | 5.3 | 5.0 | 5.1 | 4.7 | 4.7 | 4.5 | 56.6 |
| **2008** | 4.3 | 4.0 | 3.9 | 4.5 | 6.0 | 6.0 | 4.2 | 4.2 | 6.6 | 6.1 | 4.2 | 4.2 | 58.2 |
| **2009** | 4.0 | 3.9 | 4.2 | 4.6 | 4.9 | 5.1 | 5.1 | 5.2 | 4.6 | 4.4 | 4.1 | 4.0 | 54.1 |
| **2010** | 3.9 | 4.0 | 4.1 | 4.2 | 4.8 | 5.3 | 5.3 | 5.3 | 4.7 | 4.5 | 4.1 | 4.0 | 54.2 |
| **2011** | 3.9 | 3.9 | 4.2 | 4.6 | 4.8 | 5.0 | 5.1 | 5.1 | 4.5 | 4.3 | 4.1 | 4.2 | 53.6 |
| **2012** | 4.0 | 3.9 | 4.1 | 4.3 | 4.8 | 5.4 | 5.2 | 5.1 | 4.6 | 4.4 | 4.2 | 4.1 | 54.2 |
| **2013** | 3.9 | 3.9 | 4.2 | 4.5 | 4.9 | 5.3 | 5.2 | 5.2 | 4.8 | 4.7 | 4.4 | 4.2 | 55.3 |
| **2014** | 3.9 | 4.4 | 5.0 | 3.9 | 3.8 | 3.9 | 4.0 | 3.9 | 3.8 | 3.6 | 3.4 | | 43.5 |

**MFR Inside City Adjusted Avg Use (CCF/Housing Unit)**

| | Month | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Year** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **Annual** |
| **2000** | 5.1 | 5.3 | 5.3 | 5.6 | 6.2 | 6.5 | 6.5 | 6.5 | 6.1 | 5.8 | 5.5 | 5.2 | 69.5 |
| **2001** | 5.2 | 5.3 | 5.0 | 5.3 | 6.2 | 6.6 | 6.3 | 6.3 | 6.2 | 5.9 | 5.5 | 5.3 | 69.1 |
| **2002** | 4.6 | 4.6 | 5.4 | 5.9 | 6.0 | 6.3 | 5.9 | 6.0 | 6.1 | 5.7 | 5.3 | 5.0 | 66.7 |
| **2003** | 4.8 | 4.8 | 4.9 | 5.2 | 5.8 | 6.0 | 6.1 | 6.5 | 6.2 | 5.5 | 5.1 | 5.0 | 66.0 |
| **2004** | 5.1 | 5.6 | 5.5 | 5.3 | 6.3 | 6.6 | 6.2 | 5.9 | 5.3 | 5.2 | 5.1 | 5.6 | 67.8 |
| **2005** | 6.2 | 5.9 | 4.7 | 4.7 | 5.6 | 5.6 | 6.0 | 6.0 | 5.6 | 5.4 | 5.2 | 4.9 | 65.9 |
| **2006** | 4.5 | 5.1 | 4.6 | 4.2 | 5.9 | 5.8 | 6.2 | 5.8 | 5.5 | 5.5 | 4.7 | 4.8 | 62.6 |
| **2007** | 4.6 | 5.1 | 4.7 | 4.5 | 5.2 | 5.8 | 6.5 | 6.0 | 5.7 | 5.3 | 4.2 | 4.6 | 62.3 |
| **2008** | 5.1 | 5.2 | 5.5 | 5.4 | 5.3 | 5.7 | 6.2 | 5.6 | 5.4 | 5.3 | 4.7 | 4.5 | 63.6 |
| **2009** | 4.6 | 4.4 | 4.6 | 4.9 | 5.1 | 5.2 | 5.3 | 5.4 | 5.2 | 5.1 | 4.7 | 4.5 | 58.9 |
| **2010** | 4.9 | 4.6 | 4.3 | 4.6 | 5.1 | 5.3 | 5.4 | 5.5 | 5.3 | 5.2 | 4.8 | 4.4 | 59.6 |
| **2011** | 4.7 | 4.5 | 4.4 | 4.8 | 5.2 | 5.2 | 5.4 | 5.5 | 5.2 | 4.9 | 4.7 | 4.5 | 58.8 |
| **2012** | 4.6 | 4.8 | 4.6 | 4.7 | 5.1 | 5.5 | 5.6 | 5.4 | 5.2 | 5.1 | 4.9 | 4.6 | 60.0 |
| **2013** | 4.6 | 4.5 | 4.6 | 4.9 | 5.3 | 5.5 | 5.4 | 5.4 | 5.3 | 5.4 | 5.1 | 4.8 | 60.7 |
| **2014** | 4.7 | 4.4 | 4.4 | 4.5 | 4.5 | 4.5 | 4.5 | 4.4 | 4.3 | 4.3 | 4.1 | | 48.7 |

**MFR Outside City Adjusted Avg Use (CCF/Housing Unit)**

| | Month | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Year** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **Annual** |
| **2000** | 5.1 | 5.2 | 5.4 | 5.8 | 6.1 | 6.1 | 6.6 | 6.5 | 6.7 | 6.0 | 5.8 | 5.5 | 70.8 |
| **2001** | 5.3 | 5.0 | 4.9 | 5.8 | 6.4 | 6.5 | 6.7 | 6.5 | 6.7 | 6.1 | 5.9 | 5.7 | 71.5 |
| **2002** | 5.4 | 5.0 | 5.1 | 5.7 | 6.1 | 6.3 | 6.7 | 6.5 | 6.7 | 6.0 | 5.7 | 5.3 | 70.3 |
| **2003** | 5.1 | 5.1 | 5.1 | 5.4 | 5.7 | 6.3 | 6.8 | 6.6 | 6.7 | 6.0 | 5.6 | 5.2 | 69.5 |
| **2004** | 5.0 | 5.1 | 5.2 | 5.8 | 6.2 | 6.2 | 6.5 | 6.4 | 6.5 | 5.8 | 5.5 | 5.3 | 69.6 |
| **2005** | 5.4 | 4.9 | 4.6 | 5.2 | 5.7 | 6.0 | 6.3 | 6.1 | 6.2 | 5.8 | 5.5 | 5.1 | 66.8 |
| **2006** | 4.9 | 4.7 | 4.7 | 5.1 | 5.4 | 5.7 | 6.1 | 5.9 | 6.1 | 5.6 | 5.3 | 5.0 | 64.6 |
| **2007** | 4.8 | 4.7 | 4.7 | 5.0 | 5.3 | 5.5 | 5.8 | 5.5 | 5.6 | 5.3 | 5.2 | 5.0 | 62.3 |
| **2008** | 4.8 | 4.5 | 4.4 | 5.0 | 6.6 | 6.5 | 4.7 | 4.7 | 7.2 | 6.7 | 4.7 | 4.8 | 64.6 |
| **2009** | 4.6 | 4.4 | 4.8 | 5.2 | 5.4 | 5.7 | 5.7 | 5.8 | 5.2 | 5.0 | 4.7 | 4.6 | 61.2 |
| **2010** | 4.5 | 4.6 | 4.7 | 4.9 | 5.4 | 5.9 | 6.0 | 6.0 | 5.4 | 5.2 | 4.7 | 4.6 | 61.9 |
| **2011** | 4.5 | 4.5 | 4.9 | 5.2 | 5.5 | 5.7 | 5.8 | 5.8 | 5.2 | 5.0 | 4.8 | 4.9 | 62.0 |
| **2012** | 4.7 | 4.7 | 4.9 | 5.0 | 5.6 | 6.1 | 6.0 | 5.9 | 5.3 | 5.2 | 4.9 | 4.9 | 63.2 |
| **2013** | 4.7 | 4.7 | 5.0 | 5.3 | 5.7 | 6.1 | 6.0 | 6.0 | 5.6 | 5.6 | 5.2 | 5.0 | 65.0 |
| **2014** | 4.7 | 5.3 | 5.8 | 4.7 | 4.6 | 4.8 | 4.9 | 4.8 | 4.7 | 4.5 | 4.3 | | 53.1 |

**BUS Inside City Plumbing Code Water Savings Since 2000 (MG)**

| | Month | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Year** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **Annual** |
| **2000** | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| **2001** | 0.0 | 0.1 | 0.1 | 0.1 | 0.1 | 0.2 | 0.2 | 0.2 | 0.3 | 0.3 | 0.3 | 0.4 | 2.3 |
| **2002** | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 4.6 |
| **2003** | 0.4 | 0.5 | 0.5 | 0.5 | 0.5 | 0.6 | 0.6 | 0.6 | 0.6 | 0.7 | 0.7 | 0.7 | 6.8 |
| **2004** | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.8 | 0.8 | 0.8 | 0.8 | 8.9 |
| **2005** | 0.8 | 0.8 | 0.8 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 1.0 | 1.0 | 1.0 | 1.0 | 10.9 |
| **2006** | 1.0 | 1.0 | 1.0 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 12.8 |
| **2007** | 1.1 | 1.1 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.3 | 1.3 | 1.3 | 1.3 | 14.6 |
| **2008** | 1.3 | 1.3 | 1.3 | 1.3 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 16.4 |
| **2009** | 1.4 | 1.4 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.6 | 1.6 | 1.6 | 18.1 |
| **2010** | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | 19.8 |
| **2011** | 1.7 | 1.7 | 1.7 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.9 | 1.9 | 21.5 |
| **2012** | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.0 | 2.0 | 23.2 |
| **2013** | 2.0 | 2.0 | 2.0 | 2.0 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 24.9 |
| **2014** | 2.2 | 2.2 | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | | 23.6 |

**BUS Outside City Plumbing Code Water Savings Since 2000 (MG)**

| | Month | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Year** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **Annual** |
| **2000** | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| **2001** | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.2 | 0.2 | 1.1 |
| **2002** | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 2.3 |
| **2003** | 0.2 | 0.2 | 0.2 | 0.2 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 3.3 |
| **2004** | 0.3 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 4.4 |
| **2005** | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 5.4 |
| **2006** | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 6.3 |
| **2007** | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 7.2 |
| **2008** | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 8.1 |
| **2009** | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 8.9 |
| **2010** | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 9.7 |
| **2011** | 0.8 | 0.8 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 10.6 |
| **2012** | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 11.4 |
| **2013** | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.1 | 1.1 | 12.3 |
| **2014** | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | | 11.6 |

**BUS Inside City Services**

| | Month | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Year** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** |
| **2000** | 1,273 | 1,276 | 1,278 | 1,280 | 1,283 | 1,285 | 1,287 | 1,290 | 1,292 | 1,294 | 1,297 | 1,299 |
| **2001** | 1,297 | 1,294 | 1,292 | 1,289 | 1,287 | 1,285 | 1,282 | 1,280 | 1,277 | 1,275 | 1,272 | 1,270 |
| **2002** | 1,269 | 1,269 | 1,268 | 1,267 | 1,267 | 1,266 | 1,265 | 1,265 | 1,264 | 1,263 | 1,263 | 1,262 |
| **2003** | 1,262 | 1,263 | 1,263 | 1,264 | 1,264 | 1,265 | 1,265 | 1,265 | 1,266 | 1,266 | 1,267 | 1,267 |
| **2004** | 1,266 | 1,266 | 1,265 | 1,265 | 1,264 | 1,264 | 1,263 | 1,262 | 1,262 | 1,261 | 1,261 | 1,260 |
| **2005** | 1,260 | 1,260 | 1,260 | 1,259 | 1,259 | 1,259 | 1,259 | 1,259 | 1,259 | 1,258 | 1,258 | 1,258 |
| **2006** | 1,258 | 1,258 | 1,258 | 1,258 | 1,258 | 1,258 | 1,257 | 1,257 | 1,257 | 1,257 | 1,257 | 1,257 |
| **2007** | 1,257 | 1,257 | 1,257 | 1,257 | 1,257 | 1,258 | 1,258 | 1,258 | 1,258 | 1,258 | 1,258 | 1,258 |
| **2008** | 1,258 | 1,258 | 1,258 | 1,257 | 1,257 | 1,257 | 1,257 | 1,257 | 1,257 | 1,256 | 1,256 | 1,256 |
| **2009** | 1,256 | 1,257 | 1,257 | 1,258 | 1,258 | 1,259 | 1,259 | 1,259 | 1,260 | 1,260 | 1,261 | 1,261 |
| **2010** | 1,261 | 1,260 | 1,260 | 1,260 | 1,259 | 1,259 | 1,259 | 1,258 | 1,258 | 1,258 | 1,257 | 1,257 |
| **2011** | 1,257 | 1,258 | 1,258 | 1,259 | 1,259 | 1,260 | 1,260 | 1,260 | 1,261 | 1,261 | 1,262 | 1,262 |
| **2012** | 1,262 | 1,262 | 1,262 | 1,261 | 1,261 | 1,261 | 1,261 | 1,261 | 1,261 | 1,260 | 1,260 | 1,260 |
| **2013** | 1,260 | 1,259 | 1,259 | 1,259 | 1,258 | 1,258 | 1,258 | 1,257 | 1,257 | 1,257 | 1,256 | 1,256 |
| **2014** | 1,256 | 1,257 | 1,257 | 1,258 | 1,258 | 1,259 | 1,259 | 1,259 | 1,260 | 1,260 | 1,261 | |

**BUS Outside City Services**

| | Month | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Year** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** |
| **2000** | 620 | 621 | 621 | 622 | 623 | 624 | 624 | 625 | 626 | 627 | 627 | 628 |
| **2001** | 628 | 628 | 628 | 628 | 628 | 628 | 628 | 628 | 628 | 628 | 628 | 628 |
| **2002** | 628 | 628 | 628 | 628 | 628 | 629 | 629 | 629 | 629 | 629 | 629 | 629 |
| **2003** | 629 | 629 | 628 | 628 | 628 | 628 | 627 | 627 | 627 | 627 | 626 | 626 |
| **2004** | 626 | 626 | 626 | 626 | 626 | 626 | 626 | 626 | 626 | 626 | 626 | 626 |
| **2005** | 626 | 626 | 625 | 625 | 625 | 625 | 624 | 624 | 624 | 624 | 623 | 623 |
| **2006** | 624 | 624 | 625 | 625 | 626 | 626 | 627 | 627 | 628 | 628 | 629 | 629 |
| **2007** | 629 | 628 | 628 | 627 | 627 | 626 | 626 | 625 | 625 | 624 | 624 | 623 |
| **2008** | 623 | 623 | 623 | 623 | 623 | 623 | 622 | 622 | 622 | 622 | 622 | 622 |
| **2009** | 622 | 623 | 623 | 624 | 624 | 625 | 625 | 625 | 626 | 626 | 627 | 627 |
| **2010** | 627 | 627 | 627 | 627 | 627 | 628 | 628 | 628 | 628 | 628 | 628 | 628 |
| **2011** | 628 | 628 | 628 | 628 | 628 | 628 | 628 | 628 | 628 | 628 | 628 | 628 |
| **2012** | 629 | 629 | 630 | 630 | 631 | 631 | 632 | 632 | 633 | 633 | 634 | 634 |
| **2013** | 634 | 634 | 634 | 634 | 634 | 634 | 633 | 633 | 633 | 633 | 633 | 633 |
| **2014** | 634 | 634 | 635 | 635 | 636 | 637 | 637 | 638 | 638 | 639 | 639 | |

**BUS Inside City Plumbing Code Water Savings Since 2000 (CCF/Service)**

| | Month | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Year** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **Annual** |
| **2000** | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| **2001** | 0.0 | 0.1 | 0.1 | 0.1 | 0.2 | 0.2 | 0.2 | 0.3 | 0.3 | 0.3 | 0.3 | 0.4 | 2.4 |
| **2002** | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 4.8 |
| **2003** | 0.5 | 0.5 | 0.5 | 0.5 | 0.6 | 0.6 | 0.6 | 0.6 | 0.7 | 0.7 | 0.7 | 0.7 | 7.2 |
| **2004** | 0.7 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 9.4 |
| **2005** | 0.8 | 0.9 | 0.9 | 0.9 | 0.9 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.1 | 1.1 | 11.6 |
| **2006** | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.2 | 1.2 | 1.2 | 1.2 | 13.6 |
| **2007** | 1.2 | 1.2 | 1.2 | 1.2 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.4 | 1.4 | 1.4 | 15.6 |
| **2008** | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 17.4 |
| **2009** | 1.5 | 1.5 | 1.5 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.7 | 1.7 | 1.7 | 19.2 |
| **2010** | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 21.0 |
| **2011** | 1.8 | 1.8 | 1.8 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.0 | 22.8 |
| **2012** | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 24.6 |
| **2013** | 2.1 | 2.1 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.3 | 2.3 | 2.3 | 26.5 |
| **2014** | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | | 25.1 |

**BUS Outside City Plumbing Code Water Savings Since 2000 (CCF/Service)**

| | Month | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Year** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **Annual** |
| **2000** | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| **2001** | 0.0 | 0.1 | 0.1 | 0.1 | 0.2 | 0.2 | 0.2 | 0.3 | 0.3 | 0.3 | 0.3 | 0.4 | 2.4 |
| **2002** | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 4.8 |
| **2003** | 0.4 | 0.5 | 0.5 | 0.5 | 0.6 | 0.6 | 0.6 | 0.6 | 0.7 | 0.7 | 0.7 | 0.7 | 7.1 |
| **2004** | 0.7 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 9.3 |
| **2005** | 0.8 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 1.0 | 1.0 | 1.0 | 1.0 | 1.1 | 1.1 | 11.5 |
| **2006** | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.2 | 13.5 |
| **2007** | 1.2 | 1.2 | 1.2 | 1.2 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.4 | 1.4 | 1.4 | 15.4 |
| **2008** | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 17.3 |
| **2009** | 1.5 | 1.5 | 1.5 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.7 | 1.7 | 19.1 |
| **2010** | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | 1.8 | 1.8 | 1.8 | 20.7 |
| **2011** | 1.8 | 1.8 | 1.8 | 1.8 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 22.6 |
| **2012** | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.1 | 2.1 | 24.2 |
| **2013** | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 25.9 |
| **2014** | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | | 24.4 |

**BUS Inside City Avg Use (CCF/Service)**

| | Month | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Year** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **Annual** |
| **2000** | 31.0 | 33.1 | 34.3 | 37.3 | 42.4 | 45.1 | 45.7 | 46.1 | 41.2 | 38.6 | 34.9 | 32.3 | 462.1 |
| **2001** | 33.2 | 33.8 | 32.5 | 35.3 | 44.4 | 48.1 | 43.7 | 43.0 | 41.1 | 38.3 | 32.6 | 30.3 | 456.4 |
| **2002** | 26.9 | 27.8 | 35.0 | 39.2 | 40.5 | 42.6 | 40.3 | 42.0 | 40.6 | 37.1 | 32.5 | 30.1 | 434.5 |
| **2003** | 29.6 | 30.9 | 31.8 | 34.6 | 39.2 | 40.8 | 43.8 | 49.5 | 43.9 | 34.1 | 28.6 | 28.5 | 435.2 |
| **2004** | 29.9 | 35.8 | 36.0 | 34.8 | 42.1 | 45.0 | 44.0 | 40.8 | 32.8 | 31.9 | 30.3 | 33.1 | 436.6 |
| **2005** | 38.1 | 34.8 | 28.7 | 29.8 | 37.7 | 37.3 | 44.8 | 46.5 | 39.4 | 35.7 | 32.6 | 31.2 | 436.6 |
| **2006** | 27.4 | 31.9 | 27.6 | 26.0 | 40.1 | 40.0 | 48.3 | 45.0 | 37.1 | 35.0 | 28.1 | 29.3 | 415.8 |
| **2007** | 27.9 | 33.3 | 30.4 | 31.1 | 36.7 | 43.4 | 53.1 | 48.3 | 41.0 | 35.0 | 24.9 | 27.1 | 432.2 |
| **2008** | 30.4 | 29.8 | 32.4 | 32.3 | 34.3 | 38.8 | 43.4 | 39.9 | 34.6 | 32.4 | 27.4 | 25.5 | 401.1 |
| **2009** | 25.6 | 24.6 | 27.1 | 29.6 | 31.7 | 34.1 | 38.1 | 39.3 | 34.1 | 29.7 | 25.3 | 23.8 | 363.0 |
| **2010** | 26.4 | 24.5 | 24.4 | 27.1 | 30.5 | 34.5 | 37.2 | 37.0 | 33.3 | 29.4 | 25.0 | 22.2 | 351.5 |
| **2011** | 24.1 | 23.4 | 23.2 | 27.3 | 30.1 | 32.3 | 36.7 | 36.4 | 32.0 | 28.8 | 26.2 | 25.2 | 345.7 |
| **2012** | 25.1 | 25.5 | 26.0 | 27.0 | 29.9 | 35.0 | 38.4 | 37.5 | 34.0 | 30.7 | 27.8 | 25.4 | 362.4 |
| **2013** | 25.1 | 24.6 | 26.9 | 29.3 | 33.2 | 37.3 | 39.0 | 38.3 | 35.0 | 33.3 | 30.6 | 27.9 | 380.6 |
| **2014** | 27.1 | 25.1 | 27.2 | 29.8 | 30.8 | 32.7 | 34.2 | 32.5 | 29.3 | 27.3 | 24.2 | | 320.4 |

**BUS Outside City Avg Use (CCF/Service)**

| | Month | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Year** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **Annual** |
| **2000** | 43.5 | 43.8 | 45.2 | 50.3 | 54.0 | 56.6 | 60.2 | 58.1 | 59.1 | 52.0 | 48.5 | 45.5 | 616.6 |
| **2001** | 42.8 | 40.2 | 40.1 | 47.2 | 52.8 | 55.0 | 57.9 | 56.4 | 57.9 | 51.9 | 48.7 | 44.6 | 595.7 |
| **2002** | 41.9 | 42.7 | 43.8 | 47.7 | 51.2 | 55.2 | 59.5 | 58.3 | 60.0 | 51.2 | 45.1 | 40.8 | 597.3 |
| **2003** | 38.0 | 38.4 | 39.3 | 41.4 | 44.0 | 51.0 | 56.9 | 53.6 | 53.1 | 46.1 | 42.4 | 39.0 | 543.2 |
| **2004** | 36.3 | 37.9 | 40.8 | 47.3 | 51.8 | 54.3 | 58.7 | 57.7 | 57.7 | 49.1 | 44.6 | 42.8 | 579.1 |
| **2005** | 41.9 | 38.1 | 35.4 | 41.0 | 46.8 | 49.6 | 52.8 | 51.4 | 53.3 | 47.7 | 44.7 | 39.6 | 542.5 |
| **2006** | 35.3 | 34.2 | 34.3 | 38.4 | 42.3 | 47.4 | 51.8 | 49.6 | 51.3 | 45.5 | 41.4 | 37.7 | 509.2 |
| **2007** | 35.8 | 36.1 | 36.8 | 39.4 | 42.0 | 45.8 | 49.4 | 46.9 | 47.6 | 42.9 | 41.3 | 38.1 | 502.1 |
| **2008** | 34.9 | 33.3 | 33.3 | 39.6 | 55.9 | 55.0 | 36.0 | 37.9 | 61.1 | 56.3 | 35.7 | 33.8 | 512.6 |
| **2009** | 31.8 | 30.7 | 34.8 | 39.3 | 42.0 | 43.9 | 44.2 | 45.5 | 38.8 | 36.1 | 31.6 | 29.3 | 448.0 |
| **2010** | 29.4 | 30.1 | 30.8 | 31.2 | 36.7 | 41.9 | 41.8 | 42.7 | 37.3 | 34.8 | 29.8 | 27.4 | 414.0 |
| **2011** | 27.2 | 27.7 | 30.5 | 33.6 | 36.4 | 38.8 | 41.0 | 44.0 | 37.7 | 34.9 | 32.0 | 31.8 | 415.6 |
| **2012** | 30.7 | 29.9 | 31.7 | 33.8 | 39.3 | 43.9 | 42.5 | 43.2 | 38.7 | 37.1 | 33.2 | 31.5 | 435.4 |
| **2013** | 30.9 | 31.6 | 34.9 | 38.2 | 41.4 | 43.2 | 41.7 | 42.6 | 39.6 | 40.5 | 36.5 | 32.7 | 453.8 |
| **2014** | 30.0 | 35.0 | 40.0 | 31.9 | 34.2 | 36.7 | 36.0 | 34.8 | 33.6 | 31.9 | 28.3 | | 372.4 |

**BUS Inside City Adjusted Avg Use (CCF/Service)**

| | Month | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Year** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **Annual** |
| **2000** | 31.0 | 33.1 | 34.3 | 37.3 | 42.4 | 45.1 | 45.7 | 46.1 | 41.2 | 38.6 | 34.9 | 32.3 | 462.1 |
| **2001** | 33.2 | 33.9 | 32.6 | 35.5 | 44.6 | 48.3 | 43.9 | 43.3 | 41.3 | 38.6 | 32.9 | 30.7 | 458.9 |
| **2002** | 27.3 | 28.2 | 35.4 | 39.5 | 40.9 | 43.0 | 40.7 | 42.5 | 41.0 | 37.5 | 32.9 | 30.5 | 439.4 |
| **2003** | 30.0 | 31.4 | 32.3 | 35.1 | 39.8 | 41.4 | 44.4 | 50.1 | 44.5 | 34.8 | 29.3 | 29.2 | 442.4 |
| **2004** | 30.7 | 36.6 | 36.7 | 35.5 | 42.9 | 45.8 | 44.8 | 41.6 | 33.6 | 32.7 | 31.1 | 33.9 | 446.0 |
| **2005** | 39.0 | 35.6 | 29.6 | 30.7 | 38.6 | 38.2 | 45.8 | 47.5 | 40.5 | 36.7 | 33.7 | 32.3 | 448.2 |
| **2006** | 28.5 | 33.0 | 28.8 | 27.1 | 41.2 | 41.1 | 49.4 | 46.2 | 38.3 | 36.2 | 29.3 | 30.5 | 429.4 |
| **2007** | 29.1 | 34.5 | 31.7 | 32.4 | 37.9 | 44.7 | 54.4 | 49.6 | 42.3 | 36.3 | 26.3 | 28.5 | 447.8 |
| **2008** | 31.8 | 31.2 | 33.8 | 33.7 | 35.7 | 40.3 | 44.9 | 41.3 | 36.1 | 33.8 | 28.8 | 27.0 | 418.5 |
| **2009** | 27.1 | 26.1 | 28.7 | 31.2 | 33.3 | 35.7 | 39.7 | 40.9 | 35.7 | 31.4 | 27.0 | 25.5 | 382.2 |
| **2010** | 28.1 | 26.2 | 26.1 | 28.8 | 32.3 | 36.2 | 38.9 | 38.8 | 35.1 | 31.1 | 26.8 | 24.0 | 372.5 |
| **2011** | 25.9 | 25.2 | 25.0 | 29.2 | 31.9 | 34.2 | 38.6 | 38.3 | 34.0 | 30.8 | 28.2 | 27.2 | 368.6 |
| **2012** | 27.1 | 27.6 | 28.0 | 29.1 | 31.9 | 37.1 | 40.5 | 39.6 | 36.0 | 32.7 | 29.9 | 27.5 | 387.0 |
| **2013** | 27.3 | 26.7 | 29.0 | 31.5 | 35.4 | 39.5 | 41.2 | 40.6 | 37.2 | 35.6 | 32.9 | 30.2 | 407.0 |
| **2014** | 29.4 | 27.4 | 29.5 | 32.0 | 33.1 | 35.0 | 36.5 | 34.8 | 31.6 | 29.6 | 26.5 | | 345.5 |

**BUS Outside City Adjusted Avg Use (CCF/Service)**

| | Month | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Year** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **Annual** |
| **2000** | 43.5 | 43.8 | 45.2 | 50.3 | 54.0 | 56.6 | 60.2 | 58.1 | 59.1 | 52.0 | 48.5 | 45.5 | 616.6 |
| **2001** | 42.9 | 40.3 | 40.2 | 47.3 | 53.0 | 55.2 | 58.2 | 56.7 | 58.2 | 52.2 | 49.1 | 44.9 | 598.1 |
| **2002** | 42.2 | 43.0 | 44.2 | 48.1 | 51.6 | 55.6 | 59.9 | 58.7 | 60.4 | 51.6 | 45.5 | 41.3 | 602.1 |
| **2003** | 38.5 | 38.9 | 39.8 | 41.9 | 44.6 | 51.6 | 57.5 | 54.2 | 53.7 | 46.8 | 43.2 | 39.7 | 550.3 |
| **2004** | 37.1 | 38.6 | 41.6 | 48.0 | 52.6 | 55.1 | 59.5 | 58.5 | 58.5 | 49.9 | 45.5 | 43.6 | 588.5 |
| **2005** | 42.8 | 39.0 | 36.3 | 41.9 | 47.7 | 50.5 | 53.8 | 52.4 | 54.4 | 48.8 | 45.8 | 40.7 | 554.0 |
| **2006** | 36.4 | 35.3 | 35.4 | 39.5 | 43.4 | 48.5 | 52.9 | 50.8 | 52.4 | 46.7 | 42.5 | 38.8 | 522.6 |
| **2007** | 37.0 | 37.3 | 38.0 | 40.6 | 43.2 | 47.0 | 50.7 | 48.2 | 48.9 | 44.3 | 42.7 | 39.5 | 517.5 |
| **2008** | 36.3 | 34.7 | 34.7 | 41.0 | 57.3 | 56.4 | 37.4 | 39.3 | 62.6 | 57.8 | 37.2 | 35.3 | 530.0 |
| **2009** | 33.3 | 32.2 | 36.3 | 40.8 | 43.6 | 45.5 | 45.8 | 47.1 | 40.4 | 37.8 | 33.3 | 30.9 | 467.1 |
| **2010** | 31.1 | 31.8 | 32.5 | 32.9 | 38.4 | 43.7 | 43.6 | 44.4 | 39.1 | 36.6 | 31.5 | 29.2 | 434.8 |
| **2011** | 29.0 | 29.5 | 32.4 | 35.4 | 38.3 | 40.7 | 42.9 | 45.9 | 39.7 | 36.8 | 34.0 | 33.8 | 438.2 |
| **2012** | 32.7 | 31.9 | 33.7 | 35.8 | 41.4 | 45.9 | 44.5 | 45.2 | 40.7 | 39.1 | 35.3 | 33.5 | 459.6 |
| **2013** | 33.0 | 33.7 | 37.0 | 40.3 | 43.6 | 45.4 | 43.9 | 44.8 | 41.8 | 42.7 | 38.7 | 35.0 | 479.7 |
| **2014** | 32.3 | 37.2 | 42.2 | 34.1 | 36.4 | 38.9 | 38.2 | 37.0 | 35.8 | 34.1 | 30.5 | | 396.8 |

# ATTACHMENT 5 MODEL ESTIMATION RESULTS

**Single Family Customer Class Model**

Heteroscedastic and auto-correlation consistent standard errors reported in parentheses.

| | Dependent variable: |
|---|---|
| | ln.adj.use |
| geooutside | 0.061 (0.018)*** |
| fmonthFeb | -0.013 (0.010) |
| fmonthMar | 0.014 (0.015) |
| fmonthApr | 0.159 (0.015)*** |
| fmonthMay | 0.451 (0.021)*** |
| fmonthJun | 0.564 (0.021)*** |
| fmonthJul | 0.632 (0.022)*** |
| fmonthAug | 0.615 (0.023)*** |
| fmonthSep | 0.550 (0.018)*** |
| fmonthOct | 0.360 (0.017)*** |
| fmonthNov | 0.143 (0.014)*** |
| fmonthDec | 0.053 (0.009)*** |
| temp.nov.mar | 0.203 (0.091)** |
| temp.apr.jun | 0.422 (0.204)** |
| temp.jul.oct | 0.636 (0.191)*** |
| rain.nov.mar | -0.016 (0.009)* |
| rain.apr.jun | -0.069 (0.014)*** |
| rain.jul.oct | -0.040 (0.020)** |
| ln.rain.dev.lag1 | -0.034 (0.006)*** |
| ln.rain.dev.lag2 | -0.026 (0.007)*** |
| ln.price.winter | -0.075 (0.010)*** |
| ln.price.summer | -0.139 (0.017)*** |
| ln.hh.inc | 0.228 (0.076)*** |
| drght.stage1 | -0.051 (0.019)*** |
| drght.stage2 | -0.071 (0.017)*** |
| drght.stage3 | -0.431 (0.019)*** |
| geooutside:ln.price.summer | 0.020 (0.009)** |
| Constant | -0.605 (0.845) |
| Observations | 358 |
| R2 | 0.923 |
| Adjusted R2 | 0.917 |
| Residual Std. Error | 0.064 (df = 330) |
| F Statistic | 147.089*** (df = 27; 330) |
| Note: | *p<0.1; **p<0.05; ***p<0.01 |

**Multi Family Customer Class Model**

Heteroscedastic and auto-correlation consistent standard errors reported in parentheses.

| | Dependent variable: |
|---|---|
| | ln.adj.use |
| geooutside | 0.055 (0.012)*** |
| fmonthFeb | 0.009 (0.014) |
| fmonthMar | -0.006 (0.014) |
| fmonthApr | 0.031 (0.014)** |
| fmonthMay | 0.141 (0.013)*** |
| fmonthJun | 0.185 (0.012)*** |
| fmonthJul | 0.194 (0.015)*** |
| fmonthAug | 0.189 (0.013)*** |
| fmonthSep | 0.150 (0.012)*** |
| fmonthOct | 0.111 (0.011)*** |
| fmonthNov | 0.033 (0.015)** |
| fmonthDec | -0.001 (0.013) |
| temp.nov.mar | 0.100 (0.066) |
| temp.apr.jun | 0.338 (0.099)*** |
| temp.jul.oct | -0.037 (0.089) |
| rain.nov.mar | 0.001 (0.005) |
| rain.apr.jun | -0.020 (0.009)** |
| rain.jul.oct | -0.018 (0.008)** |
| ln.price | -0.124 (0.029)*** |
| ln.vac.cap.dev | -0.164 (0.058)*** |
| drght.stage1 | -0.009 (0.010) |
| drght.stage2 | -0.028 (0.008)*** |
| drght.stage3 | -0.192 (0.010)*** |
| geooutside:fmonthFeb | -0.030 (0.017)* |
| geooutside:fmonthMar | 0.002 (0.021) |
| geooutside:fmonthApr | 0.051 (0.017)*** |
| geooutside:fmonthMay | 0.018 (0.016) |
| geooutside:fmonthJun | 0.022 (0.018) |
| geooutside:fmonthJul | 0.044 (0.017)*** |
| geooutside:fmonthAug | 0.031 (0.016)** |
| geooutside:fmonthSep | 0.057 (0.018)*** |
| geooutside:fmonthOct | 0.017 (0.014) |
| geooutside:fmonthNov | 0.041 (0.016)** |
| geooutside:fmonthDec | 0.033 (0.014)** |
| Constant | 1.726 (0.035)*** |
| Observations | 351 |
| R2 | 0.909 |
| Adjusted R2 | 0.900 |
| Residual Std. Error | 0.035 (df = 316) |
| F Statistic | 93.266*** (df = 34; 316) |
| Note: | *p<0.1; **p<0.05; ***p<0.01 |

**Business Customer Class Model**

Heteroscedastic and auto-correlation consistent standard errors reported in parentheses.

| | Dependent variable: |
|---|---|
| | ln.adj.use |
| geooutside | 0.486 (0.048)*** |
| fmonthFeb | 0.033 (0.017)* |
| fmonthMar | 0.048 (0.017)*** |
| fmonthApr | 0.116 (0.015)*** |
| fmonthMay | 0.250 (0.016)*** |
| fmonthJun | 0.330 (0.015)*** |
| fmonthJul | 0.396 (0.017)*** |
| fmonthAug | 0.380 (0.018)*** |
| fmonthSep | 0.273 (0.015)*** |
| fmonthOct | 0.172 (0.014)*** |
| fmonthNov | 0.044 (0.020)** |
| fmonthDec | -0.005 (0.020) |
| temp.nov.mar | 0.243 (0.103)** |
| temp.apr.jun | 0.400 (0.193)** |
| temp.jul.oct | -0.135 (0.121) |
| rain.nov.mar | 0.001 (0.007) |
| rain.apr.jun | -0.034 (0.013)*** |
| rain.jul.oct | -0.028 (0.010)*** |
| rain.lag1.apr.jun | -0.017 (0.008)** |
| ln.price | -0.099 (0.017)*** |
| ln.unemp.rate.dev.city | -0.160 (0.011)*** |
| drght.stage3 | -0.123 (0.008)*** |
| geooutside:fmonthFeb | -0.037 (0.021)* |
| geooutside:fmonthMar | -0.021 (0.026) |
| geooutside:fmonthApr | 0.010 (0.020) |
| geooutside:fmonthMay | -0.037 (0.022)* |
| geooutside:fmonthJun | -0.031 (0.023) |
| geooutside:fmonthJul | -0.064 (0.022)*** |
| geooutside:fmonthAug | -0.067 (0.024)*** |
| geooutside:fmonthSep | 0.007 (0.024) |
| geooutside:fmonthOct | 0.018 (0.020) |
| geooutside:fmonthNov | 0.062 (0.025)** |
| geooutside:fmonthDec | 0.040 (0.022)* |
| geooutside:ln.price | -0.163 (0.028)*** |
| geooutside:drght.stage3 | -0.068 (0.011)*** |
| Constant | 3.488 (0.023)*** |
| Observations | 353 |
| R2 | 0.948 |
| Adjusted R2 | 0.942 |
| Residual Std. Error | 0.047 (df = 317) |
| F Statistic | 163.460*** (df = 35; 317) |

**Municipal Customer Class Model**

Heteroscedastic and auto-correlation consistent standard errors reported in parentheses.

| | Dependent variable: |
|---|---|
| | ln.use |
| fmonthFeb | -0.025 (0.040) |
| fmonthMar | 0.101 (0.057)* |
| fmonthApr | 0.767 (0.052)*** |
| fmonthMay | 1.214 (0.049)*** |
| fmonthJun | 1.424 (0.046)*** |
| fmonthJul | 1.553 (0.040)*** |
| fmonthAug | 1.579 (0.041)*** |
| fmonthSep | 1.360 (0.045)*** |
| fmonthOct | 1.061 (0.042)*** |
| fmonthNov | 0.521 (0.039)*** |
| fmonthDec | 0.087 (0.034)** |
| eto.nov.mar | 0.516 (0.138)*** |
| eto.apr.jun | 0.804 (0.242)*** |
| eto.jul.oct | 0.357 (0.107)*** |
| rain.nov.mar | 0.037 (0.036) |
| rain.apr.jun | -0.147 (0.050)*** |
| rain.jul.oct | 0.006 (0.038) |
| ln.rain.dev.lag1 | -0.097 (0.019)*** |
| ln.rain.dev.lag2 | -0.063 (0.019)*** |
| ln.price | -0.237 (0.063)*** |
| ln.unemp.rate.dev.city | -0.142 (0.046)*** |
| drght.stage2 | -0.108 (0.034)*** |
| drght.stage3 | -0.621 (0.035)*** |
| Constant | 2.645 (0.076)*** |
| Observations | 177 |
| R2 | 0.957 |
| Adjusted R2 | 0.951 |
| Residual Std. Error | 0.137 (df = 153) |
| F Statistic | 149.772*** (df = 23; 153) |
| Note: | *p<0.1; **p<0.05; ***p<0.01 |

**Irrigation Customer Class Model**

Heteroscedastic and auto-correlation consistent standard errors reported in parentheses.

| | Dependent variable: |
|---|---|
| | ln.use |
| geooutside | 0.150 (0.034)*** |
| fmonthFeb | 0.058 (0.039) |
| fmonthMar | 0.380 (0.076)*** |
| fmonthApr | 1.256 (0.069)*** |
| fmonthMay | 1.697 (0.052)*** |
| fmonthJun | 1.938 (0.045)*** |
| fmonthJul | 2.028 (0.046)*** |
| fmonthAug | 1.992 (0.046)*** |
| fmonthSep | 1.920 (0.048)*** |
| fmonthOct | 1.614 (0.049)*** |
| fmonthNov | 1.073 (0.043)*** |
| fmonthDec | 0.479 (0.053)*** |
| eto.nov.mar | 0.509 (0.207)** |
| eto.apr.jun | 0.660 (0.243)*** |
| eto.jul.oct | 0.163 (0.184) |
| rain.nov.mar | -0.044 (0.049) |
| rain.apr.jun | -0.116 (0.065)* |
| rain.jul.oct | -0.085 (0.040)** |
| ln.rain.dev.lag1 | -0.166 (0.025)*** |
| ln.rain.dev.lag2 | -0.090 (0.021)*** |
| ln.price | -0.545 (0.069)*** |
| drght.stage1 | -0.077 (0.048) |
| drght.stage2 | -0.250 (0.044)*** |
| drght.stage3 | -0.930 (0.081)*** |
| Constant | 2.681 (0.080)*** |
| Observations | 358 |
| R2 | 0.922 |
| Adjusted R2 | 0.916 |
| Residual Std. Error | 0.216 (df = 333) |
| F Statistic | 164.036*** (df = 24; 333) |
| Note: | *p<0.1; **p<0.05; ***p<0.01 |

**Golf Customer Class Model**

Heteroscedastic and auto-correlation consistent standard errors reported in parentheses.

| | Dependent variable: |
|---|---|
| | ln.use |
| geooutside | 7.105 (0.201)*** |
| fmonthFeb | -0.242 (0.129)* |
| fmonthMar | -0.006 (0.100) |
| fmonthApr | 9.812 (0.225)*** |
| fmonthMay | 11.174 (0.177)*** |
| fmonthJun | 11.845 (0.159)*** |
| fmonthJul | 12.018 (0.165)*** |
| fmonthAug | 12.098 (0.166)*** |
| fmonthSep | 11.876 (0.161)*** |
| fmonthOct | 11.448 (0.161)*** |
| fmonthNov | 10.043 (0.147)*** |
| fmonthDec | 8.628 (0.245)*** |
| ln.eto.nov.mar | 1.135 (0.329)*** |
| ln.eto.apr.jun | 0.173 (0.452) |
| ln.eto.jul.oct | 0.792 (0.228)*** |
| ln.rain.nov.mar | -0.129 (0.083) |
| ln.rain.apr.jun | -0.441 (0.140)*** |
| ln.rain.jul.oct | -0.038 (0.055) |
| ln.rain.dev.lag1 | -0.546 (0.060)*** |
| ln.rain.dev.lag2 | -0.074 (0.047) |
| ln.price.summer | -0.358 (0.098)*** |
| drght.stage3 | -0.319 (0.064)*** |
| geooutside:fmonthFeb | 0.749 (0.255)*** |
| geooutside:fmonthMar | 0.896 (0.275)*** |
| geooutside:fmonthApr | -6.721 (0.297)*** |
| geooutside:fmonthMay | -7.186 (0.277)*** |
| geooutside:fmonthJun | -7.384 (0.258)*** |
| geooutside:fmonthJul | -7.400 (0.263)*** |
| geooutside:fmonthAug | -7.408 (0.258)*** |
| geooutside:fmonthSep | -7.397 (0.262)*** |
| geooutside:fmonthOct | -7.287 (0.256)*** |
| geooutside:fmonthNov | -6.698 (0.232)*** |
| geooutside:fmonthDec | -6.703 (0.332)*** |
| geooutside:ln.price.summer | 0.364 (0.124)*** |
| Constant | -6.701 (0.103)*** |
| Observations | 332 |
| R2 | 0.989 |
| Adjusted R2 | 0.988 |
| Residual Std. Error | 0.367 (df = 297) |
| F Statistic | 805.493*** (df = 34; 297) |
| Note: | *p<0.1; **p<0.05; ***p<0.01 |

# ATTACHMENT 6 MONTHS DROUGHT STAGES IN EFFECT

**Drought Stage 1: 0 = Not In Effect, 1 = In Effect**

| | Month | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Year** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** |
| **2000** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **2001** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **2002** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **2003** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **2004** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **2005** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **2006** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **2007** | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 |
| **2008** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **2009** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **2010** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **2011** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **2012** | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 |
| **2013** | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| **2014** | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |

**Drought Stage 2: 0 = Not In Effect, 1 = In Effect**

| | Month | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Year** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** |
| **2000** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **2001** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **2002** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **2003** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **2004** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **2005** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **2006** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **2007** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **2008** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **2009** | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 |
| **2010** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **2011** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **2012** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **2013** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **2014** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |

**Drought Stage 3: 0 = Not In Effect, 1 = In Effect**

| | Month | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Year** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** |
| **2000** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **2001** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **2002** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **2003** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **2004** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **2005** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **2006** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **2007** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **2008** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **2009** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **2010** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **2011** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **2012** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **2013** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **2014** | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |

# ATTACHMENT 7 WATER RATE AND INCOME FORECASTS

**Forecasted Increase in Water Rates**

| Year | Caltrans Inflation Rate Forecast | % Change in Water Rate | % Change Net of Inflation | Real Water Rate Index | % Change from 2014 |
|---|---|---|---|---|---|
| 2014 | 2.8% | | | 100.0 | |
| 2015 | 3.3% | 10.0% | 6.7% | 106.7 | 6.7% |
| 2016 | 3.2% | 10.0% | 6.8% | 114.0 | 14.0% |
| 2017 | 2.4% | 10.0% | 7.6% | 122.6 | 22.6% |
| 2018 | 2.3% | 10.0% | 7.7% | 132.1 | 32.1% |
| 2019 | 2.4% | 10.0% | 7.6% | 142.1 | 42.1% |
| 2020 | 2.3% | 4.4% | 2.1% | 145.1 | 45.1% |
| 2021 | 2.5% | 4.4% | 1.9% | 148.0 | 48.0% |
| 2022 | 2.6% | 4.4% | 1.8% | 150.7 | 50.7% |
| 2023 | 2.5% | 4.4% | 1.9% | 153.6 | 53.6% |
| 2024 | 2.5% | 4.4% | 1.9% | 156.6 | 56.6% |
| 2025 | 2.5% | 4.4% | 1.9% | 159.7 | 59.7% |
| 2026 | 2.5% | 4.4% | 1.9% | 162.8 | 62.8% |
| 2027 | 2.5% | 4.4% | 1.9% | 166.0 | 66.0% |
| 2028 | 2.5% | 4.4% | 1.9% | 169.2 | 69.2% |
| 2029 | 2.5% | 4.4% | 1.9% | 172.5 | 72.5% |
| 2030 | 2.5% | 4.4% | 1.9% | 175.9 | 75.9% |
| 2031 | 2.5% | 4.4% | 1.9% | 179.3 | 79.3% |
| 2032 | 2.5% | 4.4% | 1.9% | 182.8 | 82.8% |
| 2033 | 2.5% | 4.4% | 1.9% | 186.3 | 86.3% |
| 2034 | 2.5% | 4.4% | 1.9% | 190.0 | 90.0% |
| 2035 | 2.5% | 4.4% | 1.9% | 193.7 | 93.7% |

The forecasted nominal annual percentage change in water rate for 2014-2019 is from the Water Department. The forecasted nominal annual percentage change in water rate from 2020-2035 is set to the long-term annual rate of increase in the BLS Consumer Price Index for Water, Sewer, and Solid Waste Services (http://data.bls.gov/timeseries/CUSR0000SEHG). The source of the Caltrans inflation rate forecast for Santa Cruz County is: http://www.dot.ca.gov/hq/tpp/offices/eab/socio_economic_files/2014/SantaCruz.pdf#zoom=75

**Forecasted Increase in Income**

| Year | Caltrans Real Per Capita Income Forecast | % Change from 2014 |
|---|---|---|
| 2014 | $56,085 | |
| 2015 | $57,661 | 2.8% |
| 2016 | $59,004 | 5.2% |
| 2017 | $60,267 | 7.5% |
| 2018 | $61,653 | 9.9% |
| 2019 | $62,994 | 12.3% |
| 2020 | $64,379 | 14.8% |
| 2021 | $65,679 | 17.1% |
| 2022 | $66,829 | 19.2% |
| 2023 | $67,986 | 21.2% |
| 2024 | $69,191 | 23.4% |
| 2025 | $70,394 | 25.5% |
| 2026 | $71,482 | 27.5% |
| 2027 | $72,552 | 29.4% |
| 2028 | $73,614 | 31.3% |
| 2029 | $74,679 | 33.2% |
| 2030 | $75,749 | 35.1% |
| 2031 | $76,826 | 37.0% |
| 2032 | $77,844 | 38.8% |
| 2033 | $78,920 | 40.7% |
| 2034 | $80,043 | 42.7% |
| 2035 | $81,138 | 44.7% |

The source of the Caltrans forecasted increase in real per capita income for Santa Cruz County is:

http://www.dot.ca.gov/hq/tpp/offices/eab/socio_economic_files/2014/SantaCruz.pdf#zoom=75

While per capita income is projected to grow over the forecast period, it is less clear that median household income will exhibit similar growth. According to Census data, median household income in Santa Cruz County after adjusting for inflation has been stagnant to declining since 1989. Consequently, the demand forecasts hold median household income constant at the 2013 level in the single family forecast.

Santa Cruz County, CA

Median Household Income

| Year | Nominal | CPI | Inflator | 2013 $ |
|---|---|---|---|---|
| 1989 | $37,112 | 128.000 | 1.8877 | $70,056 |

| | | | | |
|---|---|---|---|---|
| 1999 | $53,998 | 168.500 | 1.4340 | $77,431 |
| 2005 | $58,640 | 202.600 | 1.1926 | $69,935 |
| 2009 | $64,349 | 224.110 | 1.0781 | $69,378 |
| 2010 | $65,253 | 226.919 | 1.0648 | $69,481 |
| 2013 | $66,519 | 241.623 | 1.0000 | $66,519 |

Source: US Census and ACS

# ATTACHMENT 8 PLUMBING CODE AND PROGRAM A SAVINGS FORECASTS

Forecasts of plumbing code water savings, Program A water savings, and allocation of Program A savings to customer classes were produced by Maddaus Water Management's DSS model.

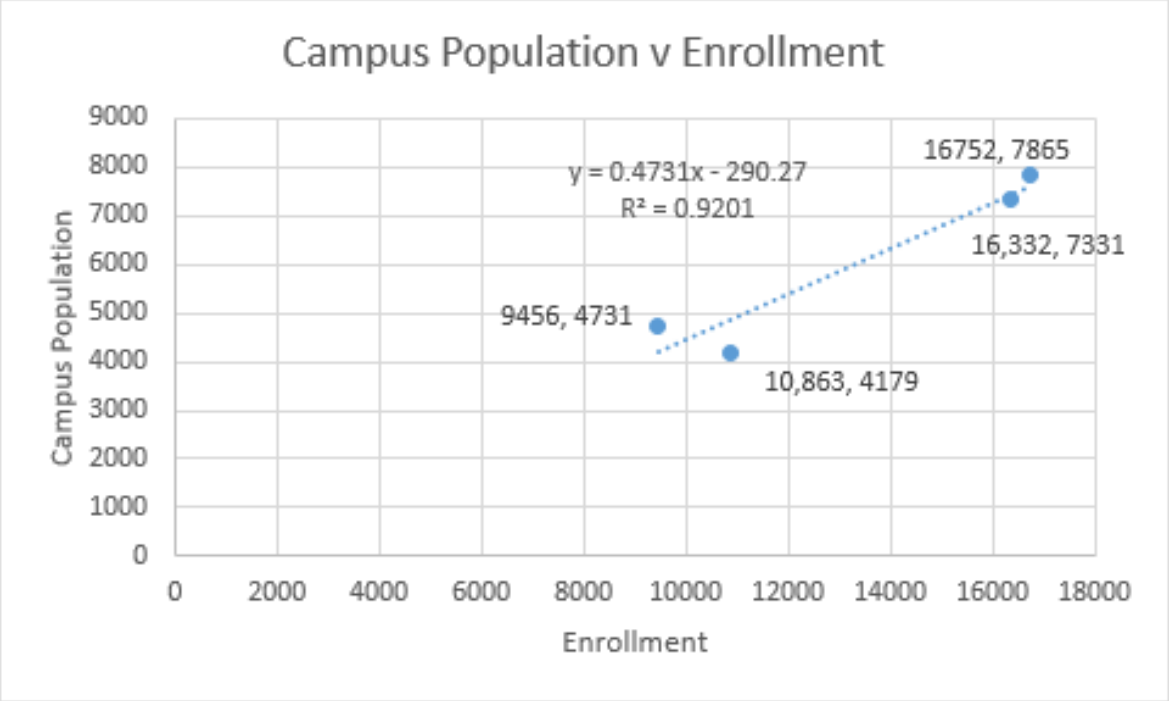
| | **SFR Code Savings, 2013 Base Year** | | | |
|---|---|---|---|---|
| Year | MG/Yr | CCF/Yr | Services | CCF/Service |
| 2020 | 32.7 | 43,717 | 19559 | 2.2 |
| 2025 | 68.0 | 90,909 | 19907 | 4.6 |
| 2030 | 103.3 | 138,102 | 20256 | 6.8 |
| 2035 | 124.7 | 166,711 | 20256 | 8.2 |
| | **SFR Prog A Savings, 2013 Base Year** | | | |
| Year | MG/Yr | CCF/Yr | Services | CCF/Service |
| 2020 | 55.8 | 74,663 | 19559 | 3.8 |
| 2025 | 61.6 | 82,393 | 19907 | 4.1 |
| 2030 | 59.8 | 79,932 | 20256 | 3.9 |
| 2035 | 57.2 | 76,533 | 20256 | 3.8 |
| | **MFR Code Savings, 2013 Base Year** | | | |
| Year | MG/Yr | CCF/Yr | Services | CCF/Service |
| 2020 | 29.6 | 39,544 | 18867 | 2.1 |
| 2025 | 58.6 | 78,394 | 19430 | 4.0 |
| 2030 | 87.7 | 117,286 | 20416 | 5.7 |
| 2035 | 103.2 | 137,991 | 21174 | 6.5 |
| | **MFR Prog A Savings, 2013 Base Year** | | | |
| Year | MG/Yr | CCF/Yr | Services | CCF/Service |
| 2020 | 33.0 | 44,082 | 18867 | 2.3 |
| 2025 | 50.9 | 68,078 | 19430 | 3.5 |
| 2030 | 48.0 | 64,205 | 20416 | 3.1 |
| 2035 | 45.7 | 61,048 | 21174 | 2.9 |
| | **BUS Code Savings, 2013 Base Year** | | | |
| Year | MG/Yr | CCF/Yr | Services | CCF/Service |
| 2020 | 3.1 | 4,110 | 2373 | 1.7 |
| 2025 | 4.9 | 6,498 | 2494 | 2.6 |
| 2030 | 6.3 | 8,477 | 2621 | 3.2 |
| 2035 | 6.9 | 9,249 | 2755 | 3.4 |
| | **BUS Prog A Savings, 2013 Base Year** | | | |
| Year | MG/Yr | CCF/Yr | Services | CCF/Service |
| 2020 | 18.4 | 24,557 | 2373 | 10.3 |
| 2025 | 28.1 | 37,553 | 2494 | 15.1 |
| 2030 | 28.5 | 38,047 | 2621 | 14.5 |
| 2035 | 28.3 | 37,848 | 2755 | 13.7 |

**Program A Savings Allocation to Customer Classes**

| | | Class Shares (%) | | | | |
|---|---|---|---|---|---|---|
| Year | Total (MG) | SFR | MFR | BUS | MUN | IND |
| 2020 | 110 | 51% | 30% | 17% | 2% | 0% |
| 2025 | 143 | 43% | 36% | 20% | 1% | 0% |
| 2030 | 139 | 43% | 35% | 21% | 1% | 0% |
| 2035 | 134 | 43% | 34% | 21% | 1% | 0% |

# ATTACHMENT 9 UCSC CAMPUS POPULATION FORECAST

Data on enrollment and campus population were collected for 1990, 2000, 2010, and 2013. Enrollment data are from UCSC. Population data are for Census Tract 1004. The enrollment data are from University of California Office of the President. The relationship between enrollment and campus population is shown in the following figure.




The average gain in population per one student gain in enrollment over this period was 0.47. Over the 23 year period considered, campus population has averaged about 45% of total enrollment. According to the UCSC Long Range Development Plan (LRDP, p. 71), future campus development will maintain or possibly increase this ratio. The campus population forecast used for this report assumes the rate of campus population gain is the same as show in the figure above, resulting in the following campus population forecast.

| **UCSC** | **2010** | **2020** | **2025** | **2030** | **2035** |
|---|---|---|---|---|---|
| AMBAG UCSC Enrollment Projection | 16,300 | 19,500 | 21,100 | 22,700 | 24,300 |
| Gain | | 3,200 | 4,800 | 6,400 | 8,000 |
| Projected Campus Population | 7,331 | 8,845 | 9,602 | 10,359 | 11,116 |
| Gain | | 1,514 | 2,271 | 3,028 | 3,785 |

# ATTACHMENT 10 INDUSTRIAL DEMAND FORECAST MODEL

| Year | Industrial Water Use (CCF) | County Mfg Empl | Recovery Dummy |
|---|---|---|---|
| 2003 | 54623 | 7000 | 0 |
| 2004 | 59656 | 7400 | 0 |
| 2005 | 53384 | 7200 | 0 |
| 2006 | 49297 | 6700 | 0 |
| 2007 | 51018 | 6400 | 0 |
| 2008 | 42607 | 6100 | 0 |
| 2009 | 32753 | 5300 | 0 |
| 2010 | 56145 | 5300 | 1 |
| 2011 | 60782 | 5400 | 1 |
| 2012 | 72070 | 5600 | 1 |
| 2013 | 74451 | 5800 | 1 |

Model: use = constant + recovery.dummy + employment + employment x recovery.dummy

```
================================================
                        Dependent variable:
                    ---------------------------
                                use
------------------------------------------------
recovery.dum         -116,651.400 (38,297.110)**
emp                      11.863 (1.451)***
recovery.dum:emp         26.434 (6.861)***
Constant              -29,081.030 (9,608.094)**
------------------------------------------------
Observations                  11
R2                           0.967
Adjusted R2                  0.953
Residual Std. Error     2,575.436 (df = 7)
F Statistic            69.305*** (df = 3; 7)
================================================
Note:                *p<0.1; **p<0.05; ***p<0.01
```

POLICY ANALYSIS FOR THE PUBLIC AND PRIVATE SECTORS
M.CUBED

5358 MILES AVENUE
OAKLAND, CA 94618
PH: 510-547-4369
FX: 510-547-3002
MITCHELL@MCUBED-ECON.COM

DATE: March 30, 2016
TO: Toby Goddard, City of Santa Cruz
FR: David Mitchell
RE: Effect of Temperature on City of Santa Cruz Water Demands

**Summary**

This memorandum presents estimates of the expected percentage change in demand per a 1 degree F change in monthly average maximum daily air temperature. These estimates are shown in Table 1. Per the table, a 1 degree F increase in monthly average maximum daily air temperature would be expected to increase SFR demand by 0.62 percent, but golf course demand by 1.38 percent. Total system demand would be expected to increase by 0.45 percent.

The estimates in Table 1 assume a 1 degree F increase from the long-term average in monthly average maximum daily air temperature across all twelve months. Thus it is the average change across the entire year given a uniform increase in temperature. The expected change in demand for specific months would differ from the estimates in Table 1, being generally higher in the spring and fall and lower in the winter.

*Table 1. Expected % Change in Demand per 1 Degree F Change in Monthly Average Maximum Daily Air Temperature*

| Customer Category | % change in demand per 1 degree F |
|---|---|
| **SFR** | 0.62 |
| **MFR** | 0.19 |
| **BUS** | 0.29 |
| **MUN** | 1.09 |
| **IRR** | 0.80 |
| **GOLF** | 1.38 |
| **IND** | 0.00 |
| **Weighted Average** | 0.45 |

**Estimation**

The following analytical steps were taken to develop the estimates in Table 1.

***Step 1: Estimate relationship between temperature, rainfall, and ETo***

Weather effects for City of Santa Cruz water demand were estimated econometrically. For the residential and business customer categories, the weather effects were measured based on deviations in rainfall and temperature from their 25-year normal. However, for the municipal, irrigation, and golf course customer categories, ETo was used instead of temperature. It therefore is necessary to translate

a 1 degree F change in temperature to the corresponding change in ETo. This was done by regressing rainfall and temperature against ETo for each month to get the average change in monthly ETo per 1 degree change in temperature. The results are shown in Table 2.

*Table 2. Change in ETo per 1 Degree F Change in Temperature*

| Month | Mean Monthly Value | | Change in ETo per Degree Change in Temp |
|---|---|---|---|
| | Max Daily Temp F | ETo Inches | |
| **Jan** | 60.6 | 1.63 | 0.0478 |
| **Feb** | 61.2 | 2.03 | 0.0000 |
| **Mar** | 63.9 | 3.56 | 0.0485 |
| **Apr** | 66.4 | 4.42 | 0.0760 |
| **May** | 69.7 | 5.18 | 0.1064 |
| **Jun** | 72.4 | 5.48 | 0.1233 |
| **Jul** | 72.8 | 5.16 | 0.0648 |
| **Aug** | 74.7 | 4.85 | 0.0623 |
| **Sep** | 74.4 | 3.93 | 0.1322 |
| **Oct** | 71.7 | 2.98 | 0.0828 |
| **Nov** | 65.0 | 1.80 | 0.0491 |
| **Dec** | 59.4 | 1.35 | 0.0560 |

***Step 2: Estimate % Change in Demand per 1 Degree F Change in Temp by Month and Customer Category***

The next step was to use the results of the econometric demand models to estimate the percentage change in demand given a 1 degree F change in monthly average maximum daily air temperature by month and by customer category.

If all variables in the econometric demand models other than temperature or ETo are assumed constant, a customer category's expected monthly demand can be represented as:

$$y = kx^{\beta}$$

where y is expected monthly demand, x is temperature or ETo, k is a constant, and β is the econometrically estimated parameter for temperature or ETo.

Let $\bar{x}$ be the 25-year normal for monthly average maximum daily air temperature or ETo. Then for the residential and business demand categories, the expected percentage change in monthly demand given a 1 degree F increase in the 25-year normal temperature is given by

$$\frac{y_1 - y_0}{y_0} = \frac{k(\bar{x}+1)^{\beta} - k\bar{x}^{\beta}}{k\bar{x}^{\beta}} = \left(\frac{\bar{x}+1}{\bar{x}}\right)^{\beta} - 1$$

For the customer categories that utilize ETo the 1 degree F increase in temperature must be translated into the corresponding expected change in ETo using the results in Table 2. Denoting the change in ETo by ε, the expected percentage change in monthly demand for these customer categories is given by

$$\frac{y_1 - y_0}{y_0} = \frac{k(\bar{x} + \varepsilon)^\beta - k\bar{x}^\beta}{k\bar{x}^\beta} = \left(\frac{\bar{x} + \varepsilon}{\bar{x}}\right)^\beta - 1$$

The 25-year normals for temperature and ETo used to implement these equations are given in Table 2. The β parameters from the econometric demand models are given in Table 3.

*Table 3. β Parameters for Temperature and ETo from Econometric Demand Models*

| | Temperature | | | ETo | | |
|---|---|---|---|---|---|---|
| **Month** | SFR | MFR | BUS | MUN | IRR | GOLF |
| **Jan** | 0.203 | 0.100 | 0.243 | 0.516 | 0.509 | 1.135 |
| **Feb** | 0.203 | 0.100 | 0.243 | 0.516 | 0.509 | 1.135 |
| **Mar** | 0.203 | 0.100 | 0.243 | 0.516 | 0.509 | 1.135 |
| **Apr** | 0.422 | 0.338 | 0.400 | 0.804 | 0.660 | 0.173 |
| **May** | 0.422 | 0.338 | 0.400 | 0.804 | 0.660 | 0.173 |
| **Jun** | 0.422 | 0.338 | 0.400 | 0.804 | 0.660 | 0.173 |
| **Jul** | 0.636 | 0.000 | 0.000 | 0.357 | 0.163 | 0.792 |
| **Aug** | 0.636 | 0.000 | 0.000 | 0.357 | 0.163 | 0.792 |
| **Sep** | 0.636 | 0.000 | 0.000 | 0.357 | 0.163 | 0.792 |
| **Oct** | 0.636 | 0.000 | 0.000 | 0.357 | 0.163 | 0.792 |
| **Nov** | 0.203 | 0.100 | 0.243 | 0.516 | 0.509 | 1.135 |
| **Dec** | 0.203 | 0.100 | 0.243 | 0.516 | 0.509 | 1.135 |

The resulting estimates of the percentage change in demand given a 1 degree F increase in temperature by month and customer category are shown in Table 4.

*Table 4. Expected % Change in Demand per 1 Degree F Change in Temperature*

| Month | SFR | MFR | BUS | MUN | IRR | GOLF |
|---|---|---|---|---|---|---|
| **Jan** | 0.333 | 0.164 | 0.399 | 1.504 | 1.483 | 3.338 |
| **Feb** | 0.330 | 0.162 | 0.395 | 0.000 | 0.000 | 0.000 |
| **Mar** | 0.316 | 0.155 | 0.378 | 0.700 | 0.691 | 1.546 |
| **Apr** | 0.632 | 0.506 | 0.599 | 1.381 | 1.132 | 0.295 |
| **May** | 0.603 | 0.482 | 0.571 | 1.647 | 1.350 | 0.352 |
| **Jun** | 0.581 | 0.465 | 0.550 | 1.804 | 1.479 | 0.385 |
| **Jul** | 0.872 | 0.000 | 0.000 | 0.447 | 0.204 | 0.993 |
| **Aug** | 0.850 | 0.000 | 0.000 | 0.457 | 0.208 | 1.017 |
| **Sep** | 0.853 | 0.000 | 0.000 | 1.188 | 0.541 | 2.655 |
| **Oct** | 0.885 | 0.000 | 0.000 | 0.985 | 0.448 | 2.197 |
| **Nov** | 0.310 | 0.153 | 0.372 | 1.400 | 1.381 | 3.105 |
| **Dec** | 0.340 | 0.167 | 0.407 | 2.115 | 2.086 | 4.710 |

### *Step 3: Estimate Annual % Change in Demand per 1 Degree F Change in Temperature for Each Customer Category*

The next step is to use each customer categories seasonal demand index to estimate the percentage change in annual demand per 1 degree F change in temperature. The seasonal demand indices for the customer categories were estimated using the econometric demand models and are shown in Table 5.

*Table 5. Seasonal Demand Indices*

| Month | SFR | MFR | BUS | MUN | IRR | GOLF |
|---|---|---|---|---|---|---|
| **Jan** | 6.02 | 7.62 | 6.96 | 3.14 | 1.97 | 0.18 |
| **Feb** | 5.94 | 7.69 | 7.19 | 3.06 | 2.09 | 0.29 |
| **Mar** | 6.11 | 7.57 | 7.30 | 3.47 | 2.88 | 0.43 |
| **Apr** | 7.06 | 7.86 | 7.81 | 6.75 | 6.92 | 3.89 |
| **May** | 9.45 | 8.77 | 8.94 | 10.55 | 10.75 | 9.54 |
| **Jun** | 10.58 | 9.17 | 9.68 | 13.03 | 13.69 | 15.32 |
| **Jul** | 11.33 | 9.25 | 10.34 | 14.81 | 14.97 | 17.92 |
| **Aug** | 11.14 | 9.21 | 10.18 | 15.22 | 14.44 | 19.26 |
| **Sep** | 10.44 | 8.85 | 9.14 | 12.21 | 13.44 | 15.59 |
| **Oct** | 8.63 | 8.51 | 8.26 | 9.06 | 9.90 | 11.35 |
| **Nov** | 6.95 | 7.88 | 7.27 | 5.28 | 5.76 | 5.02 |
| **Dec** | 6.35 | 7.61 | 6.92 | 3.42 | 3.18 | 1.21 |
| **Total** | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |

Denoting the monthly change in demand from Table 4 for customer category j as $d_{ij}$ and the monthly seasonal index value from Table 5 as $s_{ij}$, then the percentage change in annual demand for customer category j, $D_j$, per 1 degree F change in temperature is given by

$$D_j = \frac{1}{100}\sum_{i=1}^{12} d_{ij} \times s_{ij}$$

The results of this calculate for each customer category is given in Table 6.

*Table 6. Expected % Change in Demand per 1 Degree F Change in Monthly Average Maximum Daily Air Temperature*

| Customer Category | % change in demand per 1 degree F |
|---|---|
| **SFR** | 0.62 |
| **MFR** | 0.19 |
| **BUS** | 0.29 |
| **MUN** | 1.09 |
| **IRR** | 0.80 |
| **GOLF** | 1.38 |

### *Step 4: Estimate Annual % Change in Demand per 1 Degree F Change in Temperature for Total Demand*

The final step is to construct the consumption-weighted average change in annual demand across all customer categories. This was done using the customer category demand shares given in Table 7.

*Table 7. Customer Category Demand Shares*

| Year | SFR | MFR | BUS | MUN | IRR | GOLF | IND |
|---|---|---|---|---|---|---|---|
| **2001** | 1486 | 859 | 717 | 63 | 130 | 110 | 342 |
| **2002** | 1503 | 836 | 696 | 60 | 129 | 114 | 233 |
| **2003** | 1502 | 812 | 666 | 64 | 132 | 108 | 247 |
| **2004** | 1521 | 798 | 671 | 55 | 124 | 80 | 229 |
| **2005** | 1424 | 798 | 671 | 55 | 124 | 80 | 229 |
| **2006** | 1359 | 752 | 630 | 53 | 118 | 83 | 236 |
| **2007** | 1357 | 728 | 636 | 59 | 131 | 111 | 238 |
| **2008** | 1374 | 735 | 610 | 66 | 137 | 120 | 240 |
| **2009** | 1217 | 687 | 554 | 46 | 91 | 91 | 185 |
| **2010** | 1185 | 691 | 527 | 49 | 96 | 78 | 227 |
| **Total** | 13928 | 7696 | 6378 | 570 | 1212 | 975 | 2406 |
| **% Total** | 42% | 23% | 19% | 2% | 4% | 3% | 7% |

Denoting the annual change in demand from Table 6 for customer category j as $D_j$ and the customer category j's share of demand from Table 7 as $\delta_j$, then the weighted average percentage change in annual demand, D, per 1 degree F change in temperature is given by

$$D = \frac{1}{100}\sum_{j=1}^{7} D_j \times \delta_j$$

In this calculation, it is assumed the temperature effect for the industrial customer category is zero. The resulting value for the percentage change in total demand per 1 degree F increase in temperature is 0.45, as shown in the last row of Table 1.

**Calculation Workbook**

The calculations described above are provided in the workbook "uwmp_climate_effects_workbook.xlsx."

**Figure D-2**
**Water conservation baseline and targets development process**

# JOINT EXERCISE OF POWERS AGREEMENT

**by and among**

**CENTRAL WATER DISTRICT**

**CITY OF SANTA CRUZ**

**COUNTY OF SANTA CRUZ**

**and**

**SOQUEL CREEK WATER DISTRICT**

**creating the**

**SANTA CRUZ MID-COUNTY GROUNDWATER AGENCY**

**March 17, 2016**

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# JOINT EXERCISE OF POWERS AGREEMENT OF THE SANTA CRUZ MID-COUNTY GROUNDWATER AGENCY

This **Joint Exercise of Powers Agreement ("Agreement")** is made and entered into as of March 17, 2016 ("Effective Date"), by and among the Central Water District, the City of Santa Cruz, the County of Santa Cruz, and the Soquel Creek Water District, sometimes referred to herein individually as a "**Member**" and collectively as the "**Members**" for purposes of forming the Santa Cruz Mid-County Groundwater Agency ("**Agency**") and setting forth the terms pursuant to which the Agency shall operate. Capitalized defined terms used herein shall have the meanings given to them in Article 1 of this Agreement.

## RECITALS

A. Each of the Members is a local agency, as defined by the Sustainable Groundwater Management Act of 2014 ("**SGMA**"), duly organized and existing under and by virtue of the laws of the State of California, and each Member can exercise powers related to groundwater management.

B. SGMA requires designation of a groundwater sustainability agency ("**GSA**") by June 30, 2017, for groundwater basins designated by the California Department of Water Resources ("**DWR**") as medium- and high-priority basins.

C. SGMA requires adoption of a groundwater sustainability plan ("**GSP**") by January 31, 2020, for all medium- and high-priority basins identified as being subject to critical conditions of overdraft.

D. Each of the Members either extracts groundwater from or regulates land use activities overlying a common groundwater basin located within the mid-county coastal region of the County of Santa Cruz. This Basin includes all or part of four basins identified in DWR's Bulletin Number 118, including the following basins (designated by the name of the basin and number assigned to it in DWR-Bulletin No. 118): Soquel Valley (3-1), West Santa Cruz Terrace (3-26), Santa Cruz Purisima Formation (3-21), and Pajaro Valley Basin (3-2). All or some of these basins have been designated as medium or high priority basins. Through the Agency, the Members provided modifications to the Bulletin-118 boundaries as allowed by Title 23 of the California Code of Regulations to create a new consolidated basin called the "Santa Cruz Mid-County Groundwater Basin" with 3-1 as the number for the consolidated basin under DWR Bulletin No. 118 (hereafter "**Basin**").

E. The Members intend for the Agency to develop a GSP and manage the Basin pursuant to SGMA.

F. Under SGMA, a combination of local agencies may form a GSA through a joint powers agreement.

G. The Members have determined that the sustainable management of the Basin pursuant to SGMA may best be achieved through the cooperation of the Members operating through a joint powers agency.

H. The Joint Exercise of Powers Act of 2000 ("Act") authorizes the Members to create a joint powers authority, to jointly exercise any power common to the Members, and to exercise additional powers granted under the Act.

I. The Act, including the Marks-Roos Local Bond Pooling Act of 1985 (Government Code sections 6584, *et seq.*), authorizes an entity created pursuant to the Act to issue bonds, and under certain circumstances, to purchase bonds issued by, or to make loans to, the Members for financing public capital

improvements, working capital, liability and other insurance needs or projects whenever doing so results in significant public benefits, as determined by the Members. The Act further authorizes and empowers a joint powers authority to sell bonds so issued or purchased to public or private purchasers at public or negotiated sales.

J. The Members have a history of collaborating on groundwater management issues in the Santa Cruz Mid-County Groundwater Basin, originally with a joint powers agreement formed in 1995 by the Soquel Creek Water District and the Central Water District, which was subsequently amended in August of 2015 to include the City of Santa Cruz and the County of Santa Cruz, to form the Soquel-Aptos Groundwater Management Committee.

K. The Members agree that by approving the creation of the Santa Cruz Mid-County Groundwater Agency they are withdrawing from and disbanding the joint powers agency formed as a result of earlier joint powers agreements originally creating the Basin Implementation Group as subsequently amended to create the Soquel-Aptos Groundwater Management Committee.

L. Based on the foregoing legal authority, the Members desire to create a joint powers authority for the purpose of taking all actions deemed necessary by the joint powers authority to ensure sustainable management of the Basin as required by SGMA.

M. The governing board of each Member has determined it to be in the Member's best interest and in the public interest that this Agreement be executed.

## TERMS OF AGREEMENT

In consideration of the mutual promises and covenants herein contained, the Members agree as follows:

## ARTICLE 1
## DEFINITIONS

The following terms have the following meanings for purposes of this Agreement:

1.1 "Act" means the Joint Exercise of Powers Act, set forth in Chapter 5 of Division 7 of Title 1 of the Government Code, sections 6500, *et seq.*, including all laws supplemental thereto.

1.2 "Agreement" has the meaning assigned thereto in the Preamble.

1.3 "Auditor" means the auditor of the financial affairs of the Agency appointed by the Board of Directors pursuant to Section 14.3 of this Agreement.

1.4 "Agency" has the meaning assigned thereto in the Preamble.

1.5 "Basin" has the meaning assigned thereto in Recital D.

1.6 "Board of Directors" or "Board" means the governing body of the Agency as established by Article 6 of this Agreement.

1.7 "Bylaws" means the bylaws, if any, adopted by the Board of Directors pursuant to Article 11 of this Agreement to govern the day-to-day operations of the Agency.

1.8 "Director" and "Alternate Director" mean a director or alternate director appointed pursuant to Sections 6.3 and 6.4 of this Agreement. "Member Director" is a Director or Alternate Director appointed by and representing a Member agency pursuant to Section 6.1.1 of this agreement.

1.9 "DWR" has the meaning assigned thereto in Recital B.

1.10 "GSA" has the meaning assigned thereto in Recital B.

1.11 "GSP" has the meaning assigned thereto in Recital C.

1.12 "Member" means each party to this Agreement that satisfies the requirements of Section 5.1 of this Agreement, including any new members as may be authorized by the Board, pursuant to Section 5.2 of this Agreement.

1.13 "Officer(s)" means the Chair, Vice Chair, Secretary, or Treasurer of the Agency to be appointed by the Board of Directors pursuant to Section 7.1 of this Agreement.

1.14 "SGMA" has the meaning assigned thereto in Recital A.

1.15 "State" means the State of California.

## ARTICLE 2
## CREATION OF THE AGENCY

2.1 Creation of a Joint Powers Authority. There is hereby created pursuant to the Act a joint powers authority, which will be a public entity separate from the Members to this Agreement, and shall be known as the Santa Cruz Mid-County Joint Powers Agency ("**Agency**"). Within 30 days after the Effective Date of this Agreement and after any amendment, the Agency shall cause a notice of this Agreement or amendment to be prepared and filed with the office of the California Secretary of State containing the information required by Government Code section 6503.5. Within 10 days after the Effective Date of this Agreement, the Agency shall cause a statement of the information concerning the Agency, required by Government Code section 53051, to be filed with the office of the California Secretary of State and with the County Clerk for the County of Santa Cruz, setting forth the facts required to be stated pursuant to Government Code section 53051(a).

2.2 Purpose of the Agency. Each Member to this Agreement has in common the power to study, plan, develop, finance, acquire, construct, maintain, repair, manage, operate, control, and govern the water supply and water management within the Basin, either alone or in cooperation with other public or private non-member entities, and each is a local agency eligible to serve as a GSA within the Basin, either alone or jointly through a joint powers agreement as provided for by SGMA. The purpose of this Agency is to serve as the GSA for the Basin and to develop, adopt, and implement the GSP for the Basin pursuant to SGMA and other applicable provisions of law.

## ARTICLE 3
## TERM

This Agreement shall become effective upon execution by each of the Members and shall remain in effect until terminated pursuant to the provisions of Article 17 (Withdrawal of Members) of this Agreement.

## ARTICLE 4
## POWERS

The Agency shall possess the power in its own name to exercise any and all common powers of its Members reasonably related to the purposes of the Agency, including but not limited to the following powers, together with such other powers as are expressly set forth in the Act and in SGMA. For purposes of Government Code section 6509, the powers of the Agency shall be exercised subject to the restrictions upon the manner of exercising such powers as are imposed on the County of Santa Cruz, and in the event of the withdrawal of the County of Santa Cruz as a Member under this Agreement, then the manner of exercising the Agency's powers shall be those restrictions imposed on the City of Santa Cruz.

4.1 To exercise all powers afforded to a GSA pursuant to and as permitted by SGMA.

4.2 To develop, adopt and implement the GSP pursuant to SGMA.

4.3 To adopt rules, regulations, policies, bylaws and procedures governing the operation of the Agency and adoption and implementation of the GSP.

4.4 To obtain rights, permits and other authorizations for or pertaining to implementation of the GSP.

4.5 To perform other ancillary tasks relating to the operation of the Agency pursuant to SGMA, including without limitation, environmental review, engineering, and design.

4.6 To make and enter into all contracts necessary to the full exercise of the Agency's power.

4.7 To employ, designate or otherwise contract for the services of agents, officers, employees, attorneys, engineers, planners, financial consultants, technical specialists, advisors, and independent contractors.

4.8 To exercise jointly the common powers of the Members, as directed by the Board, in developing and implementing a GSP for the Basin.

4.9 To investigate legislation and proposed legislation affecting the Basin and to make appearances regarding such matters.

4.10 To cooperate and to act in conjunction and contract with the United States, the State of California or any agency thereof, counties, municipalities, public and private corporations of any kind (including without limitation, investor-owned utilities), and individuals, or any of them, for any and all purposes necessary or convenient for the full exercise of the powers of the Agency.

4.11 To incur debts, liabilities or obligations, to issue bonds, notes, certificates of participation, guarantees, equipment leases, reimbursement obligations and other indebtedness, and, to the extent provided for in a duly adopted Agency to impose assessments, groundwater extraction fees or other charges, and other means of financing the Agency as provided in Chapter 8 of SGMA commencing at Section 10730 of the Water Code.

4.12 To collect and monitor data on the extraction of groundwater from, and the quality of groundwater in, the Basin.

4.13 To establish and administer a conjunctive use program for the purposes of maintaining sustainable yields in the Basin consistent with the requirements of SGMA.

4.14 To exchange and distribute water.

4.15 To regulate groundwater extractions as permitted by SGMA.

4.16 To impose groundwater extraction fees as permitted by SGMA.

4.17 To spread, sink and inject water into the Basin.

4.18 To store, transport, recapture, recycle, purify, treat or otherwise manage and control water for beneficial use.

4.19 To apply for, accept and receive licenses, permits, water rights, approvals, agreements, grants, loans, contributions, donations or other aid from any agency of the United States, the State of California, or other public agencies or private persons or entities necessary for the Agency's purposes.

4.20 To develop and facilitate market-based solutions for the use and management of water rights.

4.21 To acquire property and other assets by grant, lease, purchase, bequest, devise, gift or eminent domain, and to hold, enjoy, lease or sell, or otherwise dispose of, property, including real property, water rights, and personal property, necessary for the full exercise of the Agency's powers.

4.22 To sue and be sued in its own name.

4.23 To provide for the prosecution of, defense of, or other participation in actions or proceedings at law or in public hearings in which the Members, pursuant to this Agreement, may have an interest and may employ counsel and other expert assistance for these purposes.

4.24 To exercise the common powers of its Members to develop, collect, provide, and disseminate information that furthers the purposes of the Agency, including but not limited to the operation of the Agency and adoption and implementation of the GSP to the Members, legislative, administrative, and judicial bodies, as well the public generally.

4.25 To accumulate operating and reserve funds for the purposes herein stated.

4.26 To invest money that is not required for the immediate necessities of the Agency, as the Agency determines is advisable, in the same manner and upon the same conditions as Members, pursuant to Government Code section 53601, as it now exists or may hereafter be amended.

4.27 To undertake any investigations, studies, and matters of general administration.

4.28 To perform all other acts necessary or proper to carry out fully the purposes of this Agreement.

## ARTICLE 5
## MEMBERSHIP

5.1 Members. The Members of the Agency shall be the Central Water District, the City of Santa Cruz, the County of Santa Cruz, and the Soquel Creek Water District, as long as they have not, pursuant to the provisions hereof, withdrawn from this Agreement.

5.2 New Members. Any public agency (as defined by the Act) that is not a Member on the Effective Date of this Agreement may become a Member upon: (a) the approval of the Board of Directors by a supermajority of at least seventy-five (75%) of the votes held among all Directors as specified in Article 9 (Member Voting); (b) payment of a pro rata share of all previously incurred costs that the Board of Directors determines have resulted in benefit to the public agency, and are appropriate for assessment on the public agency; and (c) execution of a written agreement subjecting the public agency to the terms and conditions of this Agreement.

## ARTICLE 6
## BOARD OF DIRECTORS AND OFFICERS

6.1 Formation of the Board of Directors. The Agency shall be governed by a Board of Directors ("**Board**"). The Board shall consist of eleven (11) Directors consisting of the following representatives who shall be appointed in the manner set forth in Section 6.3:

6.1.1 Two representatives appointed by the governing board of each of the following public agency Members: the Central Water District, the City of Santa Cruz, the County of Santa Cruz, and the Soquel Creek Water District.

6.1.2 Three representatives of private well owners within the boundaries of the Agency.

6.2 Duties of the Board of Directors. The business and affairs of the Agency, and all of its powers, including without limitation all powers set forth in Article 4 (Powers), are reserved to and shall be exercised by and through the Board of Directors, except as may be expressly delegated to the staff or others pursuant to this Agreement, Bylaws, or by specific action of the Board of Directors.

6.3 Appointment of Directors. The Directors shall be appointed as follows:

6.3.1 The two representatives from the Central Water District shall be appointed by resolution of the Central Water District Board of Directors.

6.3.2 The two representatives from the City of Santa Cruz shall be appointed by resolution of the City of Santa Cruz City Council.

6.3.3 The two representatives from the County of Santa Cruz shall be appointed by resolution of the County of Santa Cruz Board of Supervisors.

6.3.4 The two representatives from the Soquel Creek Water District shall be appointed by resolution of the Soquel Creek Water District Board of Directors.

6.3.5 The three representatives of private well owners shall be appointed by majority vote of the eight public agency Member Directors. The procedures for nominating the private well owners shall be set forth in the Bylaws.

6.4 Alternate Directors. Each Member may have one Alternate to act as a substitute Director for either of the Member's Directors. One Alternate shall also be appointed to act as a substitute Director for any of the three Directors representing private well owners. All Alternates shall be appointed in the same manner as set forth in Section 6.3. Alternate Directors shall have no vote, and shall not participate in any discussions or deliberations of the Board unless appearing as a substitute for a Director due to absence or conflict of interest. If the Director is not present, or if the Director has a conflict of interest which precludes participation by the Director in any decision-making process of the Board, the Alternate Director appointed to act in his/her place shall assume all rights of the Director, and shall have the authority to act in his/her absence, including casting votes on matters before the Board. Each Alternate Director shall be appointed prior to the third meeting of the Board. Alternates are strongly encouraged to attend all Board meetings and stay informed on current issues before the Board.

6.5 Requirements. Each Member's Directors and Alternate Director shall be appointed by resolution of that Member's governing body to serve for a term of four years except, for the purpose of establishing staggered terms, one of the initially-appointed Directors of each Member shall, as designated by the Member, serve an initial term of two years. A Member's Director or Alternate Director may be removed during his or her term or reappointed for multiple terms at the pleasure of the Member that appointed him or her. A Director representing private well owners may be removed or reappointed in the same manner as he or she was appointed as set forth in Section 6.3. No individual Director may be removed in any other manner, including by the affirmative vote of the other Directors.

6.6 Vacancies. A vacancy on the Board of Directors shall occur when a Director resigns or at the end of the Director's term as set forth in Section 6.5. For Member Directors, a vacancy shall also occur when he or she is removed by his or her appointing Member. For Directors representing private well owners, a vacancy shall also occur when the Director is removed as set forth in Section 6.5. Upon the vacancy of a Director, the Alternate Director shall serve as Director until a new Director is appointed as set forth in Section 6.3 unless the Alternate is already serving as a substitute Director in the event of a prior vacancy, in which case, the seat shall remain vacant until a replacement Director is appointed as set forth in Section 6.3. Members shall provide notice of any changes in Director or Alternate Director positions to the Board of Directors or its designee in writing and signed by an authorized representative of the Member.

## ARTICLE 7
## OFFICERS

7.1 Officers. Officers of the Agency shall be a Chair, Vice Chair, Secretary, and Treasurer. The Treasurer shall be appointed consistent with the provisions of Section 14.3. The Vice Chair, or in the Vice Chair's absence, the Secretary, shall exercise all powers of the Chair in the Chair's absence or inability to act.

7.2 Appointment of Officers. Officers shall be elected annually by, and serve at the pleasure of, the Board of Directors. Officers shall be elected at the first Board meeting, and thereafter at the first Board meeting following January 1st of each year, or as duly continued by the Board. An Officer may serve for multiple consecutive terms, with no term limit. Any Officer may resign at any time upon written notice to the Board, and may be removed and replaced by a simple majority vote of the Board.

7.3 Principal Office. The principal office of the Agency shall be established by the Board of Directors, and may thereafter be changed by a simple majority vote of the Board.

## ARTICLE 8
## DIRECTOR MEETINGS

8.1 Initial Meeting. The initial meeting of the Board of Directors shall be held in the County of Santa Cruz, California, within thirty (30) days of the Effective Date of this Agreement.

8.2 Time and Place. The Board of Directors shall meet at least quarterly, at a date, time and place set by the Board within the jurisdictional boundaries of one or more of the Members, and at such other times as may be determined by the Board.

8.3 Special Meetings. Special meetings of the Board of Directors may be called by the Chair or by a simple majority of Directors, in accordance with the provisions of Government Code section 54956.

8.4 Conduct. All meetings of the Board of Directors, including special meetings, shall be noticed, held, and conducted in accordance with the Ralph M. Brown Act (Government Code sections 54950, *et seq.*). The Board may use teleconferencing in connection with any meeting in conformance with and to the extent authorized by applicable law.

8.5 Local Conflict of Interest Code. The Board of Directors shall adopt a local conflict of interest code pursuant to the provisions of the Political Reform Act of 1974 (Government Code sections 81000, *et seq.*)

## ARTICLE 9
## MEMBER VOTING

9.1 Quorum. A quorum of any meeting of the Board of Directors shall consist of an absolute majority of Directors plus one Director. In the absence of a quorum, any meeting of the Directors may be adjourned by a vote of the simple majority of Directors present, but no other business may be transacted. For purposes of this Article, a Director shall be deemed present if the Director appears at the meeting in person or participates telephonically, provided that the telephone appearance is consistent with the requirements of the Ralph M. Brown Act.

9.2 Director Votes. Voting by the Board of Directors shall be made on the basis of one vote for each Director. A Director, or an Alternate Director when acting in the absence of his or her Director, may vote on all matters of Agency business unless disqualified because of a conflict of interest pursuant to California law or the local conflict of interest code adopted by the Board of Directors.

9.3 Affirmative Decisions of the Board of Directors. Except as otherwise specified in this Agreement, all affirmative decisions of the Board of Directors shall require the affirmative vote of a simple majority of all appointed Directors participating in voting on a matter of Agency business, provided that if a Director is disqualified from voting on a matter before the Board because of a conflict of interest, that Director shall be excluded from the calculation of the total number of Directors that constitute a majority. Notwithstanding the foregoing, a unanimous vote of all Member Directors participating in voting shall be required to approve any of the following: (i) any capital expenditure that is estimated to cost $100,000 or more; (ii) the annual budget; (iii) the GSP for the Basin or any amendment thereto; (iv) the levying of assessments or fees; (v) issuance of indebtedness; or (vi) any stipulation to resolve litigation concerning groundwater rights within or groundwater management for the Basin.

## ARTICLE 10
## AGENCY ADMINISTRATION, MANAGEMENT AND OPERATION

The Board of Directors may select and implement an approach to Agency administration and management that is appropriate to the circumstances and adapted to the GSA's needs as they may evolve over time. Details of the Board's decision on Agency administration, management and operation shall be incorporated into the GSA's bylaws and reviewed and revised as needed using the established process for revising the GSA's bylaws.

## ARTICLE 11
## BYLAWS

The Board of Directors shall cause to be drafted, approve, and amend Bylaws of the Agency to govern the day-to-day operations of the Agency. The Bylaws shall be adopted at or before the first anniversary of the Board's first meeting.

## ARTICLE 12
## ADVISORY COMMITTEES

The Board of Directors may from time to time appoint one or more advisory committees or establish standing or ad hoc committees to assist in carrying out the purposes and objectives of the Agency. The Board shall determine the purpose and need for such committees and the necessary qualifications for individuals appointed to them.

## ARTICLE 13
## OPERATION OF COMMITTEES

Each committee shall include a Director as the chair thereof. Other members of each committee may be constituted by such individuals approved by the Board of Directors for participation on the committee. However, no committee or participant on such committee shall have any authority to act on behalf of the Agency except as duly authorized by the Board.

## ARTICLE 14
## ACCOUNTING PRACTICES

14.1 General. The Board of Directors shall establish and maintain such funds and accounts as may be required by generally accepted public agency accounting practices. The Agency shall maintain strict accountability of all funds and a report of all receipts and disbursements of the Agency.

14.2 Fiscal Year. Unless the Board of Directors decides otherwise, the fiscal year for the Agency shall run concurrent with the calendar year.

14.3 Appointment of Treasurer and Auditor: Duties. The Treasurer and Auditor shall be appointed in the manner, and shall perform such duties and responsibilities, specified in Sections 6505.5 and 6505.6 of the Act.

## ARTICLE 15
## BUDGET AND EXPENSES

15.1 Budget. Within 120 after the first meeting of the Board of Directors, and thereafter prior to the commencement of each fiscal year, the Board shall adopt a budget for the Agency for the ensuing fiscal

year no later than June 30th . In the event that a budget is not so approved, the prior year's budget shall be deemed approved for the ensuing fiscal year, and any groundwater extraction fee or assessment(s) of contributions of Members, or both, approved by the Board during the prior fiscal year shall again be assessed in the same amount and terms for the ensuing fiscal year.

15.2 Agency Funding and Contributions. For the purpose of funding the expenses and ongoing operations of the Agency, the Board of Directors shall maintain a funding account in connection with the annual budget process. The Board of Directors may fund the Agency and the GSP as provided in Chapter 8 of SGMA, commencing with Section 10730 of the Water Code, and may also issue assessments for contributions by the Members in the amount and frequency determined necessary by the Board. Such Member contributions shall be paid by each Member to the Agency within 30 days of assessment by the Board.

15.3 Return of Contributions. In accordance with Government Code section 6512.1, repayment or return to the Members of all or any part of any contributions made by Members and any revenues by the Agency may be directed by the Board of Directors at such time and upon such terms as the Board of Directors may decide; provided that (1) any distributions shall be made in proportion to the contributions paid by each Member to the Agency, and (2) any capital contribution paid by a Member voluntarily, and without obligation to make such capital contribution pursuant to Section 15.2, shall be returned to the contributing Member, together with accrued interests at the annual rate published as the yield of the Local Agency Investment Fund administered by the California State Treasurer, before any other return of contributions to the Members is made. The Agency shall hold title to all funds and property acquired by the Agency during the term of this Agreement.

15.4 Issuance of Indebtedness. The Agency may issue bonds, notes or other forms of indebtedness, as permitted under Section 4.11, provided such issuance be approved at a meeting of the Board of Directors by unanimous vote of the Member Directors as specified in Article 9 (Member Voting).

## ARTICLE 16
## LIABILITIES

16.1 Liability. In accordance with Government Code section 6507, the debt, liabilities and obligations of the Agency shall be the debts, liabilities and obligations of the Agency alone, and not the Members.

16.2 Indemnity. Funds of the Agency may be used to defend, indemnify, and hold harmless the Agency, each Member, each Director, and any officers, agents and employees of the Agency for their actions taken within the course and scope of their duties while acting on behalf of the Agency. Other than for gross negligence or intentional acts, to the fullest extent permitted by law, the Agency agrees to save, indemnify, defend and hold harmless each Member from any liability, claims, suits, actions, arbitration proceedings, administrative proceedings, regulatory proceedings, losses, expenses or costs of any kind, whether actual, alleged or threatened, including attorney's fees and costs, court costs, interest, defense costs, and expert witness fees, where the same arise out of, or are in any way attributable, in whole or in part, to negligent acts or omissions of the Agency or its employees, officers or agents or the employees, officers or agents of any Member, while acting within the course and scope of a Member relationship with the Agency.

## ARTICLE 17
## WITHDRAWAL OF MEMBERS

17.1 Unilateral Withdrawal. Subject to the Dispute Resolution provisions set forth in Section 18.9, a Member may unilaterally withdraw from this Agreement without causing or requiring termination of this Agreement, effective upon 30 days written notice to the Board of Directors or its designee.

17.2 Rescission or Termination of Agency. This Agreement may be rescinded and the Agency terminated by unanimous written consent of all Members, except during the outstanding term of any Agency indebtedness.

17.3 Effect of Withdrawal or Termination. Upon termination of this Agreement or unilateral withdrawal, a Member shall remain obligated to pay its share of all debts, liabilities and obligations of the Agency required of the Member pursuant to terms of this Agreement, and that were incurred or accrued prior to the effective date of such termination or withdrawal, including without limitation those debts, liabilities and obligations pursuant to Sections 4.11 and 15.4. Any Member who withdraws from the Agency shall have no right to participate in the business and affairs of the Agency or to exercise any rights of a Member under this Agreement or the Act, but shall continue to share in distributions from the Agency on the same basis as if such Member had not withdrawn, provided that a Member that has withdrawn from the Agency shall not receive distributions in excess of the contributions made to the Agency while a Member. The right to share in distributions granted under this Section 17.3 shall be in lieu of any right the withdrawn Member may have to receive a distribution or payment of the fair value of the Member's interest in the Agency.

17.4 Return of Contribution. Upon termination of this Agreement, any surplus money on-hand shall be returned to the Members in proportion to their contributions made. The Board of Directors shall first offer any property, works, rights and interests of the Agency for sale to the Members on terms and conditions determined by the Board of Directors. If no such sale to Members is consummated, the Board of Directors shall offer the property, works, rights, and interest of the Agency for sale to any non-member for good and adequate consideration. The net proceeds from any sale shall be distributed among the Members in proportion to their contributions made.

## ARTICLE 18
## MISCELLANEOUS PROVISIONS

18.1 No Predetermination or Irretrievable Commitment of Resources. Nothing herein shall constitute a determination by the Agency or any of its Members that any action shall be undertaken, or that any unconditional or irretrievable commitment of resources shall be made, until such time as the required compliance with all local, state, or federal laws, including without limitation the California Environmental Quality Act, National Environmental Policy Act, or permit requirements, as applicable, has been completed.

18.2 Notices. Notices to a Director or Member hereunder shall be sufficient if delivered to the respective Director or clerk of the Member agency and addressed to the Director or clerk of the Member agency. Delivery may be accomplished by U.S. Postal Service, private mail service or electronic mail.

18.3 Amendments to Agreement. This Agreement may be amended or modified at any time only by subsequent written agreement approved and executed by all of the Members.

18.4 Agreement Complete. The foregoing constitutes the full and complete Agreement of the Members. This Agreement supersedes all prior agreements and understandings, whether in writing or oral, related to the subject matter of this Agreement that are not set forth in writing herein.

18.5 Severability. Should any part, term or provision of this Agreement be decided by a court of competent jurisdiction to be illegal or in conflict with any applicable federal law or any law of the State of California, or otherwise be rendered unenforceable or ineffectual, the validity of the remaining parts, terms, or provisions hereof shall not be affected thereby, provided however, that if the remaining parts, terms, or provisions do not comply with the Act, this Agreement shall terminate.

18.6 Withdrawal by Operation of Law. Should the participation of any Member to this Agreement be decided by the courts to be illegal or in excess of that Member's authority or in conflict with any law, the validity of the Agreement as to the remaining Members shall not be affected thereby.

18.7 Assignment. The rights and duties of the Members may not be assigned or delegated without the written consent of all other Members. Any attempt to assign or delegate such rights or duties in contravention of this Agreement shall be null and void.

18.8 Binding on Successors. This Agreement shall inure to the benefit of, and be binding upon, the successors and assigns of the Members.

18.9 Dispute Resolution. In the event that any dispute arises among the Members relating to (i) this Agreement, (ii) the rights and obligations arising from this Agreement, or (iii) or a Member proposing to withdraw from membership in the Agency, the aggrieved Member or Member proposing to withdraw from membership shall provide written notice to the other Members of the controversy or proposal to withdraw from membership. Within thirty (30) days thereafter, the Members shall attempt in good faith to resolve the controversy through informal means. If the Members cannot agree upon a resolution of the controversy within thirty (30) days from the providing of written notice specified above, the dispute shall be submitted to mediation prior to commencement of any legal action or prior to withdraw of a Member proposing to withdraw from membership. The mediation shall be no less than a full day (unless agreed otherwise among the Members) and the cost of mediation shall be paid in equal proportion among the Members. The mediator shall be either voluntarily agreed to or appointed by the Superior Court upon a suit and motion for appointment of a neutral mediator. Upon completion of mediation, if the controversy has not been resolved, any Member may exercise all rights to bring a legal action relating to the controversy or (except where such controversy relates to withdrawal of a Member's obligations upon withdrawal) withdraw from membership as otherwise authorized pursuant to this Agreement.

18.10 Counterparts. This Agreement may be executed in counterparts, each of which shall be deemed an original.

18.11 Singular Includes Plural. Whenever used in this Agreement, the singular form of any term includes the plural form and the plural form includes the singular form.

18.12 Member Authorization. The legislative bodies of the Members have each authorized execution of this Agreement, as evidenced by their respective signatures below.

**IN WITNESS WHEREOF**, the Members hereto have executed this Agreement by authorized officials thereof.

CENTRAL WATER DISTRICT

By: _____

Title: Board President - CWD

APPROVED AS TO FORM:

By: _____

Title: District Counsel

CITY OF SANTA CRUZ

By: _____

Title: City Manager

2-23-16

APPROVED AS TO FORM:

By: _____

Anthony P. Condotti

Title: City Attorney

COUNTY OF SANTA CRUZ

By: _____

Title: County Administrative Officer

APPROVED AS TO FORM:

By: _____

Title: County Counsel

SOQUEL CREEK WATER DISTRICT

By: _____

Title: President, Board

APPROVED AS TO FORM:

By: _____

Title: District Counsel

# Appendix A
# Scope of Work for the City of Santa Cruz
# Regional Recycled Water Facilities Planning Study

## Detailed Scope of Work for City of Santa Cruz-Kennedy/Jenks Consultants Agreement

The following Tasks summarize the proposed scope of work to develop a Santa Cruz Regional Recycled Water Facilities Planning Study (RWFPS), which is prepared to meet the goals posed by the City of Santa Cruz (City) and satisfies the project report requirements under the State Water Resource Control Board (SWRCB) Water Recycling Funding Program Guidelines. The primary purpose of the RWFPS for the Water Department is to meet the timeline outlined in the WSAC Agreements and Recommendations Report with the development of information on recycled water alternatives by December 2016, and to develop information about the recommended recycled water alternative early in 2017 for inclusion in a separate evaluation of In Lieu/ASR, recycled water, and seawater desalination, which will be completed by the end of 2017. The primary purpose of the RWFPS for the Department of Public Works is to develop a plan to reduce wastewater discharge into the Monterey Bay by determining the footprint and cost effectiveness of its treatment, distribution, and sale to potential new customers of the regional wastewater resource managed by the City of Santa Cruz and the County of Santa Cruz Sanitation District. The Santa Cruz Regional RWFPS will also meet the requirements of the SWRCB planning grant, which will position the City to apply for future grants and financial incentives available for recycled water projects, should a recommended recycled water project rise to the top in the analysis of the three water supply options noted above. The purpose for public outreach in the Santa Cruz Regional RWFPS is to share information with the public about the topics in the RWFPS as directed by the Santa Cruz City Council, to involve stakeholders in the progress of the study, and to satisfy the requirements of the SWRCB recycled water planning grant with regard to public outreach.

Additionally, the Santa Cruz Regional RWFPS will bring together information from former and newer studies of recycled water regarding opportunities in the region, incorporating the feasibility studies that are nearing completion. Seasonal demands also require thought to make full use of the recycled water resource, which is climate independent. For example, the City may elect to implement direct potable reuse, groundwater replenishment, irrigation water of North Coast agriculture and golf courses, and/or surface water augmentation with recycled water in dry years from the Spring to the Fall. However, there could be some evaluation of utilizing more surface water from Loch Lomond reservoir during the winter season to meet regional potable water demands and rest groundwater pumping to make room for purified recycled water when dilution water is available, and bank the groundwater for use in the dry season. Kennedy/Jenks will evaluate the efficiency of using recycled water year-round for multiple end-uses, taking into consideration the combination of several end uses for tertiary and purified recycled water in the region. This work will efficiently build on previous planning and design documents by the City and other Regional entities, including the Soquel Creek Water District (District), County of Santa Cruz (County), Scotts Valley Water District (SVWD) and other

local agencies, as appropriate. This work will also build on the technical work described in the Water Supply Advisory Committee Agreements and Recommendations Final Report (City of SC, October 2015).

## Summary of Work

The scope of work for the Regional RWFPS is organized to follow the State Water Resource Control Board's (SWRCB) Water Recycling Program Funding - Recommended Planning Outline for Water Recycling Projects (Appendix B). The scope is organized into ten tasks, as shown in Table 1, which align with chapters recommended in the SWRCB outline. A more detailed discussion of each task is provided in the Scope of Work section. Table 2 provides additional detail about each task, including subtasks, key deliverables, the associated format for each deliverable, the Regional RWFPS Chapter the work will feed into, the City's role, key Subconsultant roles and dependencies.

### Table 1: Task Structure

| Task | Regional RWFPS Chapter |
|---|---|
| Task 1 - Project Management & QA/QC | |
| Task 2 - Background Information | Chapter 1 – Study Area Characteristics<br>Chapter 2 – Water Supply Characteristics and Facilities |
| Task 3 - RW Market Analysis | Chapter 3 – Wastewater Characteristics and Facilities<br>Chapter 5 – Recycled Water Market |
| Task 4 - Treatment Evaluation / Reg Requirements | Chapter 4 – Treatment Requirements for Discharge and Reuse |
| Task 5 - Alternatives Analysis | Chapter 6 – Project Alternative Analysis |
| Task 6 – Stakeholder Involvement | Chapter 5 – Recycled Water Market |
| Task 7 - Recommended Project | Chapter 7 – Recommended Facilities Project Plan |
| Task 8 – Financial Analysis | Chapter 8 – Construction Financing Plan and Revenue Program |
| Task 9 – Regional RWFPS Report | |
| Task 10 - Meetings and Workshops | |

## Table 2: Sub-Task Structure, Deliverables, Roles and Dependencies

| Task | Key Deliverable | Presentation Format | RWFPS Chapter(s) | Lead | City Role | Dependent on |
|---|---|---|---|---|---|---|
| **Task 1 – PM & QA/QC** | | | | | | |
| 1.1 Monthly Status Reports and Invoices | 18 invoices | Email to City | n/a | K/J - Dawn | Approve Invoices | Effort to date |
| 1.2 Status Calls/Web Meetings | 36 - 1 hr calls | Conf Call/Web | n/a | K/J - Dawn | Participation | Include participants involved in current task as-needed |
| 1.3 Subonctracting Agreements | n/a | n/a | n/a | K/J - Dawn | n/a | Scope of Work |
| 1.4 Schedule | Monthly schedule update | digital | n/a | K/J - Dawn | Review / Comment, Schedule mtgs with Regional Stakeholders and TWG | TWG milestones and Stakeholder Mtgs |
| 1.5 Project Setup and Establish QA/QC Program | Project Work Plan | Update as-needed | n/a | K/J - Dawn | Review / Comment | n/a |
| **Task 2 – Background Info** | | | | | | |
| 2.1 Data Collection and Review | Data Request | Tracking Table | n/a | Team | Respond/Fulfill | Availability and speed of acquisition |
| 2.2 Study Area Characteristics | Summary Table/Figure | Draft | Chapter 1 | K/J | Review and provide updated information | Data Collection and Review |
| 2.3 Water Supply and Facilities | Summary Table/Figure | Draft | Chapter 2 | K/J | Review and provide updated information | |
| **Task 3 – Recycled Water Market Analysis** | | | | | | |
| 3.1 WWTF Facility and Supply Analysis | Summary Table/Figure | Draft | Chapter 3 | Trussell - K/J | Coordination with WWTF and Santa Cruz County Sanitation District (SCCSD) | SqCWD Groundwater Replenishment Recycled Water Feasibility Study |
| 3.2 NPR Demand Analysis | Summary Tables/ Chapter Text | Draft | Chapter 5 | K/J | Coordination with City Staff who will identify and communicate with customers | Available meter data from City, input from customers, input from CA State Parks and farmers regarding recycled water use on the North Coast |
| 3.3 Recycled Water Market Survey Map | Market Survey Map | Draft | Chapter 5 | K/J | Provide GIS files | RW IPR maps would include SVWD and SqCWD; Loch Lomond; RW NPR maps would include North Coast Ag, and irrigation/industrial |
| 3.4 IPR Potential - GW Replenishment | Tech Memo #1 | Draft | Chapter 5 | K/J | Coordination with Groundwater Stakeholders (SVWD, SqCWD, and the Soquel-Aptos Groundwater Management Committee) | Available hydrogeologic assessments, In-Lieu ASR Feasibility Study Consultant<br>Input from SqCWD on Mid-County GWR Project and from SVWD on RW Hansen Quarry project |
| 3.5 IPR Potential - Reservoir Augmentation | Tech Memo #2 | Draft | Chapter 5 | Welch - K/J | Coordination with Stakeholders | |
| 3.6 Streamflow Augmentation | Tech Memo #3 | Draft | Chapter 5 | K/J - Smith | Coordination with Stakeholders / Regulators | Input from Regulators |
| 3.7 DPR Potential | Tech Memo #4 | Draft | Chapter 5 | K/J | Coordination with Stakeholders | Input from Brown and Caldwell on DPR Project |
| **Task 4 – Treatment Eval/Reg Requirements** | | | | | | |
| 4.1 Define Water Quality Objectives for Uses | Summary Tables | Draft | Chapter 4 | K/J | Coordination with customers | Input from potential users |
| 4.2 Summarize Regulatory Requirements | Summary Tables | Draft | Chapter 4 | K/J | | |
| 4.3 Treatment Evaluation | Tech Memo #5 | Draft | Chapter 4 | Trussell - K/J | Coordination with WWTF | Input from WWTF |
| **Task 5 – Alternatives Analysis** | | | | | | |
| 5.1 Refine Long-List of Alternatives | Summary Table/Figure | Draft | Chapter 6 | K/J | Coordination with Regional Stakeholders | Input from City & Regional Partners and TWG |
| 5.2 Preliminary Screening | Summary Table | Draft | Chapter 6 | K/J - GHD | Coordination with Regional Stakeholders/ Regulators | |
| 5.3 Evaluate Short List of Alternatives | Screening Tables | Draft | Chapter 6 | K/J | Coordination with Regional Stakeholders | |
| 5.4 Alternative Capital, O&M and Life Cycle Costs | Cost Tables | Draft | Chapter 6 | K/J | | |
| **Task 6 – Stakeholder Involvement** | | | | | | |
| 6.1 Outreach Strategy and Advice | Materials as requested | Draft | Chapter 5 | DI - K/J | Development of strategy for maintaining stakeholder communication | May include input from stakeholders and potential users |
| 6.2 Outreach Materials and Support | Materials as requested | Draft | Chapter 5 | DI - K/J | Coordination/Logistics/Materials for meetings | Questions/Requests received, collection of data for report regarding customer commitments |
| **Task 7 – Recommended Project** | | | | | | |
| 7.1 Preliminary Facilities Design Criteria | Summary Table/Figure | Draft | Chapter 7 | K/J | Facilities Input | Outcome of Task 5 and City Preferences |
| 7.2 Implementation Plan | Summary Table/Figure | Draft | Chapter 7 | K/J | Operational Input | |
| **Task 8 – Financial Analysis** | | | | | | |
| 8.1 Anticipated Financing Plan | Tech Memo #6 | Draft | Chapter 8 | RFC | City Staff or Contract with Raftelis Financial Consultants, Inc | Cost Tables from Task 5 |
| 8.2 Revenue Projection Program | Tech Memo #6 | Draft | Chapter 8 | RFC | City Staff or Contract with Raftelis Financial Consultants, Inc | Cost Tables from Task 5 |
| **Task 9 – Regional RWFPS Report** | | | | | | |
| 9.1 Admin Draft for City | Admin Draft | digital | n/a | K/J | Distrbute, coordinate and compile comments from City, Regional Partners and Stakeholders | |
| 9.2 SWRCB Draft | Draft | digital/hard copy | n/a | K/J | | |
| 9.3 Final Report | Final | digital/hard copy | n/a | K/J | Distribute final document | |
| **Task 10 - Meetings and Workshops** | | | | | | |
| 10.1 Kick-off Meeting (1) | Meeting Materials | digital/hard copy | n/a | K/J | Meeting Minutes | |
| 10.2 F2F Meeting (w/ City PW and Water, TWG & Regional Partners) (2) | Meeting Materials / ppt | Draft/Final | Chapter 4/5 | K/J | Create/manage TWG, logistics for workshops (coordinate, distribute materials, meeting minutes), facilitate workshop, team meeting before and after workshop | Task 3 & 4 |
| 10.3 Workshops - Alternatives Analysis/Recommmended Project (2) | Meeting Materials / ppt | Draft/Final | Chapter 6 | K/J | | Task 5 |
| 10.4 Present Final RWFPS (1) | Meeting Materials / ppt | Draft/Final | Chapter 6 | K/J | | Task 5 |
| 10.5 SWRCB Mid-Course Mtg - Draft Report (1) | Meeting Materials / ppt | Draft/Final | Chapter 7 | K/J | | Task 7 |

## General Assumptions

The general assumptions used to prepare this Scope of Work are summarized as follows.

- Regional Partners for this study include the Soquel Creek Water District, Scotts Valley Water District and the County of Santa Cruz Sanitation District.
- Project geographic area includes the City of Santa Cruz service area and portions of each Regional Partners service area and/or jurisdiction.
- This work will build on the technical team work described in the WSAC Agreement and Recommendations Final Report, other City and SqCWD consultants, and prior and ongoing planning work.
- Draft technical memoranda (TM), summary tables and figures produced under each task will be presented during meetings/workshops and are intended to be incorporated in the Regional RWFPS as-appropriate. Comments received will be integrated into a revised version to be incorporated into the Admin Draft Regional RWFPS for further review by the City and Regional Partners.
- Each subtask deliverable will include a draft presented during a conference call or meeting, and a final incorporating any comments. Summary tables, figures and associated text will be integrated into the Regional RWFPS as appropriate.
- The Regional RWFPS Report will include (1) administrative initial draft for review by the City and Regional Partners, (2) second draft for review by the City, Regional Partners and the SWRCB and (3) final Report for publication.
- For each deliverable, the City will provide a set of combined written comments from City and/or Regional Partners. The project schedule has been developed assuming all review comments will be received within two weeks of the draft documents' date. Comments will be discussed as required and incorporated into the final document as appropriate.
- The Kennedy/Jenks team will provide verbal progress updates to City staff during scheduled conference calls and a monthly status report will accompany each invoice for work.
- The work under this task order is assumed to be performed over an 18-month period starting upon receipt of the Notice to Proceed (NTP). If the work extends beyond this time period due to delays caused by others, the project management budget shall be increased as-required based on discussions with the City. This budget will be used to cover additional effort associated with additional meetings, invoices and coordination, etc resulting from the schedule extension.
- The Scope of Work shall be managed to be within the overall budget established for the project. Some tasks and subtasks may require more or less effort to complete, based on conditions that may be unforeseen at the time of scoping. Kennedy/Jenks reserves the right to move budget between tasks/subtasks for the base scope.
- Sampling and other field work is not included in this scope of work.
- Design or implementation of a pilot study is not included in this scope of work. Treatment technologies and facilities sizing will be evaluated using existing effluent water quality data from the Santa Cruz Wastewater Treatment Facility (WWTF), and other information provided by the City. Recommendations for bench-scale and/or pilot-scale treatment technology studies may be provided depending on the recommended project.

### Public Outreach Assumptions

- Outreach activities will be coordinated with existing City Communications staff, who will provide services as described in the scope of work.
- The Kennedy/Jenks Team will prepare and present outreach materials within the scope described herein.

- As needed graphic support (layout, text & design) for collateral outreach materials and public meeting support materials such as posters, PowerPoint presentations and handouts is included up to the budgets established herein.

## Services Provided by the City

The scope of work, schedule and budget assumes that the following services will be provided by City:

- The City will designate one or more individuals (as-needed) to:
  - Serve as a point of contact to assist the Kennedy/Jenks Team in obtaining needed data and scheduling meetings, workshops, site visits as defined in the scope of work.
  - Coordinate with other City Departments, other City consultants, potential customers, groundwater (GW) stakeholder groups, regulators and other stakeholders as-requested to support the scope of work.
  - Coordinate, schedule and provide logistics for meetings with potential users, workshops and meetings with Regional Partners.
  - Create and manage the Technical Working Group (TWG) and provide coordination and logistics for TWG workshops.
  - Distribute materials, take meeting minutes and provide support as-needed during meetings/workshops.
  - Distribute deliverables and coordinate the review process with the Regional Partners and other reviewers, and to provide consolidated comments and information to the Kennedy/Jenks team within the durations shown on the project schedule.
- The City will provide prior reports, technical memoranda, presentations and other information from prior planning efforts upon request, and in digital format if available.
- Aerial photos, GIS shapefiles, AutoCAD files and other facility information from previous planning and design efforts, or other City sources will be made available at no additional cost to the Kennedy/Jenks Team.
- The City Water Engineering and Public Works Staff will provide draft report text/tables/figures from previous planning efforts and will provide data to assist K/J GIS staff with the production of graphics for workshops as-requested.
- The City will provide relevant customer water use data including all meter data and previous demand estimates, at the start of the project to facilitate confirmation of the market assessment demands. These data will be provided in a digital format. If data input for hard copy information is required, additional scope and budget will be required.

## Work by Subconsultants

- Merritt Smith Consulting– Regulatory Strategy Support
- Data Instincts – Stakeholder Outreach
- Trussell Technologies – WWTF Facility/Supply Analysis, Treatment Technologies and QA/QC Support
- Stratus Consulting/Abt Associates – Triple Bottom Line Analysis
- GHD Inc. – CEQA/Environmental Compliance Support
- Michael Welch, PhD. – Reservoir Augmentation

# City of Santa Cruz
# Water Supply Advisory Committee

# Final Report on
# Agreements and Recommendations

# October, 2015

The Water Supply Advisory Committee

SantaCruzWaterSupply.com



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**GLOSSARY**

**Active recharge**: Regarding aquifer storage, active recharge implies artificially moving water from the surface into ground water systems.
**Adaptation framework**: General approach to enable the City and Water Department to adjust plans (i.e., to adapt) in the face of key future uncertainties, by taking account of future information as it becomes available.
**Adaptive flexibility:** The ability of a plan to adjust to changing circumstances and emerging information over time.
**Adaptive pathway:** The path forward through time, representing where and why plans may need adjustment (adaptation) as new information becomes available.
**Adjustment framework:** Similar to the adaptation framework, but pertaining to modest-sized adjustments to a path rather than a possible movement from one future path to another.
**AFY, acre feet per year:** A unit of measurement that demonstrates both water supply and demand on a municipal-wide scale. One acre foot is the volume of one acre of surface area to a depth of one foot. One acre foot is 43,560 cubic feet or 325,851 gallons.
**Alternatives**: Proposed solutions or alleviations to the system's supply shortfall that intend to use new or underutilized sources of water, expanding storage, and/or creating or adapting production methods.
**CII:** Commercial, institutional and industrial entities; non-residential customers of the Water Department.
**CII MF:** CII (see above) and multi-family residential customers.
**Confluence®**: An analytical water resources planning tool that simulates current and future water supply and demand scenarios, evaluates the results, and presents them in an understandable fashion. (Confluence was developed by Gary Fiske and Associates.)
**Confluence model**: The presentation of the Confluence results which provides a vast array of information in a flexible manner.
**Conjunctive use:** Using groundwater and surface waters together to improve water availability and reliability.
**Decision nodes:** Points along an adaptive pathway at which information is anticipated that may support a decision to either proceed as initially planned, or adjust the plan (e.g., switch to a different pathway forward).
**Decision space**: The factors, information, and time in which a decision is to be made.
**Demand management**: The guidance of reduced water consumption through conservation and other curtailment methods (e.g., departmental rebate for low-flow toilet installation).
**Direct potable reuse**: An approach to recycled water where advanced purified wastewater is introduced directly into a potable water supply distribution system.
**Drought-resistant**: Alternative water supply that is not highly dependent on rainfall for its source.
**Econometric**: A form of statistical analysis applied in the social sciences (e.g., to explain or forecast water demand).
**Fish flows**: Designation of specific stream flows at a particular location for a defined time, and typically follows seasonal variations with the intent of protecting and preserving resources for the surrounding environment and fish. [Ref. http://www.dfg.ca.gov/water/instream_flow.html]
**Flow regime:** The amount of water that is (or is required to be) found instream, across seasons and hydrologic years.

**Forward osmosis (FO)**: Forward osmosis (FO) is an osmotic process that uses a semi-permeable membrane to effect separation of water from dissolved solutes. The driving force for this separation is an osmotic pressure gradient between a solution of high concentration, often referred to as a "draw" and a solution of lower concentration, referred to as the "feed".
**Gantt chart**: A bar chart that demonstrates components of a project's schedule.
**GPCD**: Gallons per capita per day, or the average daily water usage per person.
**HCP**: A Habitat Conservation Plan (HCP) is a required part of an application for permits to continue to take water from the San Lorenzo River and North Coast Streams. The HCP evaluates the impacts the City's water withdrawals have on endangered fish and spells out how they will be avoided or minimized. The HCP establishes an agreed upon amount of water that is needed for fish protection, and therefore how much remains for City consumption.
**Indirect potable reuse**: An approach to recycled water where advanced purified water is combined with water from a natural water source (often in an aquifer or reservoir) where it can later receive more treatment before being introduced to a potable water supply distribution system.
**Interest-based bargaining**: A method intended to increase the effectiveness of negotiations to develop consensus. The goal is for every member of the negotiation to win something, and to do so by addressing all interests, maintain a cooperative approach, and focus on the importance of relationships among members. There is usually more than one satisfactory solution in Interest-based bargaining.
**Intertie**: A connecting pipeline between water systems that allows the transfer of potable water.
**Karst**: A terrain with distinctive landforms and hydrology created from the dissolution of soluble rocks, principally limestone and dolomite. Karst terrain is characterized by springs, caves, sinkholes, and a unique hydrogeology that results in aquifers that are highly productive but extremely vulnerable to contamination. In the United States, about 40% of the groundwater used for drinking comes from karst aquifers. [Ref. http://water.usgs.gov/ogw/karst/pages/whatiskarst]
**MGY, Million gallons per year:** A unit of measurement that demonstrates both water supply and demand on a municipal-wide scale.
**Modeling and forecasting**: Water supply planning and analytical tools used in designing the water system and estimating its performance and demands under various future scenarios.
**Multi criteria decision system (MCDS)**: A framework for organizing, analyzing, and communicating considerations of proposed approaches to water supply and demand. MCDS produces a model that contains criterion and alternatives. Each criterion and alternative has a description, ratings scales, and weights.
**NTUs (Nephelometric Turbidity Units)**: A measure of the level of turbidity, or suspended particles, in a liquid. Drinking water standards require turbidity to be in the range of ~ 0-1NTU.
**Passive recharge**: Regarding aquifer storage, passive recharge implies moving water naturally from the surface into ground water systems (such as by substituting surface water to supply water users, and thereby resting extraction wells).
**Peak season**: The months between May and October where demand for water is higher than the remaining months due to dry weather conditions and a significant increase in tourist activity.
**Portfolio**: Collections of potential solutions and alleviations to the system's supply and demand shortfall distributed to the Committee to review, consider, and assess.
**Production:** The volume of potable water generated in a specific time period, which may vary during different times of the year and different hydrologic conditions. The difference between production

and yield is production measures each supply source, while yield measures the water supply system as a whole.

**Price elasticity**: Regarding demand, price elasticity is an economic term that represents the responsiveness of demand when the price of goods and/or services are subjected to changes.

**Ranney collectors**: A patented type of radial collector well used to extract water from a direct connection to a surface water source (e.g., a river) by extending radially under the surface floor (e.g., river bed). These radial or horizontal wells flow to a conventional well before being pumped to the surface.

**Reverse osmosis**: A system of filtering dissolved solids from water by driving the water through a semi-permeable membrane. Compared to forward osmosis, reverse osmosis is a high pressure driven system.

**Rule curve**: As applied to dam operations, for example, indicating the guidelines for how releases from the dam are managed (i.e., when to use the water, and when to store it).

**Runoff**: The flow of surface water from excess rain or other sources. This occurs when the source of water is distributed faster than the surface is able to absorb it, resulting in the flow of water.

**Scalability**: The capability to alter a project's plans to meet differing demand scenarios (ex.: adapting the plans regarding the size of a recycled water plant to produce less water for a smaller customer base than what was originally imagined).

**Scenario planning**: Exercises intended to demonstrate potential future water supply and demand situations (ex.: long periods of drought, lowered demand due to conservation, etc.).

**Supply augmentation:** Adding to the water supply.

**Supply-demand gap**: The difference between a water system's ability to sustainably store and provide water to its customers and the demand on the system. The amount by which demand may exceed supply, such as in the peak demand season.

**Turbidity**: The cloudiness or haziness of a fluid caused by the presence of particulates in the water.

**UHET:** Ultra high efficiency toilet.

**Urban Water Management Plan**: A report that fulfills the requirements described in the Urban Water Management Planning Act. The report describes the utility's water resource supplies and projects needs over a twenty-year planning horizon with relation to conservation, water service reliability, water recycling, opportunities for water transfers, and contingency plans for drought events. The latest report was published in 2010.

**Yield:** The resulting reduction in system-wide water shortages during the peak season when a new source is added to the system. Two measures of yield are typically shown: (1) under the worst hydrologic conditions; and (2) as an average across all hydrologic conditions. The difference between production and yield is production measures each supply source, while yield measures the water supply system as a whole.

**Water year**: Each water year begins October 1 and extends through September 30.

**Water-neutral:** As applied to development paths (i.e., levels of population or economic growth), signifying an approach that does not change overall demand for water.

# Article I. Executive Summary

Appointed by City Council in 2014, the Water Supply Advisory Committee's (WSAC) charge was to *explore, through an iterative, fact-based process, the City's water profile, including supply, demand and future risks; analyze potential solutions to deliver a safe, adequate, reliable, affordable and environmentally sustainable water supply; and, to develop recommendations for City Council consideration.* This document lays out the WSAC Process, Information Developed and Considered, Analysis, Agreements and Recommendations.

The WSAC brought together a diverse set of perspectives and viewpoints from a broad sector of the community. The Committee placed a high value on transparency, trust and consensus. With that in mind, developing the "how" – the Agreements – was as critical as the "what" – the Recommendations.

The Agreements lay out strategies for how the recommendations will be implemented, with particular emphasis on how to approach managing change. The Committee agreed to a *Staggered Implementation Approach*, allowing work to begin on full scale implementation of the Strategy One elements, with clearly defined decision points, thresholds and metrics; and to begin preliminary work on Strategy Two elements. The implementation protocol is discussed in Section 3.22 of this document.

In addressing the issues of trust and transparency, the Agreements provide an in-depth *Change Management Strategy.* This strategy underscores the guidelines and principles that reflect the Committee's values and priorities, and establishes mechanisms for dealing with changes that will occur over time. The Change Management Strategy includes procedures for planning, doing, checking and acting; an Adaptive Pathway framework for implementing the three main supply recommendations; defined roles and responsibilities for Water Department staff and the Water Commission; and clear guidance for decision making. The Change Management Strategy is discussed in Section 3.24.

The overarching goal of the Committee's Plan is to provide significant improvement to the sufficiency and reliability of the Santa Cruz water supply by 2025. The recommendations made in this report reflect consensus among WSAC members for how best to address an agreed-upon worst year gap of 1.2 billion gallons between water supply and water demand during times of extended drought. The strategies recommended include: strengthened water conservation programs; storage of available San Lorenzo River flows during the rainy season in regional aquifers, through processes known as "In Lieu" water transfers, for passive recharge, and Aquifer Storage and Recovery (ASR) for active recharge; and a supply augmentation plan to use advanced-treated recycled water,[1] with desalination as a back-up, should the use of advanced-treated recycled water not be feasible. This report provides detailed information on each of the recommended strategies. Importantly, the Committee's Plan accomplishes the City's water supply goal while providing robust stream flows to support and enhance fish habitat restoration and protection.

In brief:

**Strategy 0 – Conservation** – In addition to the existing conservation programs such as home and business evaluations, water saving rebates, water budgets for large landscapes and free water-saving

[1] See Framework for Direct Potable Reuse: Water Reuse Foundation, American Water Works Association, Water Environment Foundation, National Water Research Institute, September 2015.

devices, the WSAC recommends looking at new programs, such as increased rebates and better management of peak season demand. The goal of these additional programs would be to further reduce demand by 200 to 250 million gallons per year (mgy) by 2035, with a particular focus on producing savings during the peak season.

**Strategy One – Groundwater Storage: In Lieu Water Exchanges** – In normal years, the Santa Cruz Water Department (SCWD) receives more rainfall than is needed to meet customer demand and can be stored in Loch Lomond Reservoir. Using In Lieu Water Exchanges, available winter flows would be delivered to Soquel Creek Water District (SqCWD) and/or Scotts Valley Water District (SVWD) customers, thus allowing reduced pumping from these regional aquifers and enabling the aquifer to passively rest and recharge. Using **Aquifer Storage and Recover (ASR),** available winter flows would be injected into aquifers through new and existing wells owned by the SCWD, SVWD and/or SqCWD, thereby actively recharging aquifers. A portion of the water delivered using In Lieu or ASR would be effectively banked in the aquifers to be extracted and returned to SCWD when needed in future dry years.

**Strategy Two – Advanced Treated Recycled Water or Desalinated Water** would be developed as a supplemental or replacement supply in the event the groundwater storage strategies described above prove insufficient to meet the plan's goals of cost-effectiveness, timeliness or yield. If it is determined that recycled water cannot meet our needs, then desalinated seawater would be used.

With these recommendations, the Water Supply Advisory Committee has met its charge to reach consensus on how best to deliver a safe, adequate, reliable, affordable and environmentally sustainable water supply to our community by 2025. The body of this report provides the detailed information that which supports the findings reported in this Executive Summary.

# Article II. Preamble

## *Section 2.01 Committee Charge*

The Committee's purpose is to explore, through an iterative, fact-based process, the City's water profile, including supply, demand and future risks; analyze potential solutions to deliver a safe, adequate, reliable, affordable and environmentally sustainable water supply and develop recommendations for City Council consideration.

## *Section 2.02 Committee Membership*

The following individuals were appointed to the Water Supply Advisory Committee to represent the interests listed:

| **Community Interest** | **Representative** |
|---|---|
| Business Organization (Think Local First) | Peter Beckmann |
| City Resident | Doug Engfer |
| Santa Cruz Water Commission | David Green Baskin |
| Non-City Resident (Outside-City Water Customer) | Sue Holt |
| City Resident | Dana Jacobson |
| City Resident | Charlie Keutmann |
| Santa Cruz Desalination Alternatives | Rick Longinotti |
| Environmental Organization (Surfrider Foundation) | Sarah Mansergh |
| Business Organization (Santa Cruz Chamber of Commerce) | Mark Mesiti-Miller |
| Environmental Organization (Coastal Watershed Council) | Greg Pepping |
| Santa Cruz Sustainable Water Coalition | Mike Rotkin |
| Business Organization (Santa Cruz County Business Council) | Sid Slatter |
| Environmental Organization (Sierra Club) | Erica Stanojevic |
| Santa Cruz Water Commission | David Stearns |
| Santa Cruz Water Department (ex officio/non-voting member) | Rosemary Menard |

## *Section 2.03 Committee Agreement about Decision-Making*

The Committee's decision-making processes will differ from the Council or City Commissions in that it is intended to reach consensus through a collaborative process. Therefore, the Committee will use this hierarchy of decision tools:

i. The preferred decision tool is for the Committee to arrive at a "sense of the meeting."

ii. Consensus is highly desirable.

iii. Informal voting may only be used to explore the decision space.

iv. Formal voting may be used as a fallback when consensus fails as long as there is consensus that a vote should take place. The voting shall be by a supermajority of 10.

## *Section 2.04 General Context and Framing Issues*

The most important element of a problem solving process is defining the problem. Yet one of the characteristics of long range planning for complex systems is that even the problem itself is difficult to define. This is true of Santa Cruz's water planning.

Like all long range planning, water supply planning must deal with the realities of an uncertain future. In a historical context, water supply planning uncertainties have included the normal sources of variability:

- Weather and its impacts on supply;
- Demand increases in the future due to growth and development;
- Demand decreases resulting from changing plumbing codes, technologies, demographics, or consumer behaviors (conservation); and
- Potential supply decreases due to regulatory requirements to release water to support threatened or endangered fish species.

Today, uncertainties related to impacts of climate change must be added to this list.

During the first phase of the WSAC's work, the Committee was presented information about a variety of decision tools that the technical and facilitation teams believed could be useful in the Committee's work. The Committee considered and applied a variety of tools:

1. Scenario planning, including portfolio development,
2. Risk analysis and risk management, and
3. Criteria based evaluation of alternatives and portfolios using a Multi-Criteria Decision Support tool (MCDS).

The Committee explored or applied all of these tools as it did its work. The Adaptation Strategy described in more detail in Section 3.24 later in this document exists largely as a result of the Committee's efforts to create a plan that would be able to respond to the new information that will emerge and the potential changes in our understanding of circumstances that will occur over time.

## *Section 2.05 Overview of Committee Process*

The Committee's process was divided into three phases:

- A Reconnaissance Phase where the Committee learned about the water system and its issues and identified a broad range of alternatives approaches for addressing the system reliability issues;

- An Analysis Phase where more detailed information about supply, demand, the supply shortfall, and the alternative approaches to solving the problem were explored in some detail; and
- An Agreements Phase where the Committee developed the agreements and recommendations that they conveyed to the City Council. The process has been iterative without stark boundaries between the phases but with a steadily increasing level of understanding of the issues, drivers, opportunities and constraints that the Committee was dealing with.

The Committee's process has been supported by a technical team that brought a diverse range of skills, experience and expertise to the tasks the Committee defined. The Committee also selected a group of four water professionals to serve as an Independent Review Panel and provide perspective about technical issues that the Committee dealt with. Finally, the Committee was professionally facilitated by a team of individuals experienced in collaborative problem solving and multi-party negotiations.

All Committee meetings were open to the public and opportunities for public comment and input were regularly provided including, specifically, in advance of the Committee's taking action on any important decisions. The Committee had its own website and received and responded to all website communications received from the public. All public communications received via the website were shared with all Committee members, and with City staff and the technical team.

## *Section 2.06 WSAC Process and Support Team*

In addition to their monthly meetings, a number of other opportunities were made available to inform the WSAC on the myriad topics and issues associated with water supply planning. Six "Modeling and Forecasting" workshops were offered to WSAC members and the community on the various tools used by the Water Department related to water supply planning. These workshops covered topics on surface and groundwater supplies, forecasting water demand, demand management, and water shortage contingency planning. There were also a series of "Enrichment" meetings which included discussions on building code impacts on water demand, fishery agency perspective on protecting and enhancing fish habitat, climate change, water transfers/exchanges as a water supply augmentation, conservation, and recycled water.

The WSAC was supported by a Facilitation Team, Independent Review Panel, and Technical Support Team as described below.

**Facilitation Team**: The facilitation team was hired to guide the WSAC through its process including assessing community concerns; designing the WSAC process; reviewing committee composition; assisting with establishing committee meeting agendas, format and structure, legal and ethical guidelines and other process considerations; proposing work plans, objectives and deliverables; interfacing with City staff, consultants and community members; and maintaining strong lines of communications and relationships between the City, Committee and the greater community toward the end of timely delivering a set of water supply recommendations for City Council consideration. The prime consultant was Nicholas Dewar (Public Policy Collaboration) with subconsultants Carie Fox (Fox Mediation) and Philip Murphy (InfoHarvest).

**Independent Review Panel**: The WSAC hired four individuals to assist them to effectively interact with the technical consulting support team by providing critical review of products created by the technical

team and offering advice or suggestions to the WSAC regarding lines of inquiry or technical questions that should be evaluated by the technical team.

- Michael A. Cloud, Registered Geologist, County of Santa Cruz (retired)
- Patrick T. Ferraro, Water Resource management, Executive Director The Silicon Valley Pollution Prevention Center (1995 – 2004); Director on the Board of the Santa Clara Valley Water District (1973 – 1995)
- Brian L. Ramaley, P.E., Drinking water supply, treatment, distribution; Director City of Newport News Department of Public Works (1989 – 2013) (retired)
- Roy L. Wolfe, PH.D., Environmental science, water resources, utility management, water research, Metropolitan Water District of Southern California (retired).

**Technical Team:** A number of consultants were available to develop and provide information on the various topics considered by the WSAC. Stratus Consulting functioned as a general contractor and, together with Water Department staff, orchestrated the work of a number of subject matter experts. Stratus Consulting and the other consultants listed below were approved by the WSAC at their May, June, August and September 2014 meetings.

- Stratus Consulting Inc. acted as general contractor to the WSAC. Stratus provided environmental research, analytics and consulting services and responded to technical and analytical issues.
- Brown and Caldwell provided engineering support services, developing conceptual level designs and cost estimates on a myriad of options.
- Balance Hydrologics provided information related to stream flows and impacts to those flows resulting from climate change and potential release requirements for fish and other habitat.
- Gary Fiske and Associates developed the Confluence model to assist utilities manage water supply resources. Gary has consulted to the City for many years and assisted the WSAC evaluate various water supply alternatives.
- Hagar Environmental Science provided information to the WSAC on fisheries and aquatic issues as they relate to water resource management and aquatic species conservation.
- Lennihan Law provided information related to water rights.
- Maddaus Water Management Inc. has several decades of experience with water resource planning, water demand management and conservation. Maddaus has worked with the Water Department on several water conservation master planning efforts and worked with the WSAC on several occasions to discuss conservation practices and approaches to lower Santa Cruz demands.
- M. Cubed developed an econometric demand model during the WSAC to more comprehensively evaluate the water demands of the city and its influencing factors.

# Article III. Agreements

## *Section 3.01 Introduction*

This Article summarizes the work the Committee members did in several major topic areas that were key to developing their understanding of the issues and their recommendations to the Council. Each of the following sections describes a topic, summarizes the Committee's work on that topic, presents any agreement that the Committee reached about that topic, and articulates the key assumptions.

The analysis, assumptions and agreements presented in this section create the foundation for the Committee's recommendations to the City Council presented in Article IV.

Section 3.03 begins with a brief statement about the nature of Santa Cruz's water supply problem that was based on conventional wisdom and past studies and analysis. The analysis described in Section 3.04 through Section 3.07 deconstructs and then reconstructs that conventional wisdom to quantify the supply-demand gap and to include the potential impacts of fish flow releases and climate change on the size and characteristics of Santa Cruz's water supply reliability issues.

## *Section 3.02 Background*

The Water Supply Advisory Committee's Analysis Phase work program was designed around the use of scenario planning to explore and evaluate a range of alternatives. This section summarizes the basic work to date and provides an overview of the products developed to support the Committee's work. Several additional documents are attached to this document as appendices; they provide more detailed information where such information was thought to be relevant and potentially of interest.

The key ingredients of the Committee's scenario planning include:

- Problem definition
    1. Forecasts of current and future water demand;
    2. Analyses of supply available to meet current and future water demand; and
    3. Identification of probable and plausible challenges that will need to be addressed in the future; in this case these include a probable requirement for releasing water for fish flows and plausible impacts of climate change.
- Solution development
    - A range of demand management (water conservation) and supply augmentation alternatives that can be combined in various portfolios to meet the supply demand gap; and
    - Evaluation criteria to use in considering the portfolios created.

The following sections provide a high level summary of the Committee's progress in their work related to scenario planning and, where relevant, links are provided to more detailed information, typically found in materials developed for committee meetings. In addition, comprehensive information about the Committee's work is available through its website: www.santacruzwatersupply.com.

## *Section 3.03 Preliminary Problem Definition*

Over the many years that Santa Cruz has been studying ways to improve the reliability of its water supply, the problem has been defined in a variety of ways that were relevant at the time. Today, it is fair to say that the fundamental cause of the Santa Cruz water system's reliability problem is the inability to store sufficient volumes of available winter flows for use in the driest years and/or the lack of a supply that does not depend on those flows. At least one of these is needed to ensure an adequate and dependable supply during water years classified as critically dry and, to some degree, dry.

## *Section 3.04 Historical Context – The Challenge of Variability*

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

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

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

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

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

**Table 1 – Water Year Classification System**

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

Figure 1 and Figure 2 show two versions of local, historical information for water years (October 1 to September 30) classified into water-year types. These are familiar figures to many, but the purpose of including them up front is to emphasize two issues:

- Figure 1 shows the data sorted chronologically over the period from 1921 - 2015[2]. This view underlines the significant variability of the data emphasizing the fact that the City has no certainty about what the following year will bring, nor any certainty about how long any pattern may last. Average runoff during this period is about 93,000 acre-feet or 30 billion gallons[3]. The least amount of runoff, 9,500 ac-ft, occurred in the drought of 1977. The maximum recorded discharge was over 280,000 ac-ft in 1983, one of the wettest years on record in California. This natural variation in the level of runoff available in local streams and rivers, from which the City draws the majority of its supply, is the major factor that results in an inconsistent level of water supply from year to year.
- Figure 2 sorts the data into year types, showing the number of years that have historically fallen into each year type. As will be discussed later in this section, a plausible impact of climate change on Santa Cruz's water supply would be an increase, perhaps even a significant increase, in the fraction of dry and critically dry years that Santa Cruz will experience, thereby exacerbating the reliability issues the system currently faces.

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

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

**Figure 1 – Water Year Classification System Based on San Lorenzo River Runoff (by year)**

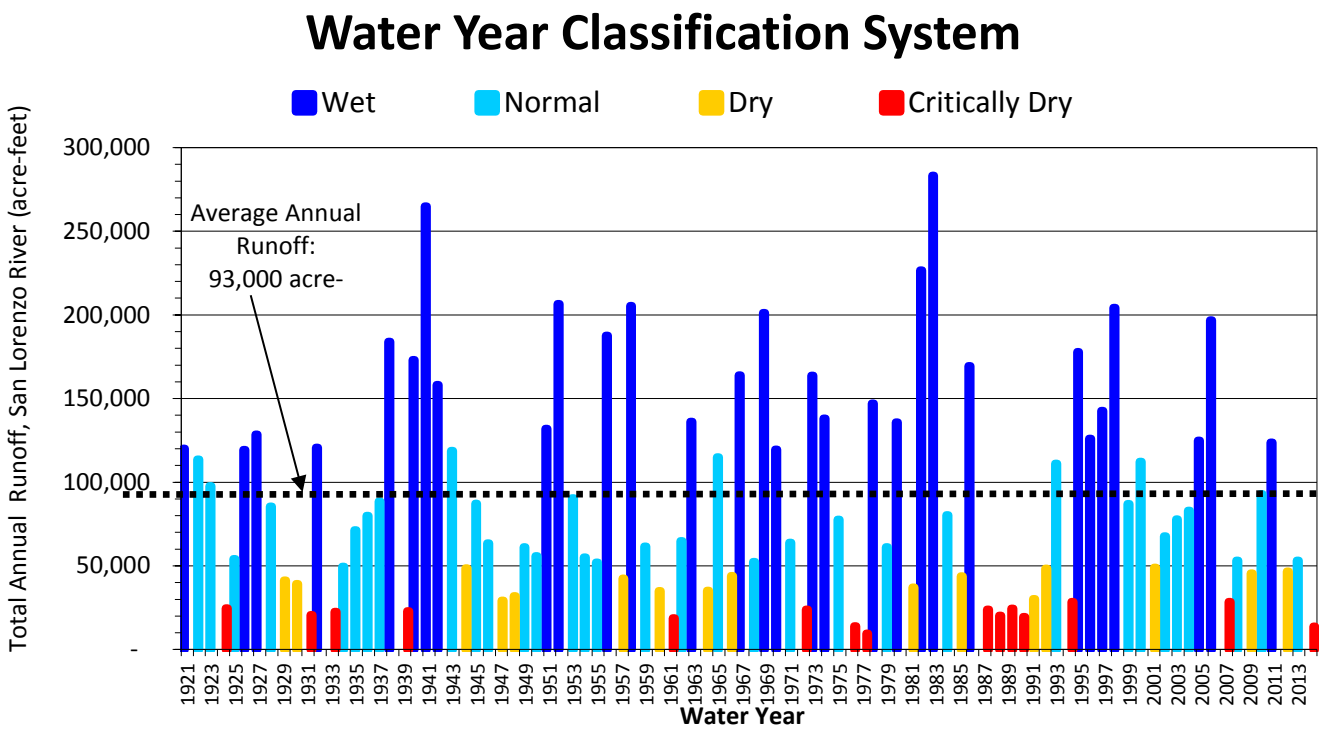
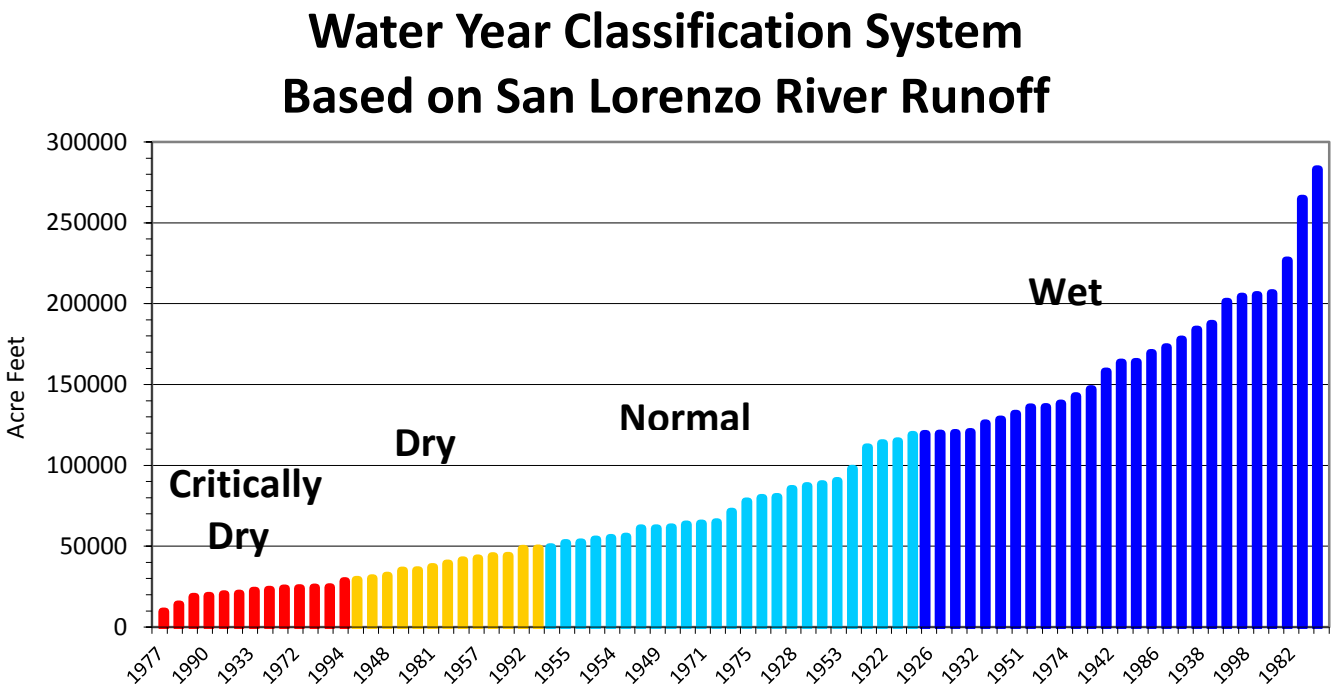



**Figure 2 – Water Year Classification System Based on San Lorenzo River Runoff (by water year type)**



## *Section 3.05 Forecast of Current and Future Water Demand*

### (a) Water Demand and Growth – the City General Plan

At its August 1, 2014 meeting, the Water Supply Advisory Committee agreed that using water scarcity to change the assumptions about the City's future growth and development, as laid out in the 2010 Council adopted General Plan, was not part of the Committee's charge from the Council. In making this agreement, the Committee recognized that there are several growth issues that are within the Committee's purview including, for example, the potential impacts of growth on water demand for the period after that covered by the General Plan.

The Committee also acknowledged the requirements in the California Urban Water Management Planning Act (Water Code Section 10631) requiring that "… The projected population estimates shall be based upon data from the state, regional, or local service agency population projections within the service area of the urban water supplier and shall be in five-year increments to 20 years or as far as data is available."

### (b) Water Demand and Growth – UCSC Future Demands

Significant work has been done to update the water demand forecast used in the 2010 Urban Water Management Plan. This demand forecast incorporates the changes in population and development that were part of the City's General Plan update as well as whatever up to date information was available at the time for the Water Department's outside-city service area.

The University's estimated build-out demand is 349 mgy. The WSAC did not generate an independent estimate of UCSC demand. The 349 mgy figure for the University's build-out demand is based in part on its 2005 - 2020 Long Range Development Plan with added demand for the University's Marine Science and Delaware Street facilities. The only change made by City staff to the University water demand was to extend the previous forecast of 349 mgy in 2030 further out into the future to reflect a lower, more realistic, rate of growth, with two potential endpoints: 2035 and 2050. In the lower bound forecast, build-out occurs in 2050. In the upper bound forecast it occurs in 2035. The primary forecast is the midpoint between the lower and upper bound forecasts. The forecast of UCSC demand is given in Table 2. The primary forecast almost exactly replicates a forecast based on projected enrollment and average rates of water use per student.[4]

**Table 2 – Primary, High and Low Projections for University Growth**

| | 2013* | 2020 | 2025 | 2030 | 2035 |
|---|---|---|---|---|---|
| Low | 182 | 186 | 213 | 240 | 268 |
| Primary | 182 | 196 | 234 | 271 | 308 |
| High | 182 | 207 | 254 | 302 | 349 |

Notes

*Actual per Water Department billing records.

[4] The enrollment-based approach yields a 2035 demand of 304 MG, which differs from the primary forecast by less than 2%.

### (c) Interim Demand Forecast – February to April 2015

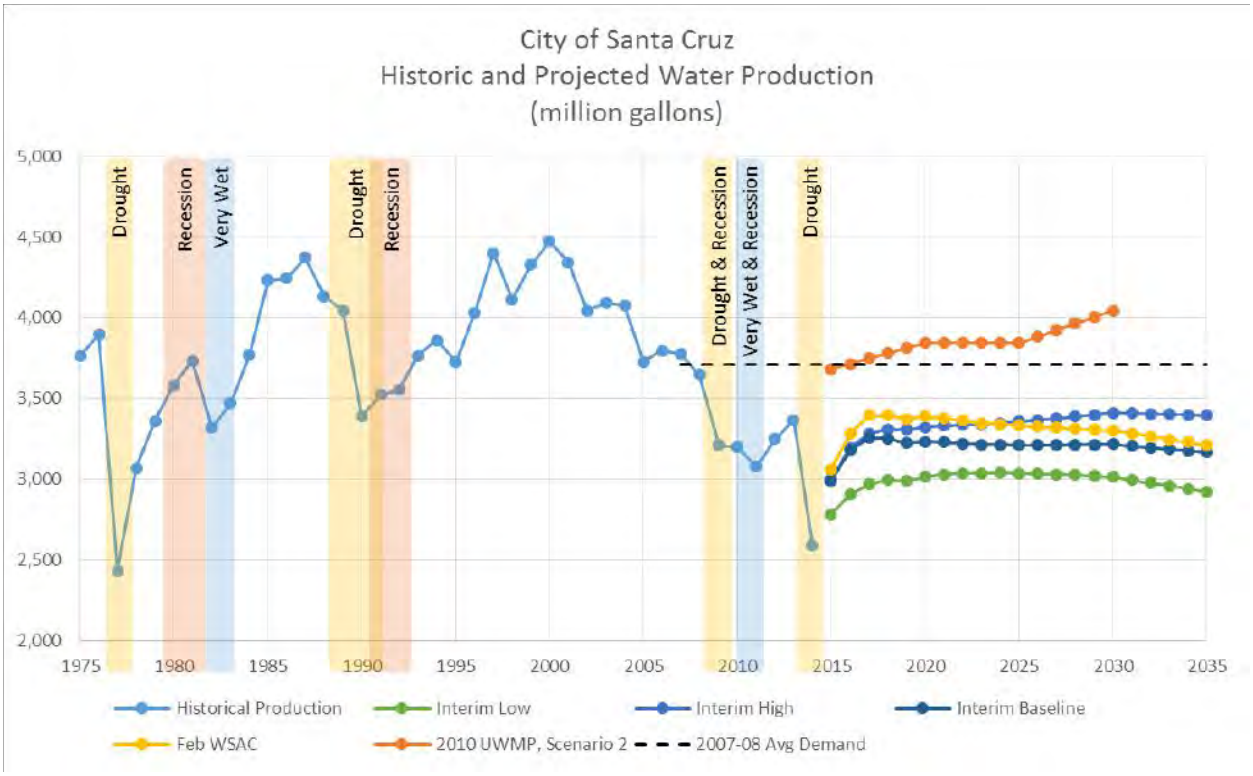
An interim demand forecast was developed by working from the demand forecast used in the 2010 Urban Water Management Plan. The 2010 Urban Water Management Plan demand forecast incorporates the changes in population and development that were part of the City's General Plan update as well as whatever up-to-date information was available at the time for the Water Department's outside-city service area at the time. Working from the 2010 forecast, the interim forecast incorporated a number of key changes including:

- Incorporating effects of existing, ongoing water conservation programs,
- Integrating the expected impacts of changes in the state's building and plumbing codes that will affect future water use in both existing and new construction,
- Adding into the forecast the effects of income changes and price increases on water use,
- Revising the projected growth of commercial services, and
- Using the university's projection of its ultimate build-out demand but extending its time for completion as described above.

The result was a forecast for current and future demand that looks substantially different from the 2010 Urban Water Management Plan forecast. Most notably, the revised forecast no longer shows an increase in water demand during the coming 20 years.

Figure 3 below portrays the interim demand forecast and incorporates the changes described above as well as the revisions to the University's growth projections described above.

**Figure 3 – April 2015 Interim Demand Forecast with High and Low Forecasts**



An explanation of how the high and low demand forecasts were developed can be found in the April 17, 2015 Technical Memo included in Appendix 1.[5]

At the April 30 – May 1, 2015 meeting the Committee agreed that this interim forecast would be used as the basis for the Committee's work until the results of the econometric forecast became available.

### (d) Econometric Demand Forecast – July to September 2015

The forecast of future water demand is a foundational component to any water utility of its future needs for water supply. In recent years the historical patterns of water demand have been upended by a variety of factors, including the cumulative effects of tighter efficiency standards for appliances and plumbing fixtures, greater investment in conservation, a significant uptick in water rates, an equally significant downturn in economic activity during the Great Recession, and on-going drought. These events have resulted in even more uncertainty than usual regarding future water demand and have placed even greater importance on sorting out the effect each has had on demand in recent years as well as how they are likely to affect demand going forward.

One of the first requests made by the WSAC was for the Water Department to update the demand forecast to reflect current information on water usage and to account for effects of conservation, water rates, and other factors expected to impact the future demand for water.

i) Statistical Models of Average Demand

Econometric demand forecasting develops statistically-based models of average water use per service by customer class. A demand forecast was developed based on these models covering the period 2020-2035 and incorporating empirical relationships between water use and key explanatory variables, including season, weather, water rates, household income, employment, conservation, and drought restrictions. The approach builds on similar models of water demand developed for the California Urban Water Conservation Council (Western Policy Research, 2011), Bay Area Water Supply and Conservation Agency (Western Policy Research, 2014), California Water Service Company (A&N Technical Services, 2014, M.Cubed 2015), and Contra Costa Water District (M.Cubed 2014).

The statistical models of demand were estimated using historical data on customer class water use, weather, water price, household income, conservation, and other economic variables driving water demand. The monthly models of water demand were combined with service and housing growth forecasts to predict future water demands. The demand models explain 90 to 99% of the observed variation in historical average use over the 14-year estimation period.

The forecasts of average demand by customer class are summarized in Table 3. The forecasts include adjustments for future effects of water rates, plumbing codes and the City's baseline conservation program[6] and are predicated on average weather and normal (predicted) income and growth.

[5] Appendix 1 includes Technical Memos on Demand Forecasts authored by M.Cubed (D. Mitchell) and City Staff.

[6] The baseline conservation program level is Program A in the City's forthcoming water conservation master plan.

**Table 3 – Forecasted Average Demand by Customer Class (CCF/Year)[7]**

| YEAR | | 2013 | 2020 | | 2025 | | 2030 | | 2035 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Per | Actual [1/] | Forecast | CI | Forecast | CI | Forecast | CI | Forecast | CI |
| Single Family | Housing Unit | 87 | 86 | ± 3 | 83 | ± 3 | 80 | ± 4 | 78 | ± 4 |
| Multi Family | Housing Unit | 53 | 56 | ± 2 | 52 | ± 2 | 50 | ± 2 | 49 | ± 3 |
| Business | Service | 405 | 400 | ± 12 | 389 | ± 12 | 382 | ± 13 | 377 | ± 13 |
| Municipal | Service | 388 | 296 | ± 26 | 290 | ± 27 | 283 | ± 29 | 277 | ± 30 |
| Irrigation | Service | 365 | 286 | ± 28 | 271 | ± 28 | 257 | ± 28 | 244 | ± 28 |
| Golf | Acre | 990 | 671 | ± 130 | 641 | ± 134 | 606 | ± 137 | 593 | ± 144 |

1/ Actual use, unadjusted for weather or economy. Stage 1 drought water use restrictions in effect May - Dec.

CI = 95% confidence interval.

ii) Industrial Demand

Because of its unique characteristics, industrial demand was forecasted separately from the other customer categories. In the case of industrial demand, there is a strong relationship between Santa Cruz County manufacturing employment and aggregate industrial water use. This relationship is used to generate the industrial demand forecast shown in Table 4 below.

**Table 4 – Industrial Demand Forecast**

| | 2013 [1/] | 2020 | 2025 | 2030 | 2035 |
|---|---|---|---|---|---|
| Mfg Employment Forecast[2/] | | 5,900 | 6,200 | 6,400 | 6,500 |
| Industrial Water Demand (MG) | | | | | |
| Low | 56 | 56 | 58 | 59 | 60 |
| Primary | 56 | 57 | 59 | 61 | 62 |
| High | 56 | 57 | 60 | 63 | 64 |

Notes

1/ Actual per Water Department billing records.

2/ Caltrans Economic Forecast for Santa Cruz County.

**iii)** Population, Housing, and Non-Residential Connection Forecasts

Forecasts of population, housing units, and non-residential connections are anchored to AMBAG's 2014 Regional Growth Forecast (AMBAG 2014). Projected growth in single- and multi-family housing units are shown in Table 5 and projected growth in non-residential services (excluding industrial and UCSC) are summarized in Table 6.[8]

[7] Table 2 through Table 7 are from M.Cubed's August 2015 Draft Final Report on its work developing the econometric demand model, which can be found in Appendix 1.

[8] The decrease in forecasted golf acreage is due to the intention of Pasatiempo golf course to shift to non-City sources of irrigation water.

**Table 5 – Forecast of Occupied Housing Units**

| | 2014 [1/] | 2020 | 2025 | 2030 | 2035 |
|---|---|---|---|---|---|
| Inside-City | | | | | |
| Single Family | 12,246 | 12,534 | 12,780 | 13,030 | 13,246 |
| Multi-Family | 9,583 | 10,958 | 11,398 | 12,106 | 12,679 |
| Subtotal | 21,829 | 23,492 | 24,177 | 25,136 | 25,925 |
| Outside-City | | | | | |
| Single Family | 6,743 | 6,922 | 7,074 | 7,230 | 7,390 |
| Multi-Family | 7,901 | 7,910 | 8,033 | 8,310 | 8,495 |
| Subtotal | 14,644 | 14,832 | 15,107 | 15,540 | 15,884 |
| Service Area | | | | | |
| Single Family | 18,989 | 19,456 | 19,854 | 20,260 | 20,636 |
| Multi-Family | 17,484 | 18,868 | 19,431 | 20,416 | 21,174 |
| Total | 36,473 | 38,324 | 39,284 | 40,676 | 41,809 |

Notes
1/ Actual per Water Department billing records.

**Table 6 – Forecast of Non-Residential Services and City-Irrigated Golf Acreage**

| | 2013 [1/] | 2020 | 2025 | 2030 | 2035 |
|---|---|---|---|---|---|
| Business [2/] | 1,889 | 1,948 | 1,971 | 2,008 | 2,055 |
| Municipal [3/] | 218 | 218 | 218 | 218 | 218 |
| Irrigation [4/] | 452 | 651 | 723 | 845 | 951 |
| Golf | | | | | |
| DeLaveaga | 79 | 79 | 79 | 79 | 79 |
| Pasatiempo | 68 | 40 | 30 | 20 | 20 |
| Total Golf | 146 | 119 | 109 | 99 | 99 |

Notes
1/ Actual per Water Department billing records.
2/ Based on ratio of business to residential demand.
3/ No expected growth in number of municipal services.
4/ Based on historical rate of gain in irrigation services per gain in multi-family and business services.

iv) Demand Forecasts

The primary forecast of system demand is provided in Table 7. Under the primary forecast, total system demand is expected to remain stable at about 3,400 MGY over the forecast period, despite a 13 percent increase in population over the same period. Per capita water use is projected to go from 93 gallons per day in 2020 to 84 gallons per day in 2035, a decrease of approximately 10 percent.

**Table 7 -- Primary Forecast of Class Demands and System Production**

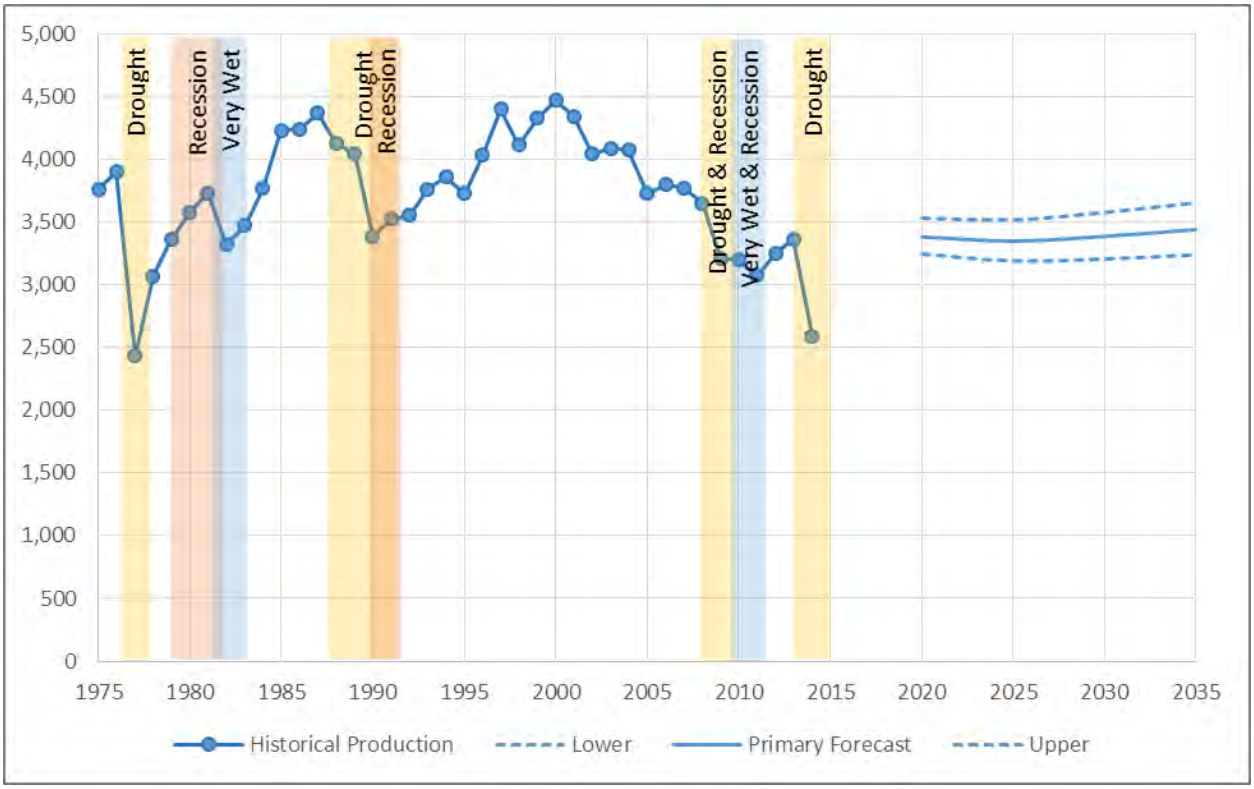
| **YEAR** | | **2020** | **2025** | **2030** | **2035** |
|---|---|---|---|---|---|
| | | Forecast | Forecast | Forecast | Forecast |
| **Service Units** | **Units** | | | | |
| SFR | Housing Units | 19,456 | 19,854 | 20,260 | 20,636 |
| MFR | Housing Units | 18,867 | 19,430 | 20,416 | 21,174 |
| BUS | Services | 1,948 | 1,971 | 2,008 | 2,055 |
| IND | NA | NA | NA | NA | NA |
| MUN | Services | 218 | 218 | 218 | 218 |
| IRR | Services | 651 | 723 | 845 | 951 |
| GOLF | Acres | 119 | 109 | 99 | 99 |
| UC | NA | NA | NA | NA | NA |
| | | | | | |
| **Avg Demand** | **Units** | | | | |
| SFR | CCF | 86 | 83 | 80 | 78 |
| MFR | CCF | 56 | 52 | 50 | 49 |
| BUS | CCF | 400 | 389 | 382 | 377 |
| IND | NA | NA | NA | NA | NA |
| MUN | CCF | 296 | 290 | 283 | 277 |
| IRR | CCF | 286 | 271 | 257 | 244 |
| GOLF | CCF | 671 | 641 | 606 | 593 |
| UC | NA | NA | NA | NA | NA |
| | | | | | |
| **Annual Demand** | **Units** | | | | |
| SFR | MG | 1,256 | 1,228 | 1,208 | 1,196 |
| MFR | MG | 792 | 759 | 766 | 775 |
| BUS | MG | 583 | 573 | 575 | 580 |
| IND | MG | 57 | 59 | 61 | 62 |
| MUN | MG | 48 | 47 | 46 | 45 |
| IRR | MG | 139 | 147 | 163 | 174 |
| GOLF | MG | 60 | 52 | 45 | 44 |
| UC | MG | 196 | 234 | 271 | 308 |
| **Total Demand** | **MG** | **3,131** | **3,099** | **3,134** | **3,184** |
| MISC/LOSS | MG | 254 | 251 | 254 | 258 |
| **Total Production** | **MG** | **3,385** | **3,351** | **3,388** | **3,442** |
| **Rounded** | **MG** | **3,400** | **3,400** | **3,400** | **3,400** |

Forecasted demands are significantly lower than the 2010 UWMP forecast. The primary reasons for this are that the 2010 UWMP forecast

1. did not include adjustments for the future effects of passive and active conservation and higher water rates on future water use, and
2. assumed higher UCSC demand.

Figure 4 shows a comparison of historical production and the primary, lower, and upper bound forecasts from the econometric models. It is interesting to see how historical production has been influenced by weather and economic events. The forecast does not exhibit a similar degree of variability because it is based on average weather and normal economic conditions. In other words, it is a forecast of *expected future demand*. Realized future demand will certainly not be smooth like the forecast. It will vary about the expected value depending on year-to-year variation in future weather and economic conditions. The forecast, however, provides the baseline around which this variability is likely to occur.

**Figure 4 – Historical and Forecast Production in Millions of Gallons**[9]




[9] An explanation of how the high and low demand forecasts from the economic demand model were developed can be found in the August 2015 City of Santa Cruz Water Demand Forecast report included in Appendix 1.

### (e) Committee Agreement(s)

At the Committee's April 30 – May 1, 2015 meeting they agreed that the interim forecast would be used as the basis for the Committee's work until the results of the econometric forecast became available.

At its July 23, 2015 meeting, the Water Supply Advisory Committee agreed to use the econometric demand forecast as presented by David Mitchell of M Cubed Consulting at this meeting.

On September 10, 2015, the Committee accepted a revised forecast that corrected an error in the way that future plumbing and building code changes were incorporated into the forecast. Figure 4 above, reflects the revised, corrected forecast.

### (f) List of Key Assumptions for Econometric Demand Forecast

- Future growth rates for service area population, housing units, and service connections are based on AMBAG's 2014 Regional Growth Projections and the City's General Plan.
- UC demand at build-out is assumed to be 349 MGY. Upper- and lower-bound demand forecasts assume UC build-out occurs in 2035 and 2050, respectively. The primary forecast uses the midpoint of the upper- and lower-bound forecasts.
- Future demand is progressively adjusted for expected water savings from national appliance standards (clothes and dish washers), California plumbing codes (showerheads, faucets, toilets, and urinals), and continuation of the City's basic conservation programs. These adjustments total approximately 370 MGY by 2035.
- The Pasatiempo Golf Course is assumed to shift off of City water so that by 2030 no more than 20 acres of the course (29%) are irrigated with City water.
- Water rates are assumed to increase by an average of 10% per year for the next five years and by an average of 4.4% per year thereafter.
- Median household income is assumed to grow at its long-term historical rate of growth (based on 30 years of census data).
- Regional unemployment and housing vacancy rates are assumed to equal their long-term average rates.
- Monthly rainfall and average maximum daily air temperature are assumed to equal their 30-year normal values.
- No restrictions on water use due to drought or other reason are assumed to be in place. The forecast assumes unrestricted customer water demands.

## *Section 3.06 Analysis of Supply Available to Meet Current and Projected Future Water Demand*[10]

The projected change in demand has had an immediate and important impact on the analysis of the adequacy of current supply to meet demand. Essentially the projected stabilization and longer term reduction in demand would allow the water system to fully meet customer demand, under natural

[10] Appendix 2 includes Technical Memos used in the analyses described in Sections 3.06 and 3.07.

(unconstrained) flow conditions, even in historically worst case conditions such as the 1976-1977 drought.

City staff and members of the technical team discussed this result and recognized that modeled results based on historic hydrological information underestimate the real-world likelihood of curtailments being implemented. This is because water managers making decisions in the late winter and spring of one water year may act more conservatively than the model to conserve storage in light of the uncertainty the coming months and the next water year will bring. In fact, this reality was behind City staff's recommendation for implementing Stage 3 water restrictions in the spring of 2015.

The key assumption of using natural (unconstrained) flow conditions is also an important one. Natural flows mean no externally driven constraints on the City's ability to withdraw water from its existing sources, except for those associated with the City's water rights. The likelihood of this condition being the case in the future is low. The more likely case is that the City's ability to withdraw water from its supply sources will be affected by both the need to release water for fish flows (to meet the federal and state requirements for the protection of threatened and endangered coho salmon and steelhead trout) and the impact climate change will have on available resources resulting in changed hydrology and increased likelihood of extended droughts. The implications of both of these factors on the City's future supply are discussed in more detail in the next sections.

## (a) Future Challenges – Fish Flow Releases

The City has not yet finalized a flow agreement with state and federal fishery agencies. Two flow regimes have been identified and were used by the WSAC to assess water supply reliability. The lower bound flow regime is called "City Proposal" and the upper bound flow regime is called "DFG-5." Both result in less water available for diversion than the natural flows discussed above and both have different impacts on the long-term availability of water to meet City needs.

i) Potential implications of Fish Flow Releases on the Frequency and Severity of Water Shortages

Table 8 and Table 9 respectively show the forecasted peak-season shortage profiles in 2020 and 2035.

**Table 8 – 2020 Shortage Profiles**

| 2020 Shortage Profiles | | | | | | Worst-Year Peak-Season Shortage |
|---|---|---|---|---|---|---|
| FLOWS | Likelihood of Peak-Season Shortages | | | | | |
| | 0% | <15% | 15%-25% | 25%-50% | >50% | |
| | 0 | <300 mg | 300-500 mg | 500-1000 mg | >1000 mg | |
| **Natural** | 100% | 0% | 0% | 0% | 0% | 0% |
| **City Prop** | 86% | 12% | 0% | 1% | 0% | 34% |
| **DFG-5** | 81% | 10% | 7% | 1% | 1% | 68% |

**Table 9 – 2035 Shortage Profiles**

| 2035 Shortage Profiles | | | | | | Worst-Year Peak-Season Shortage |
|---|---|---|---|---|---|---|
| FLOWS | Likelihood of Peak-Season Shortages | | | | | |
| | 0% | <15% | 15%-25% | 25%-50% | >50% | |
| | 0 | <305 mg | 305-515 mg | 515-1025 mg | >1025 mg | |
| **Natural** | 100% | 0% | 0% | 0% | 0% | 0% |
| **City Prop** | 86% | 12% | 0% | 1% | 0% | 34% |
| **DFG-5** | 81% | 10% | 4% | 4% | 1% | 69% |

ii) Committee Conclusions on Fish Flow Releases

The Committee discussed this information and agreed that the following conclusions can be drawn from these profiles:

- With unconstrained natural flows, there are no shortages of any magnitude under any hydrologic condition. Since we saw above that there are no expected shortages under worst-year conditions, this is not surprising.
- As expected, the DFG-5 profile is worse (i.e., results in a higher likelihood of larger shortages) than the profile for City Proposed flows. For example, in both forecast years, there is about a 10% likelihood (7 out of 73 years) of a peak-season shortage larger than 15% under DFG-5. This compares to around 1% (1 out of 73 years) under the City Proposal.
- Even under the most stringent flow regime (DFG-5), there are no expected shortages in 80% of historic hydrologic conditions. Without taking into account the possible impacts of climate change, the City's supply reliability challenges have been and will continue to be in the driest years.
- The 2020 and 2035 profiles are similar since the forecast demands for those two years are similar.
- The key conclusion is that under baseline conditions, and assuming that future hydrology looks like the historic record, the City would have sufficient supply to serve its demands in the absence of any HCP flow restrictions. Under either of the habitat conservation plan flow proposals, the City faces peak-season shortages in the driest hydrologic conditions. In those driest years, those shortages can be significant, around 700 million gallons under City-Proposed flows and 1.2 billion gallons under DFG-5 flows.

iii) Key Assumptions about Fish Flow Releases

Fish flow assumptions used in the WSAC process are based on two key data sets:

- The City's July 2012 flow proposal to state and federal agencies for flow releases for the San Lorenzo River and Laguna and Majors creeks and Liddell Springs (City Proposal); and
- The September 2012 response received from the (then) California Department of Fish and Game suggesting modifications to the City Proposal (DFG-5).

Both fish flow regimes are designed to address flow requirements needed to maintain habitat for endangered coho salmon and threatened steelhead trout during their various fresh water life-stages. Both flow regimes are indexed to the amount of water available using a modified version of the year class types shown in Figure 1 and Figure 2, which divide years into five rather than four categories and specifically link flow releases for a coming month to the year class type for the amount of water in the system in the previous month.

The ultimate resolution of fish flow requirements for the City's sources of supply will be the result of the City's negotiations with state and federal fishery agencies. Negotiated flows will be the foundation of a habitat conservation plan for the City's water system. At the completion of the environmental review of the habitat conservation plan, the City will receive a long term permit, called an Incidental Take Permit (and a state version), that will give the City an ability to plan for and operate its water system with long term certainty.

iv) Committee Agreements on Fish Flow Releases

On April 30, 2015, the WSAC agreed that, for planning purposes, using the DFG-5 flows as an upper bound or the potential impacts of fish flow releases on Santa Cruz's water system made the most sense. If the ultimate negotiated flow releases are lower, then the supply demand gap will be smaller and those results can be incorporated into future planning for supply augmentation.

## (b) Potential Impacts of Climate Change

The second potentially significant factor to impact the City's current water system is climate change. With California in the throes of a deep multi-year drought, the City's water system may already be experiencing the impacts of climate change. For example, with the exception of the summer of 2011, the City has imposed some form of water restrictions on its customers every year since 2009. And this year's second consecutive year of rationing is unprecedented.

The Water Supply Advisory Committee explored the impacts on future water supply reliability of two potential manifestations of climate change:

- Longer and more severe extended droughts; and
- Changes in ongoing hydrologic patterns.

i) Extended Droughts

As the Committee began to delve into the issue of climate change, the Technical Team conducted a brief literature search to frame the discussion. A summary of information related to drought is provided here.

Recent evaluations of paleoclimate records and future climate model projections indicate that longer droughts have occurred in the past and are likely to occur again within the next century. In this section we review paleoclimate and climate change projection studies relevant to drought planning in California and the Santa Cruz region. Several publications, including some very recent ones, compare modern climate observations to historical records and to future climate projections.

Fritts (1991) shows that droughts in the Santa Cruz region were frequently much longer than three to eight years. Paleoclimate reconstruction for the California valleys show that precipitation from the 17th century until the 20th century was consistently below average 20th-century values, with long periods of relative drought and short periods of high rainfall. These data show that cycles of below-average precipitation have commonly lasted from 30 to 75 years (Fritts, 1991)[11].

Other paleoclimate analyses, summarized in Fritts (1991), have concluded:

- "The variability of precipitation was reconstructed to have been higher in the past three centuries than in the present" (p. 7).
- "Lower variability occurred in twentieth-century precipitation. Reconstructions of this kind should be used to extend the baseline information on past climatic variations so that projections for the future include a more realistic estimate of natural climatic variability than is available from the short instrumental record" (p. 8).

A recent publication by Cook et al. (2015)[12] compares paleoclimate drought records with future predicted conditions based on climate change models. Using tree ring data and current climate models, the authors found that drought conditions in the coming century are likely to be as bad as or worse than the most severe historical droughts in the region, with severe dry periods lasting several decades (20–30 years). In some cases, winter precipitation may increase, but gains in water during that period will most likely be lost due to hotter, drier summers and greater evaporation.

Other recent studies linking climate change, precipitation changes, and drought conditions have found that warming temperatures greatly increase drought risks in California (Diffenbaugh et al., 2015)[13].

The historic hydrologic record on which all of the prior analyses of Santa Cruz water supplies are based only goes back to 1937. This record therefore cannot adequately capture the kind of historic variability found in these paleoclimate studies and by extension the conditions the City might face under future conditions of climate change. The WSAC technical team created an extended-drought planning scenario that represents a discrete plausible future event that can help guide water resource planning in Santa Cruz. Building on examples from utilities around the state, the Santa Cruz extended drought planning sequence combines and places back to back the City's two worst drought sequences: 1976-77 and 1987-92. This eight-year drought sequence is worse than anything in the historic hydrologic record, but is intended to represent what might be experienced under climate change. It was combined with each of the fish flow proposals discussed above and evaluated for the frequency and severity of the shortages that would be produced. Table 10 summarizes these results.

[11] Fritts, H.C. 1991. Reconstructing Large-Scale Climatic Patterns from Tree-Ring Data: A Diagnostic Analysis. University of Arizona Press, Tucson, AZ.
[12] Cook, B.I., T.R. Ault, and J.E. Smerdon. 2015. Unprecedented 21st century drought risk in the American southwest and central plains. Science Advances 1(1):e1400082. doi: 10.1126/sciadv.1400082
[13] Diffenbaugh, N.S., D.L. Swain, and D. Touma. 2015. Anthropogenic warming has increased drought risk in California. PNAS. doi: 10.1073/pnas.1422385112.

**Table 10 – Extended drought peak-season shortage statistics (mg)**

| | City Proposal | DFG-5 |
|---|---|---|
| **Total 8-year (mg)** | 875 | 5,300 |
| **Average** | 5% | 33% |
| **Maximum** | 34% | 69% |
| **Minimum** | 0% | 0% |
| **Years > 20%** | 1 | 7 |

The key take-away message from Table 10 is that combining a multi-year drought with a significant commitment to fish flow releases would result in serious water shortages for Santa Cruz's water service customers. In the eight years modeled, customers would face curtailments of greater than 20% in seven out of the eight peak seasons. On average the shortage would be 33% and in the worst year the shortage would be nearly 70%.

To put these data in perspective, prior to the droughts occurring in water years 2014 and 2015 (October 1, 2013 through September 30, 2015) Santa Cruz's residential customers used on average about 60 gallons of water per person per day (gpcd). On average, during the extended drought modeled in this analysis, residential use would have to be reduced to 40 gpcd, and in the worst year, residential use would need to be reduced to 18 gpcd.

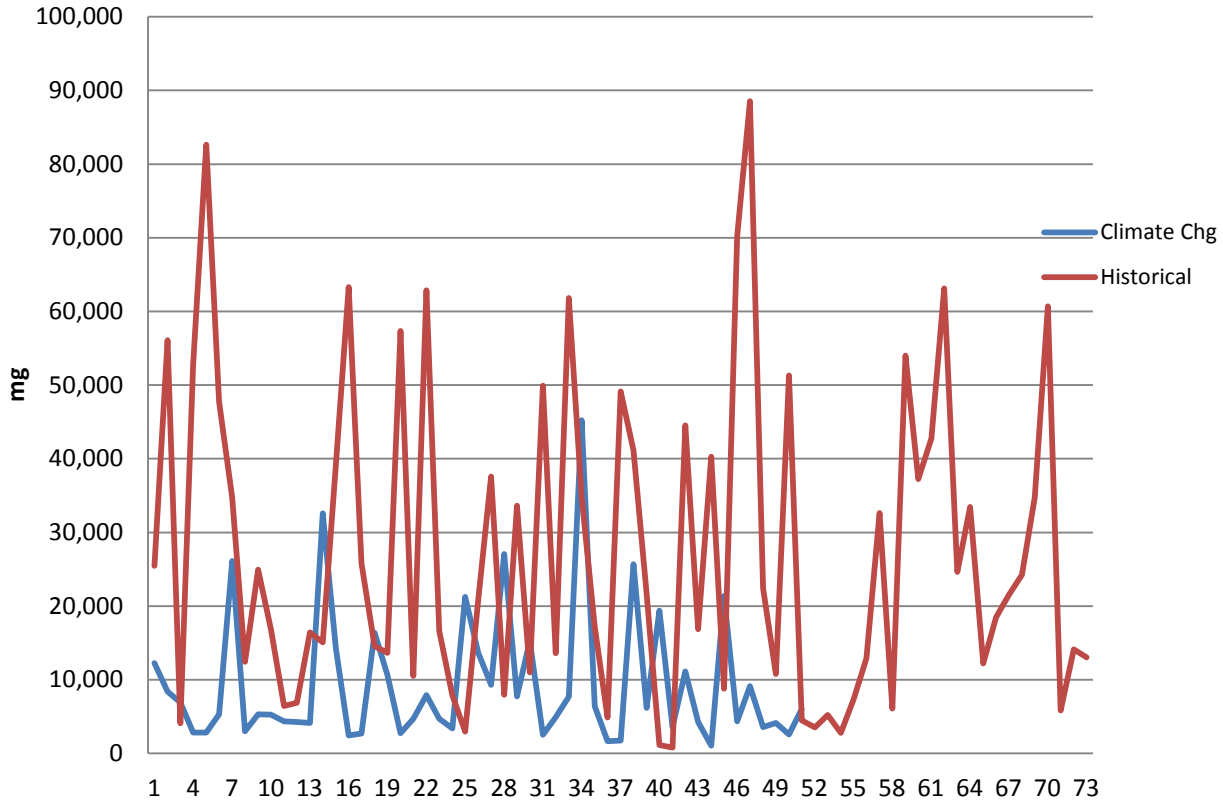
ii) Changes in Ongoing Hydrology

Across hundreds of modeling runs evaluating Santa Cruz water supplies, beginning with the 2003 Integrated Water Plan, the essential characteristics of the historic hydrologic flow record have remained constant. The worst drought event was 1976–1977. The 1987–1992 period represented another major drought. It was clear which years in the record were very wet and which were exceptionally dry.

This historical foundation on which to plan and operate water systems no longer applies when analyzing how the system will respond to potential changed hydrology driven by climate change. The essence of analyzing this type of climate change is the assumption that future weather and stream flows will not be the same as the past.

To analyze the plausible impact of climate change, a new 51 year flow record has been produced by working with hydrologic conditions that would occur in a selected global climate model and downscaling those conditions to Santa Cruz's sources and local conditions. In the resulting flow projection, there is no longer a 1976–1977 worst-case drought benchmark or a 1987–1992 sequence. As is illustrated in Figure 5 for City proposed HCP flows at Big Trees, a standard and long-term flow gauging station on the San Lorenzo River, the distribution of flows is completely different from that of the historic record.

**Figure 5 – Comparison of annual flows at Big Trees: City proposal**




While the worst years in the climate change scenario are no worse than the driest historic years, the overall pattern is a considerably drier one, which might be expected to result in a higher fraction of years in which there is insufficient water to meet the needs of both Santa Cruz water customers and fisheries.

iii) Committee Agreements on Climate Change

On April 30, 2015, the WSAC agreed that the Climate (hydrologic) Change and Extended Drought scenarios provide plausible parameters to use in its water system planning and that this analysis provides a useful point of depart for its scenario planning work. For planning purposes, the Committee agreed that the eight year drought sequence was useful as a design drought, and recognized that this drought sequence would be reviewed and revised as new information became available.

iv) Key Assumptions about Climate Change

Use of climate change projections to assess potential impacts to water supply carries the following major assumptions.

1. The utilized climate projections provide plausible climate trajectories, not predictions, for the future time period simulated.
2. The utilized climate projections provide reasonably bounded potential impacts/trends to water supply for the future time period simulated.

3. The physical character and nature of the watersheds utilized by the City for water supply will not change appreciably for the future time period simulated, specifically including:
    a. The physical characteristics which lead to development of surface runoff including types, spatial patterns and intensities of land use, and landscape scale vegetative communities and
    b. The physical expression of instream habitat conditions based on channel morphology types, occurrences, etc.
4. Historical hydrologic characteristics of supply source watersheds are a reasonable basis to simulate general hydrologic conditions under future climate trajectories, specifically including:
    a. The distribution of average daily flows for any month of the year over the historical period will not change appreciably during the future time period simulated and
    b. The relative timing and magnitude of average daily flows between supply source watersheds will not change appreciably during the future time period simulated.
5. Historical utilization or exercising of water rights within the supply source watersheds will not change appreciably during the future time period simulated, and includes water rights held by the City, other water purveyors, and others.
6. Summertime and late fall stream flows will be the primary limiting condition for water supply and instream habitat, as it has been during the historical time period, for the future time period simulated.

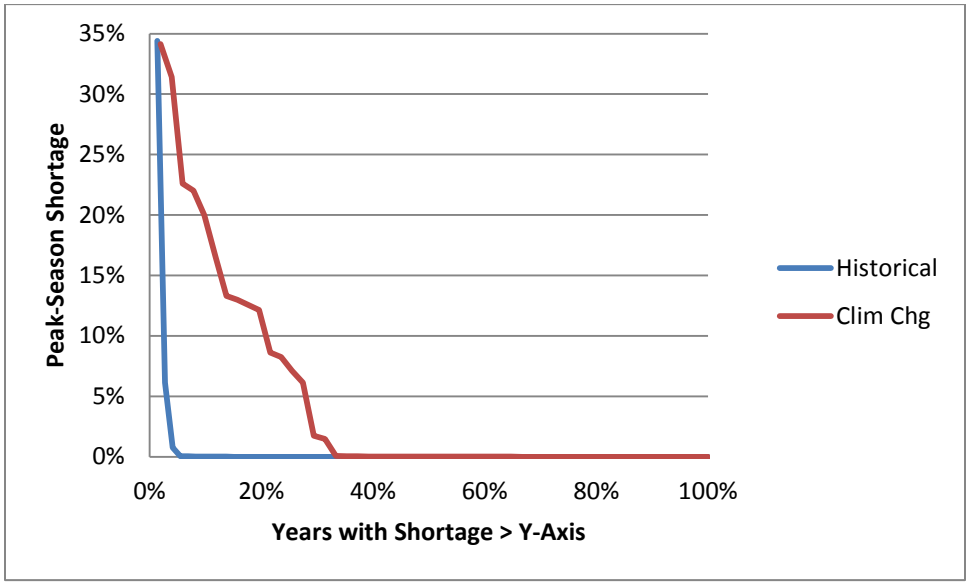
## *Section 3.07 How Climate Change Affects the System Modeling Results:*

Combining potential fish flow releases and climate change impacts shows that climate change results in increasing both the frequency and the size of shortages. The discussion below summarizes and explores these results.

### (a) City Proposed Flows

Figure 6 compares the peak-season shortage duration curves for City Proposed flows with and without climate change.

**Figure 6 – Peak season shortage duration curves with and without climate change: City Proposed Flows**

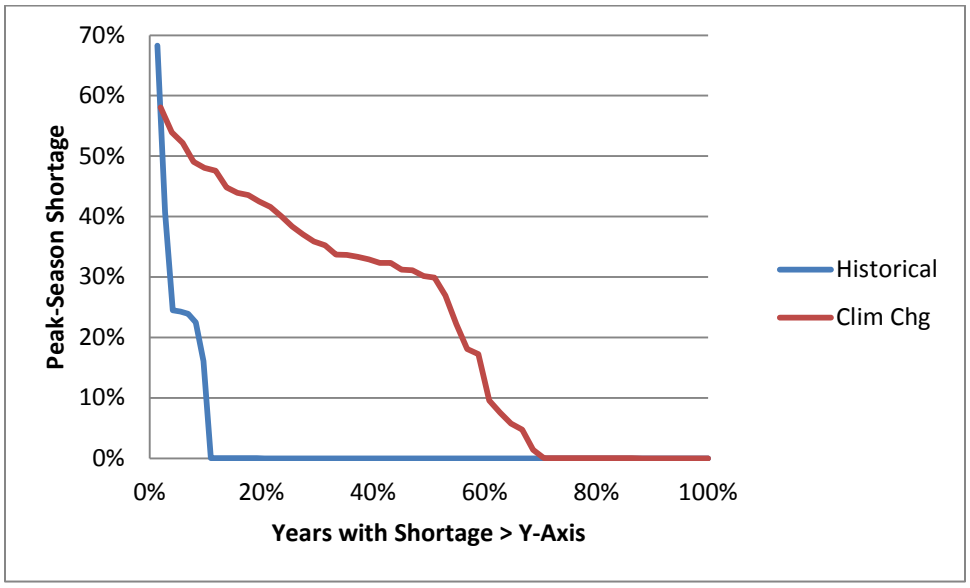



The differences between the two curves are immediately noticeable: Climate change shifts the curve upward and to the right, meaning there is an increased likelihood of larger shortages. Whereas with historic flows, there is a small chance (< 10%) of any shortage at all, this rises to more than 20% with climate change. The probability of a shortage greater than 20% increases from about 1% with historic flows to about 8% with climate change.

### (b) DFG-5 Flows

Figure 7 shows the same system reliability comparisons for DFG-5 flows.

**Figure 7 – Peak season shortage duration curves with and without climate change: DFG – 5 flows**



While the types of impacts are similar, their magnitudes with DFG-5 are increased. For example, with DFG-5 flows and climate change there will be a peak-season shortage under nearly 70% of hydrologic conditions. In fact, a shortage exceeding 25% can be expected in just over half the years.

The foregoing results are consistent with the flow patterns of Figure 5, and highlight the importance of considering climate change as Santa Cruz plans for its water supply future. Even under the City's proposed HCP flows, which represent the potential lowest impact to Santa Cruz's water supply, water customers would have to contend with frequent shortages under this climate change scenario. If the outcome of the HCP negotiations are closer to the California Department of Fish and Wildlife's (CDFW's) DFG-5 proposal, the frequency and magnitude of shortages becomes much more onerous.

Thus with climate change, the City's water future will look qualitatively different. With historical flows, while there is a real possibility of large peak-season shortages, these are generally confined to the driest years with the large majority of conditions having no shortages. Clearly, that will not be the case with the impact of climate change. Instead, significant shortages can be expected in many years. With DFG-5 flows, large shortages can be expected in the majority of years. The pattern of water availability to customers will be markedly altered and water rationing will be both more frequent and more severe.

## *Section 3.08 Problem Statement*

Based on the preceding analysis, the WSAC recommendations are designed to address the following revised problem statement:

> *Santa Cruz's water supply reliability issue is the result of having only a marginally adequate amount of storage to serve demand during dry and critically dry years when the system's reservoir doesn't fill completely. Both expected requirements for fish flow releases and anticipated impacts of climate change will turn a marginally adequate situation into a seriously inadequate one in the coming years.*
>
> *Santa Cruz's lack of storage makes it particularly vulnerable to multi-year droughts. The key management strategy currently available for dealing with this vulnerability is to very conservatively manage available storage. This strategy typically results in regular calls for annual curtailments of demand that may lead to modest, significant, or even critical requirements for reduction. In addition, the Santa Cruz supply lacks diversity, thereby further increasing the system's vulnerability to drought conditions and other risks.*
>
> *The projected worst-year gap between peak-season available supply and demand during an extended drought is about 1.2 billion gallons. While aggressive implementation of conservation programs will help reduce this gap, conservation alone cannot close this gap. The Committee's goal is to establish a reasonable level of reliability for Santa Cruz water customers by substantially decreasing this worst-year gap while also reducing the frequency of shortages in less extreme years.*

On September 11, 2015 meeting, the Committee adopted this formal problem statement. The basic understandings reflected in this problem statement underpin all the work the Committee did during

the Analysis Phase of its process to identify, evaluate and select strategies for improving the reliability of Santa Cruz's water supply.

The Committee also noted that the Water Department is already taking steps to address the supply-demand gap, including incorporating into its Capital Improvement Plan funding for replacement of the pipeline between Felton and Loch Lomond.

## *Section 3.09 Data Driven Decision Making*

The Council asked the Committee to "… explore, through an iterative, fact-based process, the City's water profile, including supply, demand and future risks; analyze potential solutions to deliver a safe, adequate, reliable, affordable and environmentally sustainable water supply and develop recommendations for City Council consideration."

After defining the problem, the Committee worked hard to use a fact-based process in its work. Section 3.10 summarizes the work the Committee did to:

- Identify and evaluate alternatives, to
- Identify and apply committee's evaluation criteria, and
- Use scenario planning and portfolio building to explore risks and uncertainties.

## *Section 3.10 Evaluation Criteria*

Criteria that enable one to distinguish among potential solutions are essential for effective problem solving. Understanding how various alternatives or portfolios of alternatives rate against those criteria is at the heart of the Committee's problem solving process. The development of the multi-criteria decision support (MCDS) model provided a focal point for the definition of criteria, subcriteria, and rating scales. Committee members also individually prioritized the criteria by applying weights to them. A key purpose of using this approach is to support data-driven decision-making.

The Council's charge to the Committee emphasizes the importance of data-driven decision making. The goal of developing and using a MCDS tool is not to produce an outcome by "pouring in the ingredients, turning the crank and having the answer come out."

No analytical tool can (or should) completely replace the judgment and careful weighing and balancing of values, uncertainties, and risks in this kind of decision-making. Rather the goal of using such a tool is to help develop information in a form that decision-makers can effectively and efficiently use as they make their decisions.

An additional benefit is that the careful thought that goes in to the creation of the MCDS tool creates many opportunities to talk about values and interests that are important to address as the collaborative problem solving process proceeds. Creating the MCDS model required the WSAC to identify important criteria and subcriteria, define what is meant by those criteria, establish individual weights for the criteria, and create rating scales for each criterion. When the model was applied to the alternatives or portfolios the Committee developed, it allowed Committee members to see how their evaluations of the options were similar and different, and how their values were reflected in the way they prioritized the criteria.

Table 11 lists the evaluation criteria used by the Committee in the MCDS evaluation it conducted in the spring of 2015. The questions articulated in the table reflect what was relevant at the time the Committee used these criteria in their work.

In addition to using these criteria in that formal evaluation, these criteria were used more informally through much of the Committee's work during the Spring and Summer of 2015 as they worked together to identify and evaluate portfolios of measures to improve the reliability of Santa Cruz's water supply.

**Table 11– WSAC Evaluation Criteria**

| Criterion | Questions |
|---|---|
| Technical Feasibility | How likely is each Plan to be technically successful? For Plan B, consider the technical feasibility at the time the plan would actually start |
| Time Required to Demonstrate Technical Feasibility | How much time is required to demonstrate whether a Plan is technically feasible? When rating Plan B, start from the time Plan B actually begins. |
| Time Required to Full Scale Production | What is the time required to full scale production? For all Plans, start the clock when the Plan is permitted, has all needed rights and property ownership issues resolved and is ready to proceed. |
| Adaptive Flexibility (includes Scalability) | What benefits in terms of adaptive flexibility is each Plan likely to contribute in the face of external conditions such as climate change, demand levels or streamflow requirements? |
| Supply Reliability | How likely would each Plan be to improve the reliability of the Santa Cruz water system in the face of different operating conditions such as turbidity, low flows, etc.? |
| Supply Diversity (Portfolio Level Only) | How does the Portfolio affect the diversity of Santa Cruz water supply portfolio? |
| Energy Profile | How much energy does each Plan require? Units are megawatts of energy per million gallons produced, mw/mg expressed as weighted average by Plan. |
| Environmental Profile | What is the environmental profile of each Plan? Note: this criterion covers a range of issues and a diversity of Plans. This is a great place to provide details about your rating using the comment button. |
| Regulatory Feasibility | How easy or difficult would the regulatory approval process be for these Plans? |
| Legal Feasibility | How easily and within what time period are these Plans likely to obtain the necessary rights in the form needed? When considering a Plan B that would start after a trigger, start the clock at the point at which the trigger actually occurs. |
| Administrative Feasibility | To what degree do each of the Plans require cooperation, collaboration, financial participation, and/or intergovernmental agreements to succeed? How likely is it that these can be obtained? |
| Potential for Grants or Special Low Interest Loans for Engineering and/or Construction | What is the potential for these Plans to qualify for grants and/or special low interest loans? |
| Political Feasibility | What level of political support is each Plan approach likely to have? When rating Plan B, take into account the impacts of additional time and the (hypothetical) failure of Plan A would have on Santa Cruz's political landscape. |
| Cost Metrics | How much do each of these Plans cost? Metric is annualized unit cost in dollars per million gallons, $/mg. |

Appendix 3 provides the detailed criteria the Committee used in its MCDS modeling and portfolio-building exercises conducted in the spring and summer of 2015.

## (a) Identifying and Evaluating Solutions[14]

The WSAC used an iterative process to identify and evaluate alternative approaches to improving the reliability of the Santa Cruz water supply. Their efforts began with their work in the summer and fall of 2014 to identify a full range of demand management and water supply options for consideration. Since then, the WSAC, City staff and the technical team supporting the WSAC have invested considerable resources in developing and fleshing out demand management and supplemental water supply and infrastructure addition and operating change options to develop more specific planning level information for use in evaluating alternatives.

This section, describes the Committee's iterative process for identifying and evaluating alternatives to improve the reliability of the Santa Cruz water supply.

### i) Alternatives Identification: Our Water, Our Future – The Santa Cruz Water Supply Convention

During the community discussions of the desalination Draft Environmental Impact Report (DEIR), a common criticism was that the City hadn't adequately evaluated other alternatives during the decades of water supply planning that preceded the selection of desalination in the Integrated Water Planning process in early 2000s. A key element of the Council's decision to convene the WSAC was to have a community based process to consider alternatives to solve the water supply problem. The goal was to look in more detail at alternatives to desalination while not excluding desalination from further consideration.

As the Committee got underway in the spring of 2014, it was clear that a handful of very engaged citizens had ideas they wanted to share with the Committee regarding how to improve the reliability of the Santa Cruz water system. The challenge was to make sure that all those who might have ideas to share would have the opportunity to do so.

In June, the WSAC decided to include in its Reconnaissance phase an event that would engage the broader public by inviting those with strategies, alternatives, or ideas for improving water supply reliability to submit their proposals. The goal was to ensure that citizen and community-based ideas, as well as those provided by the technical team and other outside experts, were considered as possible strategies to improve water supply reliability in the Santa Cruz water system.

By late July, the Committee was starting to receive submissions covering a wide range of topics including but not limited to:

- Enhancing conservation efforts
- Climate appropriate landscaping improvements
- Expanding rainwater catchments and grey water systems
- Incentivizing conservation through pricing structures

[14] See Appendix 4 – Identifying and Evaluating Alternatives for Committee work products and related Technical Memos.

- Revisiting old strategies such as exchanging highly treated wastewater for irrigation water used for north coast agriculture
- Developing recycled water facilities and systems
- More groundwater development
- Aquifer storage and recovery
- On-stream and off-stream storage projects
- Desalination using a variety of existing and new approaches and technologies for both the desalination process and the energy issues related to desalination.

In August those submitting ideas in the first round were invited to further develop their proposals for submission to the WSAC and for public review at an event called "*Our Water, Our Future – the Santa Cruz Water Supply Convention*."

The *Convention* was held from 11:00 a.m. to 9:00 p.m. on Thursday, October 16, 2014 at the Civic Auditorium. More than 40 ideas were presented in poster session presentations set up around the hall. Brief oral presentations by the submitters were provided at noon and at 6:00 p.m. and attendees were invited and encouraged to visit the poster presentations of strategies, ideas, and alternatives and to interact with the submitters.

Approximately 350 people attended the convention. Attendees included most of the members of the WSAC, members of the City Council, and many staff members of the Water Department. WSAC members practiced rating and ranking the proposals using four criteria: effectiveness, environmental impact, community impact, and practicability.

Following the conclusion of the *Convention*, the WSAC continued to accept ideas and alternatives for addressing the issues that have been identified. The most recent proposal, a project for storing water in Hanson Quarry, was received in early January 2015. The Committee's purpose in keeping the door open for submission of new proposals was to ensure that the arbitrary exercise of a deadline did not keep a great idea from being considered.

ii) Selected Alternatives

Between the Committee's October and November meetings, WSAC members provided their technical consultant, Stratus Consulting, with their input on the alternatives identified in the *Convention* that they were most interested in considering further. Stratus' job was to select a dozen or so alternatives that were representative of a broad range of approaches that the Committee would use in testing the decision model. Alternatives not selected as part of this effort were not eliminated from further consideration, just not selected for further evaluation in the Reconnaissance phase of the Committee's work.

Twelve alternatives were selected by Stratus and approved by the Committee at their November meeting. The alternatives selected were:

- WaterSmart Software Implementation
- Landscaping Revisions, Rainwater Capture and Grey Water Reuse
- Water Neutral Development

- North Coast Off Stream Storage
- The Lochquifer Alternative
- Expanded Treatment Capacity on San Lorenzo River
- Ranney Collectors on San Lorenzo River
- Reuse for Agriculture
- Aquifer Restoration
- Potable Water Reuse
- Reverse Osmosis Desalination
- Forward Osmosis Desalination

The varied and often incomplete nature of the information provided by those proposing many of the alternatives submitted in the Water Supply Convention proved to be a challenge for the Committee, City staff, and the technical team. Almost immediately following the November Committee meeting, information and assumptions about the selected alternatives were needed to support the Committee's use of the Reconnaissance MCDS model. To facilitate this timing, City staff made a variety of assumptions to fill in data gaps and used this information to provide default ratings for the alternatives and scenarios in the MCDS model. Still there is was a critical need to develop reasonably accurate technical details to support further analysis.

iii) Consolidated Alternatives

From the more than 80 initial suggestions and the more than 40 proposals presented by community interests, project proponents, and City staff during and after the October 16, 2014 Water Supply Convention, the technical team created 20 Consolidated Alternatives.

"Consolidated Alternatives" were created from groups of Water Convention Alternatives with similar concepts and attributes. Consolidated Alternatives were created for a range of options and approaches such as additional demand management activities, approaches to improving storage for available system flows in the winter, to developing supply augmentation sources such as using advanced treated recycled water.

Table 12 is a list of Consolidated Alternatives and the Water Convention Alternatives they were inspired by.

**Table 12 – Consolidated Alternatives**

| # | Name/ Water Source | Description | # | Author and comments |
|---|---|---|---|---|
| CA-01 | Peak Season Reduction/ Conservation (mandated) | Develop programs to decrease peak season demands through peak reduction or peak-demand shifting | WCA-69 | SCWD: Peak season reductions – 10%, 25% and 50% |
| CA-02 | Water-Neutral Development/ Conservation (mandated) | Implement a demand offset program required for new development to offset new demands | WCA-03 | SCDA:Water-Neutral Development |
| CA-03 | Water conservation measures/ Conservation (voluntary) | Implement Program C Recommended (Crec) -- Maddaus Water Management, September 30, 2014, Table 4) | WCA-20 | McGilvray (9): Implement Conservation |
| | | | WCA-22 | SCDA: Conservation Education |
| | | | WCA-65 | zNano: Conservation rebate program |
| | | | WCA-68 | SCWD: Program C from Long-Term Water Conservation Master Plan |
| CA-04 | WaterSmart Home Water Reports/ Conservation (voluntary) | Use this software to promote conservation and efficient water use | WCA-04 | WaterSmart: Home Water Reports |
| | | | WCA-16 | Gratz: Maximize Conservation Behavior |
| CA-05 | Home Water Recycling/ Decentralized (graywater) | Package automatic treatment system suitable for single family home or condo or multi-family development; recycles gray water for toilet flushing and landscape irrigation; requires dual plumbing. | WCA-39 | Garges: Residential Gray-Water |
| | | | WCA-66 | zNano: Onsite Water re-use |
| | | | WCA-70 | Home Water Recycling |
| CA-06 | Landscaping, Capture, Reuse/ Decentralized (rainwater, graywater) | Use gray water for irrigation; minimize irrigation for lawns; capture and use rainwater for domestic, non-potable | WCA-01 | Markowitz: Landscaping, Capture, Re-use |
| | | | WCA-21 | SCDA: Climate Appropriate Landscape |

| # | Name/ Water Source | Description | # | Author and comments |
|---|---|---|---|---|
| CA-07 | Deepwater Desalination/ Seawater | In cooperation with Soquel Creek Water District, sign up for water delivered from the Deepwater Desalination Project at Moss Landing. Work with SqCWD to create the transfer facilities for potable water conveyance. Upgrade SCWD distribution system to accept water transferred through SqCWD. | WCA-19 | McGilvray: (11) Seawater Desal |
| | | | WCA-36 | Aqueous: Desalination (non-membrane) |
| | | | WCA-37 | Brown: Zero-emission Wave energy |
| | | | WCA-67 | Tanaka: Energy Efficient Desal |
| | | | WCA-72 | Seawater desalination--Deepwater Desalination |
| CA-08 | Water from Atmosphere/ Moist air | Extract water from the air to offset other demands | WCA-38 | DewPoint : Atmospheric Water Generation |
| | | | WCA-77 | SKYH2O |
| CA-09 | Winter flows capture/ Winter flows | Capture winter flows for treatment and storage or infiltration | WCA-29 | Malone: Stormwater capture |
| | | | WCA-60 | SCDA: Watershed Restoration |
| | | | WCA-63 | Smallman: Water Skate Parks |
| | | | WCA-71 | SVWD: Quarry storage/GW recharge at Hanson Quarry |
| | | | WCA-74 | McGilvray: Additional Pipeline--Felton Diversion to Loch Lomond |
| | | | WCA-76 | Bixler: Olympia Quarry |
| | | | WCA-31 | McGilvray: (3) Water Capture and Transfers |
| CA-10 | Water Reuse for aquifer recharge/ Reclaimed water | Produce CAT water at City WWTP and pump to SVWD for aquifer recharge (IPR--Indirect Potable Reuse). | WCA-44 | McGilvray: (8) Tertiary Treatment, Re-use |
| | | | WCA-62 | Smallman: (17) Recycled Water |
| | | | WCA-64 | Weisz: Water Recycling |

| # | Name/ Water Source | Description | # | Author and comments |
|---|---|---|---|---|
| CA-11 | Water reuse for direct potable/ Reclaimed water | Produce CAT water at City WWTP and pump to GHWTP for treatment and distribution system addition, a Direct Potable Reuse (DPR) alternative. | WCA-11 | SCWD: Water Reuse |
| | | | WCA-46 | McKinney: Water Reuse |
| | | | WCA-64 | Weisz: Water Recycling |
| CA-12 | Water Reuse for indirect potable/ Reclaimed water | Produce CAT water at City WWTP and pump to Loch Lomond. | WCA-44 | McGilvray: (8) Tertiary Treatment, Re-use |
| | | | WCA-52 | Paul: (17) Detention Tub String |
| | | | WCA-62 | Smallman: Recycled Water |
| | | | WCA-64 | Weisz: Water Recycling |
| CA-13 | Water Reuse for non-potable/ Reclaimed water or groundwater | The City would pump the Title 22 unrestricted effluent north through a new pipeline aligned along the railroad right of way, with turnouts to irrigate up to about 1,300 acres on private land and leased land. The City would use wells on ag land to produce water for treatment at GHWTP. | WCA-09 | Ripley: Reuse for Agriculture |
| | | | WCA-40 | Gratz: Recycled Water for Irrigation |
| | | | WCA-41 | McGilvray: (1) Recycled Water for Irrigation |
| | | | WCA-45 | McKinney: Additional Wells and WTPs |
| | | | WCA-43 | McGilvray: (6,7) Pipelines Along RR Line |
| | | | WCA-64 | Weisz: Water recycling |
| CA-14 | Desal using Forward Osmosis/ Reclaimed water or seawater | Use seawater desalting through a Trevi forward osmosis (FO) system. This alternative's other components would match those for seawater desalting. The alternative has several outstanding issues, e.g., Trevi technology and other FO technologies are still in their infancy and being tested at a pilot scale. As described, Trevi would require a lower grade heat source for separately drawing the solution from the potable water but the alternative description did not designate a source for lower grade heat. | WCA-13 | Trevi: Forward Osmosis Desalination (separate FAQs and technical memorandum summarize FO in its various incarnations and its implementation status around the world) |

| # | Name/ Water Source | Description | # | Author and comments |
|---|---|---|---|---|
| CA-15 | Desalination using Reverse Osmosis/ Seawater | This alternative for initial comparison would use seawater desalting through a new reverse osmosis desalination facility to produce about 2.5 mgd for addition to the City potable water supply. This alternative's components and development would match those for the previously proposed scwd2 desalination facility. The City would own and operate the facility and would use the water produced year round. Excess water would allow the City either to idle the Live Oak wells for conjunctive-use aquifer recovery or to undertake Live Oak well operation in an ASR mode to restore the aquifer more rapidly. In wet years, the City could sell excess desalted to SqCWD and/or SVWD. | WCA-12<br>WCA-19<br>WCA-36<br>WCA-37<br>WCA-67 | Sustainable Water Coalition: Desalination<br>McGilvray: (11) Seawater Desal<br>Aqueous: Desalination (non-membrane)<br>Brown: Zero-emission Wave energy<br>Tanaka: Energy Efficient Desal |
| CA-16 | Aquifer restoration and storage/ Winter flows | The City would sell treated water to SqCWD during normal and wet years. SqCWD would use the transferred water for either groundwater recharge or demand reduction and conjunctive use. SqCWD would sell pumped groundwater water to City during droughts. The City also should have improved production from its Live Oak wells. | WCA-08<br>WCA-28<br>WCA-49<br>WCA-59<br>WCA-10 | Paul: (13) The Lochquifer Alternatives<br>Malone: Regional Water Exchanges (also possibly addressed through CA-11)<br>Paul: (14) Upgrade Water Intertie<br>SCDA: Enhance Existing Infrastructure<br>SCDA: Regional Aquifer Restoration |
| CA-17 | Expand Treatment Capacity/ Winter Flows | Add a new 14-mgd water treatment plant (WTP) (pretreatment for turbidity control and membrane filtration) near the Tait Street Diversion to produce treated water that would be piped directly into the distribution system. It would increase capacity to divert to Loch Lomond and produce additional water for aquifer recharge. | WCA-06<br>WCA-27 | McKinney: Expanded Treatment Capacity<br>Malone: Enhanced Storage and Recharge |

| # | Name/ Water Source | Description | # | Author and comments |
|---|---|---|---|---|
| CA-18 | Off-stream water storage/ Winter Flows | Convert Liddell Quarry into 650 MG reservoir, filled with water from City North Coast diversions; use stored water to offset water demand during drought | WCA-05 | Bevirt: North Coast Quarries (modified to include diversion of water from City existing sources) |
| | | | WCA-26 | Fieberling: expand storage (addresses off stream storage) |
| | | | WCA-30 | McGilvray (2): Quarries for Water Storage |
| | | | WCA-32 | SCWD: Zayante Dam and Reservoir |
| | | | WCA-33 | Smallman: Reservoirs |
| | | | WCA-34 | Smallman: Storm Aquarries |
| CA-19 | Ranney Collectors/ Winter flows | Use Ranney collectors with a 12.9-mgd capacity (maximum capacity allowed under the current City of Santa Cruz [City] diversion permit), installed near the City's Felton diversion to draw water allocated under the City's existing water rights. Water drawn through the collectors would have greatly reduced turbidity and allow continuous refilling of Loch Lomond while also operating the GHWTP. It would produce additional water for aquifer recharge. | WCA-07 | McKinney: Ranney Collectors on SLR (requires a storage component to be a viable alternative) |
| | | | WCA-42 | McGilvray: (4,5) Upgrade Water Treatment |
| | | | WCA-48 | Paul: (12) Diversion Alternatives |
| | | | WCA-49 | Paul: (14) Upgrade Water Intertie |
| | | | WCA-57 | Paul: (23) Loch-Down Alternatives |
| CA-20 | Interagency Cooperation - County Water Authority/ Institutional and Administrative | Establish Santa Cruz County Water Authority to manage water resources development and use for public agencies and private diverters and groundwater users | WCA-14 | Gratz: Regional Water Authority |
| | | | WCA-15 | Smallman: Regional Water Authority |
| | | | WCA-18 | McGilvray: (10) Regional Collaboration |

## (b) Analytical Work on Alternatives

During the spring and early summer of 2015, the technical team developed and shared information with the Committee about each of the Consolidated Alternatives. The Committee worked with this material, which included information about capital, operating, and energy costs, yield, as well as

planning level information for each CA for each evaluation criteria. Based on questions raised and comments received from both Committee members and the public, the WSAC directed the technical team to do additional vetting of the CAs to understand the potential benefits and contributions to the water supply issues facing the City of Santa Cruz.

Committee members also developed and used the multi-criteria decision support (MCDS) model to individually rate CAs as well as portfolios of measures, including expressing their values by weighting the criteria. At their December 2014 and July 2015 meeting, the Committee discussed the results of their evaluations and used this information to both better understand their various interests and points of view as well as to focus the alternatives for further explanation.

Appendix 4 to this document includes some of the key technical memos and Committee reports that provide examples of the Committee's analysis of alternatives. In addition, an archive of all of the Committee's meeting materials is available on DVD and at www.santacruzwatersupply.com

### (c) Alternatives Considered but Not Pursued at this Time

As the Committee explored the diverse range of CAs in some detail, some CAs emerged as being more feasible and better fitted to the WSAC's vision of how to approach improving water system reliability than others. As the technical team's research and analysis work continued, information became available about some of the alternatives that raised questions about their feasibility. For others, issues of potential scale or suitability created issues that took them out of the running. As the Committee moved into their portfolio building efforts during the summer of 2015, they directed staff and the technical team to put together a list of all the CAs and the status, including those that were no longer being considered. For each CA, information was provided about its current status, and the WCAs covered by that CA. Appendix 5 includes information about the CAs, WCA's and other submittals not selected for further consideration at this time. At its September 10, 2015 meeting the WSAC, the Committee approved the information in Appendix 5 as its conclusions about the alternatives it evaluated and its reasons for not further pursuing these alternatives at this time.

## *Section 3.11 Scenario Planning*

Scenario planning is a tool often used to facilitate planning in the face of uncertainty. A goal of scenario planning is to explore a range of futures that are different from what would occur if current trends continue, but not so unlikely as to be a waste of time. One way to maximize the benefits of scenario planning is to create scenarios based on what are called "deep drivers of change." For Santa Cruz, the obvious deep drivers of change are climate change and fish flows.

Scenario planning isn't intended to result in the selection of a preferred scenario to pursue but to explore and get a better understanding of the degree to which key uncertainties such as climate change could affect the problem we need to solve or the outcomes we might be able to achieve. The "best" solutions are those that address conditions in multiple scenarios.

Throughout the Reconnaissance Phase of its work, the Committee used simple scenario planning to explore a range of potential water futures. For example, different scenarios were created to explore how the community's water supply needs would be affected by the need to release water for fish, the

implications of climate change, and potential changes to the local economy that would make Santa Cruz a place where people could both live and work.

During the first half of 2015, the technical team worked to develop consistent information about Consolidated Alternatives so that the Committee could use them as building blocks in the two rounds of scenario planning. Among the most important information emerging from this technical analysis was the result of system simulation modeling using the Confluence model.[15] These simulations concluded that two broad approaches have the potential to completely address the City's water supply challenges:

1. Harvesting and storing winter flows. This approach can work, even with current water rights, DFG-5 instream flows, and climate change. The analysis considered how the Santa Cruz water system would benefit if there were additional storage in the form of a "virtual reservoir." To achieve this benefit, the "virtual reservoir" used in the Confluence analysis would have to become real, i.e. suitable infrastructure improvements and institutional arrangements would have to be made to have a place to reliably store sufficient water and to be able to recover and use a sufficient portion of that water. The analysis indicated that the estimated quantity, about three billion gallons, would need to be banked and be recoverable at required daily volumes. This would require increasing the capacities of various current infrastructure components.
2. Developing a more drought-resistant supply (i.e. one that is insulated from year-to-year variability in weather and streamflow). Examples of such a supply include desalination and use of advanced treated recycled water. These alternatives would also require development and improvement of infrastructure.

The first round of scenario planning occurred during the March 2015 meeting. In this effort, Committee members broke into small groups, with each group working on one of three scenarios:

- Changed hydrology that results from City proposed flows;
- Changed hydrology that results from DFG-5 flows; and
- DFG-5 flows and a potential extended drought that is a plausible event under future climate change conditions.

Following several hours of work in their small groups, Committee members presented the demand management and water supply improvement measures they had created to address the conditions described in their scenario. These groups of measures were called portfolios.

Two key themes emerged from this work:

1. Committee members created water supply portfolios which included additional investments in demand management; and
2. Each of the groups gravitated to some form of winter flow capture and storage as a key strategy for meeting future water supply needs for Santa Cruz. One group acknowledged the potential need for a supplemental supply to help get the aquifer storage program going before it could

[15] See Appendix 2 for a description of the Confluence model and its use in the WSAC process.

be completely filled by available winter flows, and chose to fill that potential gap with recycled water.

Round two of scenario planning occurred at the Committee's April/May 2015 meeting and included two scenarios:

- DFG-5 flows with extended drought and
- DFG-5 flows with climate change.

Two working groups of Committee members were assigned to each scenario. Again, winter flow harvest was the centerpiece of each group's solution to the scenario they were given, and again, advanced treated recycled water played a role if and as needed as a back-up resource.

## *Section 3.12 Portfolio Development and Evaluation* [16]

Starting in May 2015, the Committee began exploring and building portfolios of measures to close the supply-demand gap. Portfolios were typically made up of combinations of demand management and supply augmentation strategies that often included projects or approaches for improving the performance of the existing water system, particularly as it relates to its ability to capture and store winter flows.

One goal of portfolio building was to provide opportunities for Committee members to explore the risks and uncertainties associated with various combinations of measures. Another was for Committee members to work with each other to create portfolios that met their common interests using interest based bargaining techniques. And a third was to give Committee members a hands-on way to engage with the information about the technical aspects of various approaches.

Especially with respect to the last goal, Committee members have received, processed, and asked for clarification of and additional information about just about every aspect of water system operation, technical and financial assumptions, and have built a substantial base of knowledge upon which to create their recommendations. The diversity of Committee member backgrounds and interests has been a significant asset to the group as it has done this important work and they have learned from each other as well as from the Technical Team and City staff participating in their work. In addition, this hands-on approach has created an unparalleled opportunity for Committee members to learn about, and learn to respect their individual perspectives and interests, which is an invaluable asset to any collaborative problem solving process.

## *Section 3.13 Issues of Risks and Uncertainties*

At the Committee's June 2015 meeting, Committee members worked with a set of four different staff-created water supply portfolios that have at their center some form of winter water harvest. In addition to a winter water harvest approach provided as a "Plan A," each portfolio contained a proposed "Plan B" and a "trigger" that would define the conditions for moving from Plan A to Plan B. The task was to consider the risks and uncertainties related to the various approaches, and the

[16] See Appendix 6 Portfolio Development and Evaluation for Committee materials related to work summarized in Sections 3.12 through 3.14

addition of a Plan B and a trigger was designed to get the Committee members thinking about and working with ideas related to "what ifs."

The four portfolios developed were:

1. **Plan A**: In lieu recharge of regional aquifers by providing system flows during the rainy season to Soquel Creek Water District and Scotts Valley Water District to meet their customer demand, thereby allowing them to rest their wells. Infrastructure or operating rule changes were added to extend the season during which in lieu recharge could be provided, thereby increasing the rate of recharge. The goal would be for groundwater to come back to Santa Cruz Water Department customers from water stored in regional aquifers when Santa Cruz needs it during drought years or other unusual events. **Plan B**: Advanced treated recycled water piped back to and mixed with Loch Lomond supplies (a technique called indirect potable reuse or IPR).
2. **Plan A**: Active recharge of regional aquifers using injection wells (a technique called Aquifer Storage and Recovery, or ASR) by providing excess flows to SVWD or SqCWD for injection into the aquifers to accelerate the rate of groundwater recharge. The goal would be for groundwater to come back to SCWD from regional aquifers when needed. **Plan B**: Advanced treated recycled water piped to and mixed with North Coast and San Lorenzo River supplies, retreated at Graham Hill Water Treatment Plant and delivered to customers (a technique called direct potable reuse, or DPR).
3. **Plan A**: ASR along with using advanced treated recycled water to create a seawater barrier along the coast to manage and impede salt water intrusion. The ultimate goal would be for groundwater to come back to Santa Cruz from regional aquifers when Santa Cruz needs it. Creating a salt water intrusion barrier would accelerate the timeline when this source would fully meet Santa Cruz's needs. Should the ASR program ultimately completely solve Santa Cruz's problem, the stranded assets in this plan would be an advanced water treatment plant for producing advanced treated recycled water and related infrastructure. **Plan B**: Converting the advanced treated recycled water plant producing water for the salt water intrusion barrier to a source of water for DPR use.
4. **Plan A**: ASR coupled with desalinated water from the proposed DeepWater Desalination plant at Moss Landing. The ultimate goal would be for groundwater to come back to Santa Cruz from regional aquifers when Santa Cruz needs it. Creating a supplemental source of potable water could result in a combined ASR and in lieu recharge strategy that would accelerate the restoration of regional aquifers, making the timeline when this source would fully meet Santa Cruz's needs shorter. Should the ASR program ultimately completely solve Santa Cruz's problem, the stranded assets in this plan would be a share of a regional desalination facility that might be sold to another party and a pipeline that might be repurposed for a different use. **Plan B**: DeepWater Desalination.

None of these portfolios was designed to be the best one. Rather, they were designed to be purposefully different from each other so that the Committee could explore the risks and uncertainties associated with different approaches. It was not part of the goal of the Committee's June meeting to select one of the portfolios as the preferred approach.

The focus on risks and uncertainties associated with the performance of these portfolios is an important one. At the level of analysis and information currently available, it is inevitable that there will be questions about actual performance of various approaches.

## *Section 3.14 Committee Member Portfolio Building*

Between the July and August meetings (2015) Committee members worked independently or in teams to prepare portfolios that addressed the supply demand gap.

One portfolio was created by David Baskin, Peter Beckmann, Sue Holt, Charlie Keutmann and David Stearns. This proposal includes In Lieu and ASR along with direct potable reuse (a more drought resistant element to be implemented concurrently). This portfolio was designed to effectively cover the "gap" and, in the long term, would go further by providing the capacity to supply water even if events occurred such as a wildfire around Loch Lomond.

A second portfolio was created by Greg Pepping, Rick Longinotti, Mark Mesiti-Miller and Sid Slatter. This portfolio proposed a combination of In Lieu and aquifer storage and recovery (ASR) with direct potable reuse. This group reached consensus on the component parts and found that they disagreed as to whether, to ensure success, it would be necessary to implement the parts of the proposal sequentially or concurrently. This proposal provides for concurrent implementation, and Rick Longinotti developed a separate portfolio (described below) that proposed a sequential implementation.

A third portfolio was developed by Rick Longinotti in consultation with Erica Stanojevic and members of Santa Cruz Desalination Alternatives. As noted above, this proposal scales down the in lieu to operate initially within the capacity of the existing system, thus avoiding significant upgrade costs for modifications to the Graham Hill Water Treatment Plant. Ongoing monitoring of the response of the aquifer would provide the information needed to determine whether to maintain the level of effort or scale up as necessary.

A fourth portfolio was developed by Sarah Mansergh. This proposal shows an approach that portrays a lower level of urgency for moving forward than some of the other portfolios. The portfolio is also designed to seek and achieve multiple benefits through regional partnerships focused on restoring regional aquifers.

The fifth portfolio was developed by Erica Stanojevic. This proposal combines the storage capacity of Loch Lomond with the aquifer. By starting the project immediately and sorting out our water rights, security will be increased and we could achieve 3BG in storage by 2020.

All of these portfolios incorporated demand management.

In the discussion that followed the following agreements were articulated:

- The Committee developed consensus that the environmental benefits of fish habitat restoration is an important value and that the supply-demand gap should reflect a commitment to releasing flows to support restoration of threatened and endangered fish species. (The specifics of the DFG-5 flow proposal are not agreed to, as the Committee wants the City to work with the agencies to define the final flow proposal.)

- The Committee has developed consensus that there are substantial benefits from pursuing regional solutions for Santa Cruz's water supply issues and that reasonable regional solutions should be pursued if possible.
- The Committee developed consensus that energy requirements for any new water supply augmentation project should be met with power from renewable sources.
- The Committee reached agreement that groundwater storage strategies implemented by in lieu (passive recharge) and ASR (active recharge) are preferred.
- The Committee has developed consensus that their direction be focused on policy versus prescriptive level detail.
- The Committee has developed consensus that the plan they develop and recommend to the City Council will include an adaptation or Change Management Strategy.

## *Section 3.15 Alternatives that Emerged as Key Strategies to Consider*

As the Committee worked through its first several meetings of the Analysis Phase, information developed by the WSAC Technical Team identified challenges with some of the alternatives. For example, it would be impractical to build surface water storage reservoirs in old quarries underlain by Karst formation geology. Other alternatives emerged as being more feasible and began to appear consistently as measures included in scenario planning results. By late spring 2015 the Committee had defined a set of alternatives and approaches that became their focus. Each area is described briefly below in Section 3.16 through Section 3.20.

## *Section 3.16 Demand Management*

During much of the Committee's work a program known as "C recommended" (Crec) was a focus of the conversation around what additional demand management activities the City should pursue. Crec is a combination of water conservation measures identified during the development of the City's updated Water Conservation Master Plan in a process that began in 2013 but was still underway in the spring and summer of 2014.

As the Committee gained a better understanding of the nature of the reliability problem Santa Cruz faces, it began to look at whether and how well the measures combined into Program Crec focused on peak season demand. In the spring of 2015, the Committee formed a Peak Season Demand Management Working Group to look at strategies for improving the focus of the future Demand Management program on peak season reductions.

The Working Group developed and presented some strategies focusing on peak season demand management. When its results were received, the Working Group had proposed that the City set a goal of reducing peak season demand by an additional 150 mgy using a variety of strategies. This proposal raised a concern about the potential for double counting demand management savings due to the significant impact of price elasticity in reducing future demand. Double counting of demand reductions in a concern because of the possibility that an unknown number of customers will respond to higher rates by switching to water-conserving landscapes, for example, and will also participate in a water Department rebate program while doing so. If this occurs, their water savings would be counted

twice – once as a program participant and again as a response to higher rates. Double counting could lead to overestimating the potential for demand reductions from programmatic conservation.

Table 13 below, lays out the impact of price response on future water demand.

**Table 13 – Peak Season Savings Due to Price Response[17]**

**Peak (May-Oct) Demand Without Price Response, MG**

| | SFR | MFR | BUS | MUN | IRR | GOLF | **TOTAL** |
|---|---|---|---|---|---|---|---|
| 2020 | 750 | 386 | 372 | 39 | 123 | 58 | **1,728** |
| 2025 | 763 | 375 | 373 | 39 | 138 | 52 | **1,739** |
| 2030 | 778 | 383 | 381 | 39 | 162 | 46 | **1,790** |
| 2035 | 798 | 393 | 393 | 39 | 184 | 46 | **1,854** |

**Peak (May-Oct) Demand With Price Response, MG**

| | SFR | MFR | BUS | MUN | IRR | GOLF | **TOTAL** |
|---|---|---|---|---|---|---|---|
| 2020 | 705 | 364 | 348 | 35 | 93 | 52 | **1,598** |
| 2025 | 703 | 347 | 342 | 35 | 104 | 45 | **1,575** |
| 2030 | 702 | 347 | 341 | 34 | 111 | 37 | **1,572** |
| 2035 | 703 | 347 | 342 | 33 | 119 | 35 | **1,580** |

**Peak (May-Oct) Savings from Price Response, MG**

| | SFR | MFR | BUS | MUN | IRR | GOLF | **TOTAL** | **% Savings** |
|---|---|---|---|---|---|---|---|---|
| 2020 | 46 | 22 | 23 | 4 | 30 | 5 | **131** | **8%** |
| 2025 | 60 | 28 | 31 | 5 | 34 | 7 | **164** | **9%** |
| 2030 | 76 | 36 | 40 | 6 | 51 | 9 | **218** | **12%** |
| 2035 | 95 | 46 | 51 | 7 | 65 | 11 | **274** | **15%** |

The price elasticity used to produce these numbers was based on the measured impact of price on the demand of various customer groups in Santa Cruz between 2000 and 2013. These elasticities were integrated into the econometric demand forecast presented to the Committee in July of 2015.

During the development of the econometric forecast, considerable effort was expended to ensure water conservation savings were not counted twice. The forecast includes an estimated 274 mgy of peak season demand reduction due to price, an estimated 170 mgy due to continuing existing programs and 248 mgy in demand reductions due to the impacts of building and plumbing codes. An additional 170 mgy in demand reduction from Program Crec was included as a supply alternative in all the Confluence modeling analyses, including those analyses used to establish the 1.4 billion gallon worst year shortage.

As the Conservation Master Plan is finalized, the new conservation measures proposed by the Working Group will be more fully analyzed and the Committee agreed that until that analysis is completed, it

[17] From Presentation by David Mitchell (M. Cubed) to the Water Supply Advisory Committee, July 23, 2015.

was best to be cautious about including the full additional 150 mgy of demand reduction in the projections.

### (a) Development of Recommendations on Demand Management[18]

At its July 24, 2015 meeting, the Committee members decided they wanted their recommendations on Demand Management to combine providing the Council with their recommendations on a package of demand management programs as well as with a results-oriented, policy level direction, including guidance about key criteria.

City staff worked with two members of the Demand Management Working Group to develop recommendations reflecting both the Committee's strong interest in pursuing conservation with the uncertainties regarding costs and water savings associated with the package of measures outlined by the working group. The recommendations developed included:

1. **Expressly acknowledge the conservation savings that have been embedded into the new econometric demand forecast.** The econometric forecast carefully factored in different estimates of conservation savings that together amount to over 700 million gallons of water per year saved by 2035. These include the savings representing the passive effects of plumbing codes (278 mgy), active water savings associated with measures currently being implemented, (also referred to "Program A", 170 mgy), and the peak season savings that is related to economic effects over the 20-year planning horizon (274 mgy). These three elements play a large role in keeping water demand relatively constant over the next 20 years, and represent a combined 17 percent savings that should be communicated and highlighted as a key part of the overall solution to balancing the City's future water supply and demand.
2. **Set a goal, expressed as a range, between 200 and 250 million gallons per year of additional water savings by 2035, with emphasis on implementing measures that focus on peak season demand reduction.** Although the exact number is yet to be finalized and needs to be revisited, modeling performed by Maddaus indicates another 168 mgy of water savings is potentially attainable by 2035 through new or expanded conservation measures (referred to as "Program C"). More savings may be possible by incorporating the working group's recommendations into the City's Water Conservation Master Plan. Various estimates have been put forward about the savings of its recommendations, ranging from 81 to 183 mgy. The proposed goal recognizes and agrees with the Working Group that more water savings is possible, especially in the peak season, but expresses it as a range to reflect the uncertainty involved at this time.
3. **Complete additional analysis** to finalize the package of programs to be implemented and to more specifically establish the savings goal. Earlier modeling performed by Maddaus Water Management indicates another 168 mgy of water savings is potentially attainable by 2035 through new or expanded conservation measures from Program Crec. Additional programmatic savings will be identified both due to changing the $2500 per million gallon threshold used in the Maddaus Water Management modeling work conducted in 2013 to a $10,000 per million gallon average program cost recommended by the WSAC and by identifying, developing and implementing more programs focused on peak season savings.

[18] See Appendix 7 for materials related to Demand Management Recommendations.

4. **Identify the water conservation measures listed in Program C and in the working group's report as the demand management package the Committee recommends.** Providing a list such as the one presented in Table 14 below would fulfill the Committee's desire to articulate a recommended suite of demand management measures.

**Table 14 – Recommended Water Conservation Measures**

| No. | Water Conservation | Included in Working Groups | Comments |
|---|---|---|---|
| 1 | System Water Loss Reduction | | Project Initiated July 2015 |
| 2 | Advanced Metering Infrastructure | | |
| 3 | Large Landscape Budget-Based Water Rates | Yes | Identified in Peak Season Report as "Shifting Landscape Budgets Toward Climate Appropriate Irrigation Levels"; lower water budgets over time |
| 4 | General Public Information | | |
| 5 | Public Information (Home Water Use Report) | Yes | Assume 3-5% savings |
| 6 | Residential Leak Assistance | | |
| 7 | Single Family Residential Surveys | Yes | Identified in Peak Season Report as "Personalized Outreach to Highest Users and Generic Landscape Budgets"; combine with water budgets |
| 8 | Plumbing Fixture Giveaway/Opt | | |
| 9 | Residential UHET Rebates | | |
| 10 | High Efficiency Clothes Washer Rebates B | Yes | Alternative delivery/financing mechanisms |
| 11 | High Efficiency Clothes Washer - New Development | | |
| 12 | Hot Water On Demand - New Development | | |
| 13 | Toilet Retrofit at Time of Sale | | |
| 14 | CII MF Common Laundry Room High Efficiency Clothes Washer | | |
| 15 | CII Incentives | Partially | |
| 16 | Pre-Rinse Spray Nozzle Installation | | Project Completed 2014 |
| 17 | CII Surveys | | |
| 18 | HEU Program | | |
| 19 | Public Restroom Faucet Retrofit - MUN | | |
| 20 | Public Restroom Faucet Retrofit - COM | | |

| No. | Water Conservation | Included in Working Groups | Comments |
|---|---|---|---|
| 21 | School Retrofit | | |
| 22 | Water Efficient Landscape Ordinance | | State mandated update due by end of 2015 |
| 23 | Single Family Residential Turf Removal A | Yes, as part of "Climate Appropriate Landscaping and Rainwater infiltration | Recommend B (increased rebate amount) |
| 24 | Multifamily Residential/CII Turf Removal A | | Recommend B (increased rebate amount) |
| 25 | Expand Large Landscape Survey/Water Budgets | Yes | |
| 26 | Sprinkler Nozzle Rebates | | |
| 27 | Gray Water Retrofit | | |
| 28 | Residential Rain Barrels | | |
| 29 | Climate Appropriate Landscaping and Rainwater Infiltration | | Includes requirement to convert spray to drip for shrub irrigation, prohibit spray irrigation in narrow areas. Rainwater infiltration component to be led by other City Department or agency |
| 30 | Conservation Pricing - Water and Sewer | | Water rate project underway through separate contract with Raftelis Financial Consultants; conservation pricing for sewer service |
| 31 | Dishwashers | | Not recommended by staff |
| 32 | Hot Water Recirculation Systems | | Not included in Program C but worth reconsideration |
| 33 | Rewarding Businesses For Adopting Best Practices | | Hotel laundry recycling one example; reduced curtailment level as reward |
| 34 | Additional Building Code Requirements for New Development | | Some requirements already in place; urinals, dishwashers, graywater, pre-rinse spray nozzles |
| 35 | Innovation Incubator Program | | Capitalize on local programs to support research and continue role as conservation innovators |

5. **Acknowledge that a final estimate of conservation savings is subject to change pending completion of the Master Plan.** A contract amendment for a second phase of work on this project was approved by the City Council at its September 8, 2015 meeting. Work is scheduled to resume this fall and will include coordinating the consultant's DSS model with the latest demand forecast, adjusting model parameters based on input received from Committee members and the Water Commission, incorporating new measures with greater emphasis on peak season savings

forwarded by the working group, and rerunning modeling scenarios. This will ensure consistency in how water savings and costs are estimated and help avoid speculation and/or double counting. In addition, staff has identified the need to revisit the sequencing and scheduling of measures listed in the latest version of Program C, and this will affect estimated savings. The final plan will, of course, be subject to public review and stakeholder input prior to its final adoption by City Council.

### (b) Committee Agreement about Demand Management

At the Committee's meeting of September 10, 2015, the Committee agreed to the recommendations described in Section 3.16(a) above.

### (c) Key Assumptions about Demand Management

The following are key assumptions about the Demand Management Program being recommended by the WSAC:

- The Econometric Demand Forecast includes significant demand reductions associated with the implementation of existing plumbing and building codes, the continuation of existing demand management programs (as a baseline) and as a function of the effect on demand of expected increases in water rates.
- A focus of new demand management programs will be on peak season demand reduction, which is also a significant focus of the expected demand reduction associated with anticipated price increases.
- New and enhanced demand management programs will be developed to build on the Water Department's current program that has contributed to reducing per capita demand in Santa Cruz to one of the lowest levels in the state.
- The programs to be implemented in the coming decade are a mix of lower cost and some higher cost measures. Those higher cost measures are meant as small-scale experiments that may be broadened if they prove popular and their costs decline over time. Together these measures incur an average total program cost of no more than $10,000 per million gallons of water saved. This figure is lower than the expected cost of supply augmentation projects recommended to be pursued as a result of WSAC's work.

## *Section 3.17 Supply Development*

As described earlier, the Committee considered a wide range of supply augmentation alternatives during its deliberations. Committee members focused on options that are local including demand management, capturing and storing surface water flows during the rainy season, or developing some form of either recycled water or desalinated water to augment existing supplies.

As the Committee worked through the process of defining the problem and evaluating potential solutions during the winter and spring of 2015, they consistently identified winter water capture and storage through passive and active recharge as an opportunity that made sense to pursue.

As previously described, the Committee's scenario planning and portfolio building efforts focused on selecting supply alternatives and then exploring the risks and uncertainties associated with the

portfolios they selected. During the Committee's work, the supply augmentation strategies that emerged included:

- Passive recharge of regional aquifers (in lieu);
- Active recharge of regional aquifers (aquifer storage and recovery – ASR);
- Some form of advanced treated recycled water (indirect potable reuse or direct potable reuse); and
- Some form of desalinated water (local desalination or a regional project called DeepWater Desalination).

To help the Committee consider the effectiveness of the supply augmentation options they were most interested in pursuing, all of the options were evaluated using the Confluence model. The estimated Confluence model yields are shown in Table 15. The yields indicated are defined as the reduction in peak-season shortages that are realized when each element is fully operational, i.e., when all technical and institutional (legal, regulatory, public acceptance) uncertainties have been successfully resolved.

**Table 15 – Estimated Peak-Season Yields and Remaining Shortage**

| | Worst Year | | | Average | | |
|---|---|---|---|---|---|---|
| **Element** | **Peak-Season Yield** | **Remaining Peak-Season Shortage** | | **Peak-Season Yield** | **Remaining Peak-Season Shortage** | |
| | **mg** | **mg** | **%** | **mg** | **mg** | **%** |
| ***Base Case*** | -- | *1230* | *63%* | -- | *470* | *24%* |
| **In Lieu** | 750 | 480 | 25% | 350 | 120 | 6% |
| **ASR** | 760 | 470 | 24% | 380 | 90 | 5% |
| **Combined In Lieu, ASR** | 760 | 470 | 24% | 380 | 90 | 5% |
| **Advanced treated RW/Desalination *** | 810 | 420 | 22% | 440 | 30 | 2% |
| **All Elements Combined** | 1230 | 0 | 0% | 470 | 0 | 0% |

* Either DPR, Deepwater Desalination, or Local Desalination.

The yield[19] estimates are necessarily based on a variety of infrastructure and operational assumptions, including but not limited to:

- For both in lieu storage and ASR, it is assumed that the maximum daily capacity to pump water from the aquifer and convey it to Santa Cruz is 4 million gallons per day (mgd). For ASR, it is assumed that the maximum ability to inject water is 5 mgd.
- For ASR, it is assumed that 80% of the injected water is recoverable. This is a function of assumed physical characteristics of the aquifers. For in lieu, it is assumed that 60% of the water conveyed to neighboring water districts is available to Santa Cruz, a function of both assumed aquifer characteristics and the outcome of discussions with the city's negotiating partners.
- For advanced treated recycled water/desalination, it is assumed that the maximum available supply on any day is 3 mgd, which is based on the estimated availability of local wastewater (i.e., excluding Soquel Creek wastewater).
- In all cases, the modeling of these supply elements makes particular assumptions about how they will be operated in conjunction with current supplies.

Given these assumptions, none of the elements on its own completely eliminates all projected water shortages though each substantially improves water supply reliability. However, since it is likely that some or all of these and other assumptions will change as better information is generated regarding physical, operational, and institutional parameters, these yields will also undoubtedly change.

During the Committee's scenario planning work, the idea of packaging various demand management and supply augmentation measures into a portfolio or integrated strategy emerged as an effective way to deal with the various uncertainties that are inevitably present in any long range planning work.

Ultimately the Committee selected two basic strategies to pursue, in addition to demand management (Element 0):

1. **Strategy One**: Development of groundwater storage using a combination of both passive and active recharge approaches and available surface water flows during the rainy season; and
2. **Strategy Two**: Development of advanced treated recycled water or desalinated water if and as needed to address any remaining supply-demand gap.

**Strategy One** includes the following Elements:

- **Element 1** – in lieu, passive recharge of the groundwater aquifers with either or both the Scotts Valley Water District and the Soquel Creek Water District; and

[19] "Yield is used to characterize the capacity of a water resource to serve as a long-term water supply. It is a fundamental water-supply planning concept, and an understanding of its attributes is critical for those who participate in water-supply issues. In the context of surface-water resources, yield is often synonymous with safe yield or firm yield. Safe yield or firm yield in the context of water reservoirs is defined as the maximum quantity of water which can be guaranteed during a critical dry period (Linsley and Franzini, 1979). The simplicity of this definition, however, belies two "complicating" factors. First, yield changes as watershed conditions, such as land use and ground-water-surface-water interactions, evolve. Second, yield is uncertain because of our inability to know the severity and duration of future drought periods."
From: http://www.kgs.ku.edu/Publications/Bulletins/239/Leib/
See also, page 3 of https://www.owasa.org/Data/Sites/1/media/whatwedo/appendix%20iii-a.pdf
Additional definitions of production and yield are provided in the Glossary and Appendix 8.

- **Element 2** – aquifer storage and recovery, active recharge of the groundwater aquifers, with or without regional partners in regional aquifers.

**Strategy Two** includes the following Elements:

- **Element 3** – advanced treated recycled water to be used in either an indirect potable reuse or a direct potable reuse application, as the initial focus of Strategy Two approaches. In the event advanced treated recycled water is eliminated from consideration, desalination would then become Element 3.

As the WSAC discussed the potential development of the potential for advanced treated recycled water to be developed if Element 3 were to be needed, it received numerous comments from members of the public who expressed the critical importance of ensuring that all supply options be safe to human health. Specifically, comments received included cautions related to recycled water, a desire for the SCWD to carefully analyze the latest research on potential human health risks from contaminants of emerging concern and the synergistic or compounding effects of mixtures of multiple constituents that may occur in advanced treated recycled water, a recommendation that the SCWD use the precautionary principle when evaluating advanced treated recycled water options, and also that the City learn from other communities using similar supplies.

## *Section 3.18 Rationale for the Committee's Preference for the Groundwater Storage and Retrieval Strategy*

Throughout the Committee's work in the spring and summer of 2015, it consistently demonstrated a preference for developing available winter flows as a supplemental supply. As the list below shows, the Committee's reasons for this preference were numerous and diverse.

1. More fully utilizes winter water flows in the San Lorenzo River.
2. Can contribute water to storage in many years. Even in dry years winter water may be available to store in local aquifers.
3. May start returning water before the entire groundwater system is built out.
4. May help reduce the threat of seawater intrusion.
5. Groundwater strategies are regional solutions. Regional solutions may help the regional economy, and thus the local economy.
6. Even without agreements to return water to SCWD in the future, in lieu recharge strategies can start immediately with existing infrastructure (an agreement is already in place for winter 2015), and can grow over time.
7. Because each ASR injection well acts as an independent storage and recovery site, together the individual wells create a flexible, resilient and scalable system, not just for the groundwater strategy but for Santa Cruz's overall water supply portfolio.
8. Water stored underground is much less affected by evaporation.
9. As aquifers are restored, base flows from groundwater to local creeks and streams may be improved and may offset some fish flow requirements.

10. May eliminate future water use curtailments during extended droughts.
11. It is believed to be politically feasible.

## *Section 3.19 Infrastructure Constraints*

As is the case with all water systems, the City of Santa Cruz water system's operation is limited by a number of infrastructure constraints. Chief among these is the inability of the Graham Hill Water Treatment Plant to efficiently treat waters with turbidities over about 15 Nephelometric turbidity units[20] (NTU). Additional infrastructure constraints involve the limited hydraulic capacity and pressure constraints of the existing pipeline between the Felton Booster Station and Loch Lomond Reservoir. Once the pipeline between Felton and Loch Lomond is replaced, the capacity of the existing Felton pumps could potentially be increased.

In the recently completed Conjunctive Use and Water Transfer Phase II study report,[21] the Graham Hill Water Treatment Plant turbidity constraint was identified as a potentially significant barrier to the idea of capturing and using winter flows for passive and active recharge of regional groundwater basins. That report laid out a phased implementation of in lieu (passive) recharge that would not require addressing the treatment plant constraints right away. The report also described various infrastructure improvements to both Graham Hill Water Treatment Plant and the Tait Street Diversion that could be required as winter water deliveries to Soquel Creek and Scotts Valley are increased.

During the Committee's scenario planning process, the technical team modified the Confluence model's operating parameters in order to assess how the water system would perform without infrastructure constraints. The Committee, City staff and the technical team gave the issue of infrastructure constraints considerable attention, and a range of possible approaches to addressing these problems was discussed.

In the "State of the Water System Report" provided to the Committee at its April/May 2015 meeting, City staff provided a high level overview of the deferred maintenance and major rehabilitation and replacement issues the system has and laid out a conceptual framework for a 15 year Capital Improvement Program (CIP) to tackle these issues. The CIP includes projects to address certain infrastructure constraints, such as the need for a replacement pipeline from Felton to Loch Lomond, but not others, like upgrades to the Graham Hill Water Treatment plant to allow it to treat higher turbidity water. The rationale for including the pipeline is that it is needed to improve system operation whether or not a winter harvest option is pursued. The need for other infrastructure improvements to address the higher turbidities of winter water, whether through the implementation of the treatment plant upgrades identified in the Conjunctive Use and Water Transfer report, or possibly the installation of Ranney collectors or other approaches, is dependent upon selection of a water supply augmentation strategy. Including such improvements in a long term CIP prior to the Committee having completed its work would not be appropriate.

[20] Nephelometric turbidity units (NTU) is a measure of water clarity that is used in drinking water treatment and safe drinking water regulations.
[21] Final Report, Conjunctive Use and Water Transfers – Phase II, May 2015
http://scceh.com/Portals/6/Env_Health/water_resources/Task%206%20Report%20051215%20clean.pdf

While current infrastructure does allow some initial regional cooperation efforts to get underway relatively soon, to fully utilize available winter water for in lieu and/or ASR will require substantial additional infrastructure. The minimum additional infrastructure requirements include creating an intertie with Scotts Valley, expansion of transmission capacity to Soquel Creek, and creating the infrastructure necessary to transfer water stored in aquifers back to Santa Cruz when needed during drought years.

## *Section 3.20 Operational Constraints*

The Santa Cruz water system uses a variety of operating rules and practices to guide its daily operation. A utility's operating rules provide straightforward and reasonable parameters for both operating the system and for modeling system performance.

Most of the City's operating rules and practices have developed over time and are based on experience operating the system. A major influence underlying the operating rules is that avoiding problems is more effective than dealing with their consequences after the fact. Some of the key operating constraints have been incorporated into the Confluence Model to help insure that system modeling results reasonably represent reality.

The WSAC examined operating rules and constraints that limit the water system's ability to provide water. During the dry season, the key constraint is the existing operating rule curve for Loch Lomond drawdown. During the rainy season, the key constraints were related to taking first flush water and dealing with turbidity levels over 15 NTU, whether for treatment at the Graham Hill Water Treatment Plant or to send to Loch Lomond to store in years when winter precipitation is not expected to fill the reservoir.

The technical team explored modifying the operating parameters using the Confluence model to simulate different operating rules. A number of recommendations for change and further evaluation were developed. Of those, two particular operating constraints stand out: the rule curve used to operate Loch Lomond, and the first flush constraint for sending water from Felton to Loch Lomond.

The existing Loch Lomond rule curve is designed to keep about a billion gallons of water in the reservoir as drought supply for a potential third year of drought conditions. When modeling the system, the Confluence Model currently runs the system to ensure that on October 31$^{st}$ of the second year of a drought, the reservoir still has one billion gallons remaining in storage. This constraint could potentially be relaxed in the event the City develops additional storage. The first flush constraint is designed to allow a sufficient quantity of water to bypass the City's Felton Diversion on the San Lorenzo River to avoid introducing large quantities of nutrients and pathogens into Loch Lomond. In critically dry years the quantity of water needed to meet the first flush criterion, 48 hours at 100 cubic feet per second or greater, may never be achieved. If this criterion can be relaxed without threatening Loch Lomond's water quality or ecosystem health, the additional water diverted to Loch Lomond during dry years could have significant benefits in reducing the size of worst year shortages.

Bearing in mind the complexity of Loch Lomond's ecosystem and the need to avoid creating a problem that would likely be time-consuming and expensive to solve, the potential supply-enhancing benefits of changing any of these constraints make it worthwhile to seriously explore this matter over the coming

years. If it is feasible to modify this operating constraint, the fix may entail operational changes, infrastructure modifications, or both.

## *Section 3.21 Agreement on Elements of the Water Supply Augmentation Plan*

As WSAC proceeded, it focused on both what the Plan should include and how it should be implemented. As had been the case during the Committee's scenario planning and portfolio building work during the spring and summer of 2015, the Committee found it relatively easy to coalesce around groundwater storage strategies, but more challenging to build agreement around whether or how it might make sense to include additional supply augmentation measures.

Beginning with the Committee's July 2015 meeting, the WSAC began developing an adaptive management plan that would be used to guide the implementation of the Plan. Through the August and early September 2015 meetings, the Committee continued to solidify its agreement about the elements of the Plan, while recognizing that final agreement would be based on both what the Plan Elements were as well as how the Plan would be implemented. At its September 11, 2015, the Committee agreed to the following Plan Elements, contingent on the Committee also reaching agreement on the implementation plan and adaptive management strategy.

***Element 0: Demand Management,*** with a goal to generate an additional 200 to 250 million gallons of demand reduction by 2035 from expanded water conservation;

***Element 1: In Lieu*** start quickly as a small program relying on existing infrastructure to provide potable water to the SqCWD. The program is intended to grow over time, if/as additional infrastructure is developed, additional agreements are reached with SqCWD and SVWD, and any needed changes to water rights are granted by the State of California. Details of sharing capital and operating costs would and how much water returns to Santa Cruz and when it would be available would be addressed in these agreements.

***Element 2: Aquifer Storage and Recovery (ASR)***, involves development of a program to inject treated water from available winter flows into regional aquifers and recover a large portion of the stored water as a supplemental supply for Santa Cruz. This program would proceed through evaluation and piloting steps as detailed in technical reports (e.g., the May 2015 Pueblo Water Resources report) and, if successful, can be implemented on a scale sufficient to meet the yield goals of this Plan.

***Element 3: Advanced Treated Recycled Water***, is intended to supplement or replace Elements 1 and 2 to the extent they do not generate sufficient yield to fill the supply/demand gap in a cost-effective and timely manner, as stipulated in the Plan. In the event advanced treated recycled water is eliminated from consideration, desalination would then become Element 3.

In addition to developing Elements 0, 1, 2 and 3 above, the Committee suggests that the City should continuously review and take steps to address infrastructure and operating constraints that are keeping the existing system from performing as well as it could, within reason. Some specific suggestions are included in the recommendation section of this report.

## *Section 3.22 Implementation Strategy Options*

Following the August 2015 Committee meeting, staff and the technical team worked to lay out a phased implementation plan for Strategies One and Two. The purpose of this task was to provide Committee members with a way to visualize how a staggered plan might actually be implemented, and to support a more thorough discussion of implementation strategy options.

As they mixed and matched supply augmentation strategies, the Committee also considered how measures in the portfolio would be implemented. The technical team provided the Committee with a useful model for thinking about both potential implementation options and adaptive management drawn from work done in the Netherlands (see https://www.deltares.nl/en/adaptive-pathways/).

As part of developing both the Committee's implementation and adaptive management strategies, the WSAC evaluated several implementation approaches, including sequential, staggered and parallel. Each approach is briefly described below.

- A sequential implementation plan would involve working on Strategy One approaches until they either succeeded or failed. Only if these approaches fail to meet the yield target would Priority Two approaches be pursued.
- A staggered implementation plan involves advancing work on Strategy One approaches to demonstrate their effectiveness, while simultaneously doing some work on Strategy Two approaches with a goal of shortening the time required to produce water from a Strategy Two approach should Strategy One approaches not prove successful.
- A parallel approach would involve moving forward on both Strategy One and Strategy Two strategies with a goal of pursuing both types of projects and significantly enhancing the City water system's reliability and robustness.

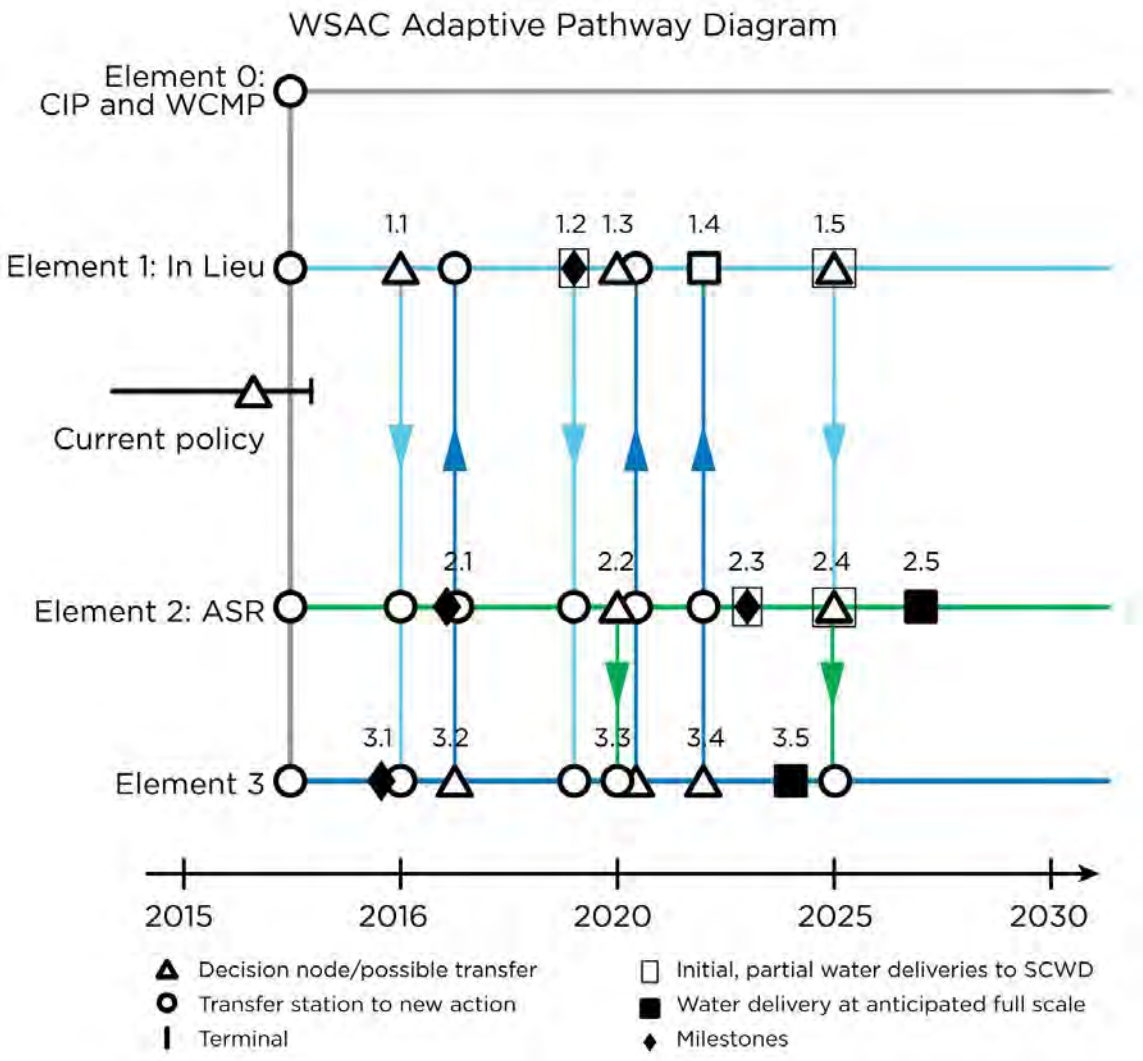
The idea behind an adaptive pathway is that you work down a path through the phases of a project or program and when you reach a decision node, you have an opportunity to decide whether to continue or change to a different approach. There are two types of decision nodes used in the adaptive pathways:

1. Open circles represent start points and possible change direction points and
2. Open triangles represent project transition points between one phase of work and the next.

Opportunities for initiating work or reviewing progress and making changes, either in the form of adjustments or as a result of assessments occur at these decision nodes. As an additional feature, the Committee decided to develop thresholds that would act as triggers for considering either adjustments or assessments. The Change Management Strategy, including further information on adjustments, assessments, and thresholds, is presented in more detail in Section 3.24.

Figure 8 shows the adaptive pathway chosen for implementation.

**Figure 8 –Adaptive Pathway Map for Implementing the Water Supply Augmentation Plan**




## *Section 3.23 Developing a Change Management Strategy*

At the same time as the Committee members were developing the implementation strategy, they were also thinking about how to deal with decision-making and dealing with the new and changing information that will develop as the plan or project is implemented.

### (a) Exploring Example Change Management Approaches

The Committee had explored several types of strategies used by others in setting up a policy and/or procedural framework to guide implementation of various kinds of plans over time. Included in this review were several specific examples of different approaches to developing policy or implementation frameworks. The most relevant examples are:

- Borrego Water Coalition Recommendations on the Groundwater Sustainability Plan being developed by the Borrego Water District.
  - Example of: Policy recommendations with phased in reduction in water production to improve groundwater sustainability and specific incremental performance targets http://www.borregospringschamber.com/bwc/documents/2014/BWC%20Policy%20Recs%20FINAL%2011-06-14.pdf
- Clackamas River Hydro Relicensing Settlement Agreement/Agreement in Principle – Fish Passage Provisions with performance based phased-in of fish passage measures:
  - Example of: Performance Benchmarks used in determining additional actions, in this case, additional measures to improve/enhance the success of fish passage at a hydroelectric dam facility.

    For details of the A, B, C and D measures called for as part of the performance based implementation of fish passage improvements, see Clackamas Agreement in Principle (AIP) document, Section II – Downstream Fish Passage Measures. This section begins on page 3 and goes to page 11 of the Agreement in Principle Fish Passage and Protection Plan that is embedded in the larger document. Using the pdf document page counter, typically found in the upper left hand area of the screen, this section starts on page 39 and goes to page 47.

    Additional Information: General information about Portland General Electric's Fish Protection Programs: https://www.portlandgeneral.com/community_environment/initiatives/protecting_fish/clackamas_river/default.aspx
- Owens Lake Dust Control – Section 5 – Framework for Resource Protection Protocols (RPP) including criteria, monitoring, indicators, triggers, and actions, significant impact thresholds, and mitigation measures.
  - Example of: Outcome oriented performance criteria; performance measurement; tiered (incremental) action oriented steps to take if performance metrics are not being met; and significant impact thresholds with required mitigation.

    https://owenslakebed.pubspsvr.com/masterproject/Master%20Project%20Document%20Library/Advisory%20Committee/April%202015/Owens%20Lake%20MP%20Advisory%20Committee%20Recommendations%20to%20LADWP.pdf (Section 5 starts on page 28 of the pdf that opens at this link.)

Two common themes of these examples are the idea that implementing plans is an inherently adaptive process and that, within reason, it is feasible to lay out an approach to making future decisions that maintains the integrity of the agreements on which the plans were based.

By the early summer of 2015, the WSAC understood that the planning level information available was only going to be adequate to allow them to make contingent recommendations. The City would need to be able to adjust or adapt them during implementation. The Committee acknowledged that questions would arise about how to proceed when new information became available and concluded that developing a Change Management Strategy, and especially guidelines and principles that reflected

their values and priorities, was as important as agreeing upon the portfolio of measures to recommend to the Santa Cruz City Council.

## *Section 3.24 WSAC's Change Management Strategy*

A major goal of the WSAC's Change Management Strategy is to establish clearly defined mechanisms for dealing with changes that will need to be made to the Plan over time. The success of whatever is done to implement the proposed recommendations is dependent upon a high degree of both transparency and accountability. The Change Management Strategy the WSAC has developed is specifically designed to facilitate that success.

### (a) The Plan-Do-Check-Act Cycle[22]

The basic premise of the WSAC's Change Management Strategy is that developing and implementing any Plan, and the projects within a plan, is a cyclic activity of continuous improvement that involves planning, doing, checking and acting (PDCA). Figure 9 shows this cycle and describes each part.

**Figure 9 – Plan, Do, Check, Act Cycle**




**Plan–Do–Check–Act Procedure**

1. Plan. Recognize an opportunity and plan a change.
2. Do. Test the change. Carry out a small-scale study.
3. Check. Review the test, analyze the results and identify what you've learned.
4. Act. Take action based on what you learned in the study step: If the change did not work, go through the cycle again with a different plan. If you were successful, incorporate what you learned from the test into wider changes. Use what you learned to plan new improvements, beginning the cycle again.

This cycle is designed to incorporate new information and well adapted to the circumstances involved in implementing the Water Supply Augmentation Plan (Plan).

The elements of the WSAC's Change Management Strategy include the following:

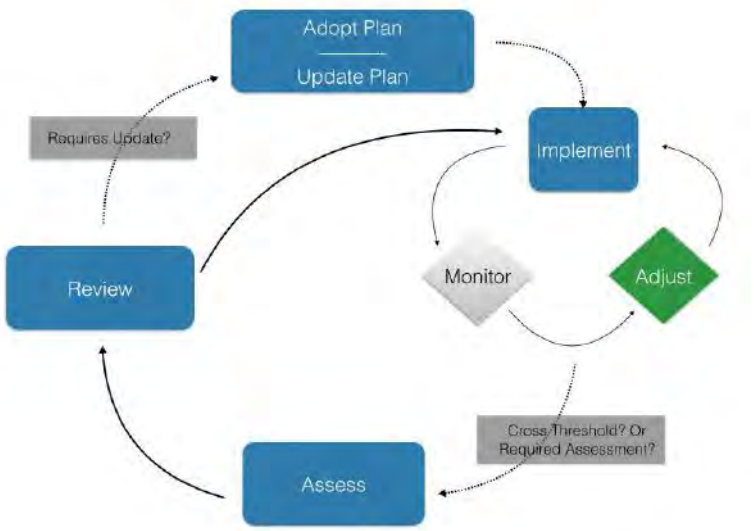
1. A Plan-Do-Check-Act model specifically adapted to the work being planned;
2. An Adaptive Pathway framework for implementing the three main supply augmentation elements;
3. Guiding Principles reflecting the WSAC's values and priorities;

[22] From: http://asq.org/learn-about-quality/project-planning-tools/overview/pdca-cycle.html

4. Procedures for implementing the strategy, including roles and responsibilities for Water Department staff and the Water Commission as they work with the Council on the issues and initiatives covered by the plan; and
5. Guidance for Decision-Making.

Figure 10 shows the Change Management Process WSAC developed:

**Figure 10 – WSAC Change Management Process**




This framework actually incorporates a smaller PDCA cycle within the larger PDCA cycle. The larger PDCA framework functions in concert with the adaptive pathways and mostly relates to adaptive decisions that would need to be made to switch from one path to another. The smaller PDCA cycle is shown on the upper right of the figure above as the "Implement, Monitor, Adjust" cycle and would be used to make needed adjustments while implementing the various Plan Elements that are part of the Plan. For example, as in lieu and ASR are being developed, their progress in meeting their project goals would be monitored. An adjustment would be needed if, for example, eight wells were needed to produce the desired yield instead of the six originally estimated. The sections below present the parameters and mechanisms the WSAC developed to guide the implementation of the Water Supply Augmentation Plan.

### (b) Definitions and Context

The WSAC's Change Management Strategy was built around several specific definitions and application of concepts. This section provides the definitions and context used in the Change Management Strategy and the circumstances under which the various adaptation approaches would be used.

1. An **Adjustment** is a change in implementation that helps the Plan stay on track. In a continuous feedback loop, the Water Department will make adjustments to help achieve (or exceed) performance targets for the various Plan Elements.

2. A**n Adaptation** is a shift from an Element or a set of Elements to another Element or set of Elements within the Plan's Adaptive Pathway. An adaptation may be recommended when certain thresholds are reached.
3. **Guiding Principles** are qualitative policy and value-based provisions that are taken into account in decision-making along with quantitative information that will be available.
4. A T**hreshold** is the set of information that leads to an Assessment of the Plan and possible adaptation. The Committee identified thresholds for the key issues that need to be considered during decision-making about a possible Adaptation. The goal was to avoid trying to address each possible eventuality, and to focus on overall program goals rather than implementation specifics. Once a threshold issue has prompted an assessment, other considerations captured in the Guiding Principles, such as regional collaborations or the collateral benefits of an approach, may be taken into consideration. The thresholds are:
    - Cost
    - Yield
    - Timeliness
5. **Performance Metrics** are developed and used to assess how well individual Elements are tracking against their performance targets. As work on implementing the Plan Elements goes forward, tracking performance will generate information that will be used in several ways:
    a. Deliver greater understanding about the system from management activities, technical work, pilot testing and modeling results and other work.
    b. Ongoing cycles of monitoring and adjusting may help the Department keep the Elements moving forward to achieve their goals and determine when and how Adjustments might affect overall goals or when Adaptation may be appropriate.

    The Committee had a chance to learn about the potential Performance Metrics that would be used in assessing Element 2, ASR, through all of its developmental phases. Further work will be needed to develop Performance Metrics for other Plan Elements.
6. **Catastrophic Events** (or other exogenous events), such as earthquakes or wildfire could disrupt the plan. Catastrophic Events are low probability/high consequence events.

## (c) Guiding Principles

The Committee recommends that the following Guiding Principles be taken into account in all applications of the Change Management Strategy:

- **Public Health** – public health protection is every water utility's most fundamental duty. The SCWD, as an organization, and as individual employees, work every day to produce and deliver an adequate and high quality supply of water that complies with numerous public health-based regulatory standards and is used for human consumption, sanitation, for other domestic and commercial use and for fire protection.

  WSAC recommends that, prior to reaching a decision on a potential preferred supply augmentation project; the City will consult with experts (recommended by the Water Department and approved by City Council) in public health, endocrinology and water chemistry

to evaluate and report on local water quality data and the public health implications of the preferred choice. This consultation would take place with ample opportunity for public review and input.

- **Public Acceptance** –The Committee was aware that the most important reason for convening the WSAC was to address the public's concerns about the proposed desalination plant. The Committee notes public acceptance issues were raised during the WSAC process about costs, including overall costs and costs to rate-payers, energy consumption, schedule for implementation and public health concerns.

  The WSAC has, throughout its process, created and applied criteria reflecting the community's values. Along with the yield, costs, timeliness and technical feasibility of various supply augmentation alternatives (including conservation), the Committee also considered energy use, and environmental impacts of the alternatives. Accordingly, these considerations and criteria should be taken into account in any future decision-making.
- **Regional Collaboration** – Where consistent with the goal of achieving a sufficient water supply, the City should promote regional collaboration to improve water supplies, reversing or slowing seawater intrusion, and support habitat restoration.
- **Plan Goal** – The Committee agrees that, to improve the sufficiency and reliability of Santa Cruz's supply using groundwater storage, an additional 2.4 billion gallons of water needs to be accessible from regional aquifers in a timely manner which will require storage of a larger volume. This additional storage, along with other key infrastructure modifications outlined in the Plan, would provide water needed to meet a worst year peak season shortage of 1.2 billion gallons under forecasted climate change and DFG5 flows.
- **Incremental Implementation** – An important premise of the Water Supply Augmentation Plan is incremental implementation. The Committee worked to develop a phased approach to develop the additional water supply needed and to integrate this approach into the Adaptive Pathway and Change Management Strategy. A significant benefit of this approach is that it will help the City avoid investing resources before they are needed and justified based on performance and other metrics.

### (d) Change Management Strategy

As the Water Department implements this Plan, the Committee recommends that staff apply the following Committee agreements in making adjustments and recommending adaptations:

For Adjustments:

1. Diligently implement the groundwater storage strategy: when implementing Plan Elements related to groundwater storage, the City will take all reasonable and necessary steps to explore and demonstrate the technical feasibility of these approaches.
2. In addition, the City will adopt and implement communication practices that support the goals of transparency and accountability about Adjustments or Adaptations.

For Adaptations:

1. Prefer groundwater storage strategies: before making a choice to move away from groundwater storage, diligently pursue all reasonable measures to make the groundwater strategies work.
2. Should the choice need to be made between options available within Element 3, the Committee's preference is for advanced treated recycled water, rather than desalination, which is estimated to cost more and use more energy than advanced treated recycled water. The Committee viewed recycled water as more sustainable than desalinating seawater and therefore more aligned with the community's values. However, if the City determines that recycled water cannot provide sufficient yield then desalination should be pursued.
3. System robustness, resilience, redundancy, and adaptive flexibility are important values.

Thresholds are an important element of the overall Change Management Strategy. The Committee developed its agreements based on assumptions and information available to it at the time it did its work and recognized that new information would be developed as the Plan is implemented. Establishing thresholds (which could, themselves, be updated as new information is developed and analyzed) gave the Committee a way to provide parameters within which to continue developing an Element as well as clear sign posts for when the Plan or an Element might be failing to perform as anticipated. Exceeding a threshold value would not necessarily result in stopping work on an Element, but would trigger an Assessment. There are three key types of thresholds:

1. Cost
2. Yield
3. Timeliness

For several of these thresholds there is no fixed number or value. This is because for items such as cost and timeliness, the threshold value is necessarily relative to the other options available at the time the threshold is reached. The achievable schedule for implementing the Elements will become clearer as additional work is done. At a decision node, the most up-to-date information should be considered.

The Committee understood that new information would be developed as the Plan was implemented and therefore what was important was to set the threshold metric rather than the threshold value. And, in addition, the Committee understood that numbers produced by planning level analyses cannot be considered exact and thus applying an acceptable range around a threshold metric would be an appropriate way to express the Committee's values and provide flexibility in implementing the Plan.

While thresholds may operate as independent triggers for an assessment, once an assessment is undertaken it would look at each Plan Element's status as it relates to each of the thresholds as well as to the Guiding Principles. Taking this more comprehensive approach to the Assessment is intended to avoid unintended consequences that could result from applying a more narrow focus.

(i) Cost Metric

Cost-effectiveness is an important consideration in making pathway changes. Any decision on cost-effectiveness will require comparing the costs of available alternatives at the time a decision is made.

After considering the range of possible cost metrics to evaluate cost-effectiveness, the Committee recommends the threshold Cost Metric be the Annualized Cost per million gallons of Average Year Yield (ACAYY). This is the cost identified in Line k of the Project Elements Summary Table included in Appendix 8, Cost Data and Cost Analysis, which table is incorporated by reference.

This metric adds the amortized annual cost of capital investments and the annual operating and maintenance cost and divides it by the estimated project average year yield.

*Amortized annual cost* is preferred because it takes into account the amortized capital investment as well as operation and maintenance costs. *Average year yield* is preferred because *yield* focuses on benefits to the overall system and *the average year yield* allows comparison among options. While other costs may be considered in future decision-making, this Cost Metric was favored because it focuses on the cost of the yield produced in an average year.

(ii) Committee Preference Statement Related to Cost

Recognizing the cost differential between some of the strategies the Committee considered in developing its recommendations, the WSAC agreed to express its preference for Strategy One over Strategy Two, and has agreed that as long as the ACAYY for implementing Strategy One is not more than 130% of the ACAYY for Strategy Two, Strategy One should be pursued provided Strategy One meets other threshold metrics.

(iii) Yield Metric

The Yield Metric is the most straight-forward, the most quantifiable, and the least flexible of the thresholds. As described earlier in this document, the supply-demand gap has been established at 1.2 billion gallons per year (bgy) for the worst year, based on Confluence modeling of the frequency and severity of shortages. The analysis takes into account DFG-5 fish flows and a plausible estimate of climate change impacts.

Updating the supply-demand gap requires both new demand forecasts and the kinds of analyses described earlier in Section 3.05 and Section 3.06. This analysis will be refreshed every five years as part of the Urban Water Management Plan update.

(iv) Timeliness Metric

For the Timeliness Metric, the Committee has agreed that a 10-year window is a reasonable target for achieving water supply sufficiency, defined as having a fully functional water system able to meet the supply-demand gap forecasted during extended droughts. Assessments, Reviews and Update to Plan

1. Procedural Steps
    a. An **Assessment** is performed by the Water Department and includes updated information and a recommendation about whether a change to the Plan is needed.

b. The Water Department submits a report to the Water Commission for its **Review, including development of recommendations to the Council**. Following Water Commission action, the recommendation is forwarded to the Council for its consideration.

c. If the Council so chooses, the Plan will be **updated**.

2. Information Sharing

   a. The Water Department will report to the Water Commission and the City Council

      i. At all decision nodes identified in the Plan;

      ii. Informally, as part of the Water Director's Oral Report at each Water Commission meeting, providing specific information about work in progress, successes and failures, and challenges and opportunities;

      iii. Quarterly in the spring, summer and fall, as an agenda item with accompanying staff report on the Water Commission agenda for discussion, public comment, and action as needed; and

      iv. Formally and annually to the Water Commission and the City Council in the winter of each year during the budget cycle, including Plan performance and significant adjustments

   b. As part of the Water Commission's and City Council's review of an updated Urban Water Management Plan, including

      i. Performance

      ii. Significant adjustments

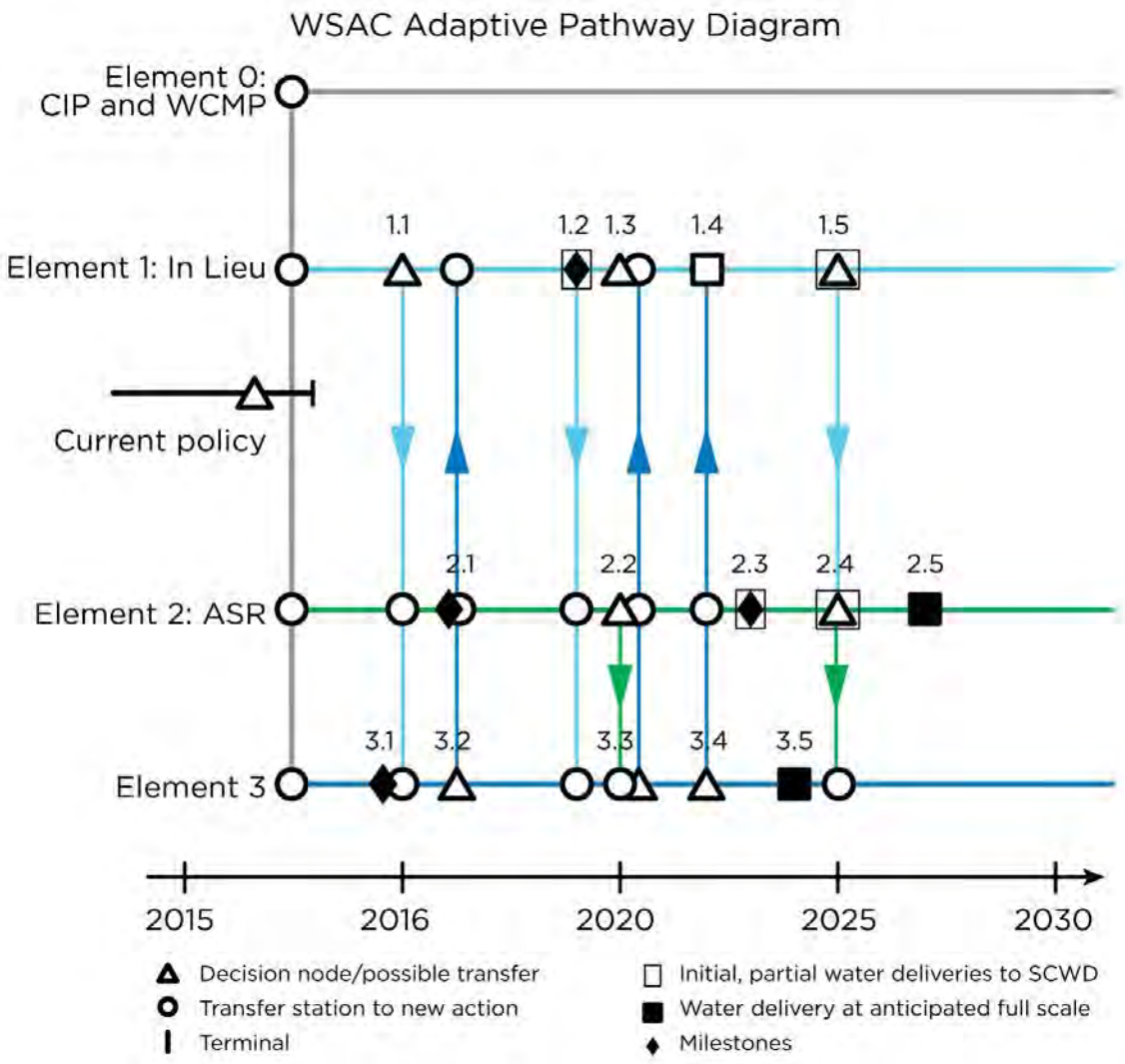
      iii. Updated Plan Goals and Assumptions (including demand, climate change, systems improvements etc.)

3. If the Water Department recommends an adaptation, such a report must contain a synthesis of each Strategy and/or Element's actual performance or most current projected performance against the most current Thresholds and an evaluation of whether the performance of individual Elements warrants making a change to the Plan as a whole, or to one or more Elements within the Plan.

### (e) Staggered Adaptive Pathway and Decision Nodes

At its September 10, 2015 meeting, the Committee agreed to use a staggered implementation approach. Figure 11 shows the agreed-upon adaptive pathway map, and Table 16 lists the numbered decision nodes and provides descriptions about the expected information, decision, or result anticipated at that node.

**Figure 11 – Agreed-Upon Adaptive Pathway Map**



## Table 16 – Table of Decision Nodes and Related Milestones

| NODE | ABBREVIATED DESCRIPTION | ENDING YEAR |
|---|---|---|
| **In Lieu (Element 1)** | | |
| 1.1D △ | Near Term: Initiation of near term water transfer/sale to SqCWD using North Coast water; agreements in place, and CEQA completed. | c. 2016 |
| 1.2M ◇ | Larger Project: Understanding the feasibility of a potentially larger water transfer/exchange project with SqCWD and/or SVWD using North Coast and San Lorenzo River waters. Includes quantifying return water (using groundwater models) from SqCWD and/or SVWD to Santa Cruz as well as understanding of water rights and inter-agency collaboration. | c. 2018 |
| 1.3W/D □ △ | Larger Project: Completion of agreements specifying terms of transfers to/from SqCWD and/or SVWD, water right modifications, planning/prelim design; complete assessments of cost, yield and schedule; and define CEQA. Decision point for proceeding on final design of associated infrastructure improvements. | c. 2019<br>c. 2020 |
| 1.4W □ | Larger Project: Potential for return of water from SqCWD, and/or SVWD, to SCWD with the construction of infrastructure/treatment improvements. | c. 2022 |
| 1.5D/W △ ■ | Assess in lieu performance: amount to SqCWD, SVWD, and SCWD; reduced groundwater pumping, groundwater elevations, etc. | c. 2025 |
| **Aquifer Storage and Recovery, ASR (Element 2) Includes evaluation of Purisima and Santa Margarita** | | |
| 2.1M ◇ | High level feasibility work: use of groundwater model; completion of site specific injection capacity and geochemical analyses; development of pilot program. | c. 2017 |
| 2.2D △ | Completion of all administrative items to conduct pilot testing (e.g., CEQA/permits/agreements and well modifications), completion of pilot testing, and assessment of probable ASR system performance, cost and schedule to complete build out of ASR system. | c. 2020 |
| 2.3M/W ◇ □ | Develop/construct ASR wells, ready to operate. | c. 2022 |
| 2.4D/W △ □ | Assess ASR performance against projections and ability to meet project goals. | c. 2024 |
| 2.5W ■ | Aquifer storage target attained (ability to sustain return flows to SCWD at desired levels). | c. 2027 |
| **Advanced Treated Recycled Water or Desalination (Element 3)** | | |
| 3.1M ◇ | Identify recycled water alternatives; increase understanding of recycled water (regulatory framework, feasibility, funding opportunities, public outreach and education) | c. 2016 |

| | | |
|---|---|---|
| 3.2D △ | Complete high level feasibility studies, as-needed demonstration testing, and conceptual level designs of alternatives;, define CEQA processes; and continue public outreach and education. Select preferred Element 3. | c. 2017 |
| 3.3D △ | Preliminary design, CEQA (including preparation of draft EIR), and apply for approvals and permits (except building permit). | c. 2020 |
| 3.4M ◇ | Complete property acquisition, final design, complete CEQA and all permits. | c. 2022 |
| 3.5W ■ | Construction completed: plant start-up, water production begins | c. 2024 |

**Abbreviations**

ASR = Aquifer Storage and Recovery
CEQA = California Environmental Quality Act
DDW = Division of Drinking Water
DPR = Direct Potable Reuse
GHWTP = Graham Hill Water Treatment Plant
IPR = Indirect Potable Reuse
SCWD = Santa Cruz Water Department
SqCWD = Soquel Creek Water District
SVWD = Scotts Valley Water District

**Notes**

- This table is intended as a companion piece to the implementation Gantt chart and subway map. Gantt chart contains additional activity detail(s) for each node.
- Node types
  - D = decision node (triangle on subway chart)
  - M = milestone (diamond on the subway chart), furthering the understanding of feasibility.
  - W = water production potentially available (squares on the subway chart; open square indicates some water; solid square represents full goal being met).
- Node types have been assigned based on a set of assumptions as to how the implementation will proceed. However, if a threshold is being tripped, the node becomes a decision node regardless of its current designation.
- Ending Year refers to when all work associated with reaching node and/or achieving goal(s) will be accomplished. Dates shown are approximate based on current information and project understanding. Dates may adjust depending on: volumes of water available due to winter precipitation levels (which may limit amount of in lieu and ASR); ability to establish agreements, permits, etc.; and ability to implement workload.

As noted in earlier discussions, thresholds represent “special decision nodes” that can be reached by any Element, at any time.

## (f) Guidance for Decision-Making at Decision Nodes

This section provides guidance for decision-making.

When a decision node on the adaptive pathway map is reached, or when the Plan or any Element appears it will fail to meet any threshold value at any time, the Committee’s Change Management Strategy recommends a “pause and assess” step. At this juncture, there are three basic kinds of decisions:

1. A decision to stay on the same path;
2. A decision to add another path or paths; or
3. A decision to switch to a different path or paths.

A decision to stay on the same path may include consideration of a range of actions. A decision to continue to the next phase in the Plan's development could involve, for example:

- Moving from preliminary engineering to design, or
- Expanding an element by deciding to make additional infrastructure investments, or
- Deciding not to put additional money into an element or approach that is struggling but to maintain the production already developed.

In general the possible decisions associated with the staying on the same pathway include:

- Start planning and/or pilot testing,
- Start preliminary engineering and/or regulatory and permitting processes,
- Start final design,
- Start construction,
- Build out or scale up,
- Stop further investment,
- Operate and maintain, and
- Stop pursuing altogether.

A decision to switch to a different path or paths may result from concluding that a particular task cannot be accomplished, for example not reaching agreement with other regional water providers for in lieu recharge, or from a failure to meet any threshold.

Recommended factors to be taken into account in decision-making about Plan implementation include the Guiding Principles as well as how well Plan Elements are performing relative to their Performance Metrics or Thresholds.

(i) Examples of Decision Guidance

This section provides several specific examples of decision guidance or special considerations for adjustments, adaptation or decision-making at specific decision nodes. Refer to Table 16 for details about decision nodes.

- **Element 1, Decision Node 1.3**
    - Build Out Element 1 – If agreements with one or more regional partners are reached, water rights issues have been resolved, assumptions about the availability of river flows are confirmed, and groundwater modeling indicates sufficient water will be returned to Santa Cruz in a cost-effective and timely manner, then proceed to build out water transfers up to the original design limits of Element 1, adding additional infrastructure as needed to optimize project effectiveness.

- Stop Element 1 – If no agencies choose to participate with the City in pursuing in lieu recharge, including return of sufficient stored water in a cost-effective and timely manner, the City will evaluate whether Element 1 should be pursued further or abandoned.

- **Element 2, Decision Node 2.2**
  - Build Out Element 2 – Use results of pilot testing and estimates of cost-effectiveness and schedule for final system build-out to decide whether to continue implementing ASR up to the original design limits of Element 2.
  - Stop Element 2 – Consider stopping Element 2 if the solution is not working within acceptable performance parameters, for example, something systemic to the aquifer appears to make too many test sites unsuccessful in effecting aquifer recharge, or costs greatly exceed budget, or the schedule for final build-out exceeds the target completion date, and other Elements can meet or exceed their performance parameters, such that the Plan can meet its goals without Element 2.
- **Element 3, Decision Node 3.2** – Select preferred approach for Element 3 (e.g., DPR, IPR, desalination), initiate high level feasibility studies, as needed demonstration testing, and conceptual designs, define CEQA process; continue public outreach and education, and select preferred alternative.
  - Start Preliminary Design Engineering and Regulatory Process for selected Element 3 – (start work outlined in 3.3). Initiate preliminary design, prepare a draft EIR, and continue public discussions about the selected Element 3. This effort involves activity up to, but not including, site acquisition, final design and EIR (Draft EIR only at this stage). A key goal of the work would be to have Element 3 ready to go into the final design stage at node 2.2.
  - Stopping Element 3 -- Decide to stop or pause Element 3 if other Elements can meet or exceed their performance parameters, such that the Plan can meet its goals without Element 3.

As each decision is made, thresholds, performance metrics developed for each Strategy and/or Element, including budget, schedule, and yield, objective results-oriented measures, would be reviewed and changes made either within the **Adjustment** framework by the Water Department, or within the **Adaptation** framework in collaboration with the Water Commission and under the direction of the City Council. In both cases, communication about progress, issues, and actions would be open, frequent and data-based.

## *Section 3.25 Article III Summary – listing of all Committee Agreements*

As indicated in Section 2.02, the Committee chose to use a consensus based decision-making process during its work. All Agreements presented in this section and elsewhere in this document were reached using this consensus process.

### (a) Committee Agreements on Demand Forecasts

At the Committee's April 30 – May 1, 2015 meeting they agreed that the interim forecast would be used as the basis for the Committee's work until the results of the econometric forecast became available.

At its July 23, 2015 meeting, the Water Supply Advisory Committee agreed to use the econometric demand forecast as presented by David Mitchell of M Cubed Consulting at this meeting.

On September 10, 2015, the Committee accepted a revised forecast that corrected an error in the way that future plumbing and building code changes were incorporated into the forecast. Figure 4 above, reflects the revised, corrected forecast.

### (b) Committee Agreement on Fish Flow Releases

On April 30, 2015, the WSAC agreed that, for planning purposes, using the DFG-5 flows as an upper bound or the potential impacts of fish flow releases on Santa Cruz's water system made the most sense. If the ultimate negotiated flow releases are lower, then the supply demand gap will be smaller and those results can be incorporated into future planning for supply augmentation.

### (c) Committee Agreement on Climate Change

On April 30, 2015, the WSAC agreed that the Climate (hydrologic) Change and Extended Drought scenarios provide plausible parameters to use in its water system planning and that this analysis provides a useful point of depart for its scenario planning work. For planning purposes, the Committee agreed that the eight-year drought sequence was useful as a design drought, and recognized that this drought sequence would be reviewed and revised as new information became available.

### (d) Committee Agreement on Problem Statement

On September 11, 2015, the Committee Agreed to the following formal problem statement:

> *Santa Cruz's water supply reliability issue is the result of having only a marginally adequate amount of storage to serve demand during dry and critically dry years when the system's reservoir doesn't fill completely. Both expected requirements for fish flow releases and anticipated impacts of climate change will turn a marginally adequate situation into a seriously inadequate one in the coming years.*
>
> *Santa Cruz's lack of storage makes it particularly vulnerable to multi-year droughts. The key management strategy currently available for dealing with this vulnerability is to very conservatively manage available storage. This strategy typically results in regular calls for annual curtailments of demand that may lead to modest, significant, or even critical requirements for reduction. In addition, the Santa Cruz supply lacks diversity, thereby further increasing the system's vulnerability to drought conditions and other risks.*
>
> *The projected worst-year gap between peak-season available supply and demand during an extended drought is about 1.2 billion gallons. While aggressive implementation of conservation programs will help reduce this gap, conservation alone cannot close this gap. The Committee's goal is to establish a reasonable level of reliability for Santa Cruz water customers by substantially decreasing this worst-year gap while also reducing the frequency of shortages in less extreme years.*

### (e) Committee Agreement on the List of Alternatives Considered but Not Being Pursued at this Time

At its September 10, 2015 meeting the WSAC, the Committee approved the information in Appendix 5 as its conclusions about the alternatives it evaluated and its reasons for not further pursuing these alternatives at this time.

### (f) Committee Agreement about Demand Management (Conservation)

At the Committee's meeting of September 10, 2015, the Committee agreed to the recommendations related to demand management described in Section 3.16(a) of this report.

### (g) Committee Agreement on Supply Augmentation Strategies

At its September 10-11, 2015 meeting, the Committee agreed to the following Supply Augmentation Strategies:

1. **Strategy One**: Development of groundwater storage using a combination of both passive and active recharge approaches and available surface water flows during the rainy season; and
2. **Strategy Two**: Development of advanced treated recycled water or desalinated water if and as needed to address any remaining supply-demand gap.

### (h) Committee Agreement on Elements of the Water Supply Augmentation Plan

At its September 10-11, 2015 meeting, the Committee agreed to the following Elements of the Water Supply Augmentation Plan:

***Element 0: Demand Management,*** with a goal to generate an additional 200 to 250 million gallons of demand reduction by 2035 from expanded water conservation;

***Element 1: In Lieu,*** start quickly as a small program relying on existing infrastructure to provide potable water to the SqCWD. The program is intended to grow over time, if/as additional infrastructure is developed, additional agreements are reached with SqCWD and SVWD, and any needed changes to water rights are granted by the State of California. Details of sharing capital and operating costs would and how much water returns to Santa Cruz and when it would be available would be addressed in these agreements.

***Element 2: Aquifer Storage and Recovery (ASR)***, involves development of a program to inject treated water from available winter flows into regional aquifers and recover a large portion of the stored water as a supplemental supply for Santa Cruz. This program would proceed through evaluation and piloting steps as detailed in technical reports (e.g., the May 2015 Pueblo Water Resources report) and, if successful, can be implemented on a scale sufficient to meet the yield goals of this Plan.

***Element 3: Advanced Treated Recycled Water,*** is intended to supplement or replace Elements 1 and 2 to the extent they do not generate sufficient yield to fill the supply/demand gap in a cost-effective and timely manner, as stipulated in the Plan. In the event advanced treated recycled water could not meet the needs, desalination would then become Element 3.

In addition to developing Elements 0, 1, 2 and 3 above, the Committee suggests that the City should continuously review and take steps to address infrastructure and operating constraints that are keeping the existing system from performing as well as it could, within reason. Some specific suggestions are included in the recommendation section of this report.

### (i) Committee Agreement on a Staggered Implementation Adaptive Pathway

At its September 30, 2015 meeting, the Committee agreed that implementation of the Water Supply Augmentation Plan should use a staggered approach that would include active pursuit of Strategy One at the same time as initial project planning and development work is occurring on Strategy Two. This approach is designed to ensure that should Strategy Two be needed as a water supply, enough work would have been done so that it will be feasible to achieve the yield goal within the original 10 to 12 year timeframe.

### (j) Committee Agreement on a Change Management Strategy

At its October 2, 2015 meeting, the Committee agreed to the Change Management Plan presented in Section 3.24.

### (k) Committee Agreement on Conveyance of Recommendations to the Santa Cruz City Council.

At its October 2, 2015 meeting, the Committee agreed to convey the Recommendations in Article IV of this report to the Santa Cruz City Council.

### (l) Committee Agreement on the WSAC Agreement

Eleven of the 14 WSAC members were present at the October 2, 2015 meeting. By consensus (including proxies for two of the absent members) the Committee unanimously affirmed and approved the Agreements and Recommendations described in this report. The Committee's consensus reflects the strong commitment of the parties to move forward with addressing and ultimately resolving the community's long-standing water supply issues.

# Article IV. Recommendations

## *Section 4.01 The Water Supply Augmentation Plan*

The Committee has worked on developing a Plan that would eliminate future water shortages by 2025, give or take two years, while allowing for robust stream flows to support and enhance fish habitat.

The agreed-upon **Water Supply Augmentation Plan** (Plan) includes:

1. A **specific goal for Yield**, as well as the assumptions underlying this goal;
2. A **Timeframe** for improving the reliability of the Santa Cruz Water Supply;
3. The **Water Supply Augmentation Plan Elements**;
4. An **Adaptive Pathway** to provide a structure within which work on the Elements can be pursued and evaluated; and
5. A **Change Management Strategy** to guide adjustments and adaptations within the Plan, as described below.

## *Section 4.02 Yield Goal*

The Committee recommends the City implement additional demand management and supply augmentation programs and projects and address key infrastructure and operating constraints to reliably make available an additional 1.2 bgy during modeled worst-year conditions.

## *Section 4.03 Timeframe for Improvement*

The Committee recommends that the City adopt a goal of completing the improvements to Santa Cruz's water supply necessary to meet the specified yield goal by the end of 2025;

## *Section 4.04 Water Supply Augmentation Plan Portfolio Elements*

The Water Supply Advisory Committee recommends that the City Council adopt a portfolio of measures for improving the reliability of the water supply. The recommended package includes the following Elements:

- **Element 0:** Additional water conservation with a goal of achieving an additional 200 to 250 million gallons of demand reduction by 2035 by expanding water conservation programs;
- **Element 1:** Passive recharge of regional aquifers by working to develop agreements for delivering surface water as an in lieu supply to the Soquel Creek Water District and/or the Scotts Valley Water Districts so they can rest their wells, help the aquifers recover, and effectively store water for use by SCWD in drought years;
- **Element 2:** Active recharge of regional aquifers by using existing infrastructure (wells, pipelines, and treatment capacity) and potential new infrastructure (wells, pipelines and treatment capacity) in the regionally shared Purisima aquifer in the Soquel-Aptos basin and/or in the Santa Margarita/Lompico/Butano aquifers in the Scotts Valley area to store water that can be available for use by Santa Cruz in drought years;

- **Element 3:** A potable water supply using advanced treated recycled water as its source, as a supplemental or replacement supply in the event the groundwater storage strategies described above prove insufficient to meet the Plan's goals of cost effectiveness, timeliness or yield. In the event advanced treated recycled water does not meet the needs, desalination would then become Element 3.

## *Section 4.05 WSAC Value Statement on Implementing Plan Elements*

The recommended Water Supply Augmentation Plan reflects the Committee's preference for pursuing a groundwater storage and retrieval strategy provided the yield goal can be achieved in a cost-effective and timely manner. Before making a choice to move away from groundwater storage, the Committee recommends that the City diligently pursue all reasonable measures to make the groundwater strategies work.

Recognizing the cost differential between some of the strategies the Committee considered in developing its recommendations, the WSAC agreed to express its preference for the Strategy One, groundwater storage and retrieval, over Strategy Two, and has agreed that as long as the ACAYY for implementing Strategy One is not more than 130% of the ACAYY for Strategy Two, while still meeting other metrics, Strategy One should be pursued.

## *Section 4.06 Adaptive Pathway Implementation Strategy*

The Committee recommends that the Council adopt a staggered Adaptive Pathway to guide implementation of the Plan and that decision-making at the various decision-nodes identified in this Adaptive Pathway be guided by the provisions of the Change Management Strategy.

## *Section 4.07 Change Management Strategy*

The Committee recommends that the Council adopt the Change Management Strategy described in Section 3.24.

## *Section 4.08 Additional Recommendations Related to Infrastructure and Operating Constraints*

### (a) Infrastructure Constraints

The Committee also supports the Water Department's plans to address certain key infrastructure constraints that are keeping the City from fully utilizing available water, especially during the high flow season. These include, but are not limited to:

- Rehabilitation of the pipeline between the Felton Diversion and Loch Lomond that would allow the City to increase diversions to Loch Lomond during the high flow season;
- Evaluation of additional pumping capacity at Felton to push more water to Loch Lomond through the replacement pipeline; and
- If proven cost-effective, and needed for the implementation of Strategy One, complete improvements that will allow the Department to treat water with turbidities that are higher than can be effectively treated by the current Graham Hill Water Treatment Plant facilities and

processes. The specific method for how to address the water treatment constraint should include evaluating a range of potential options, including, but not limited to Ranney Collectors or satellite treatment plants, and choosing the most cost-effective approach.

### (b) Operating Constraints

Another focus of the Committee's review relates to some system operational constraints. Operating constraints typically include both daily parameters for drawing water from the City's sources and operating constraint parameters that are used in modeling system performance.

The Committee recommends that the Water Department identify and regularly evaluate operating constraints to determine whether those constraints continue to be justified as necessary to protect the system and finished water quality and to support efficient and cost-effective operations. Early focus should be given to issues related to Loch Lomond year-end carry over storage requirements, particularly if/when in lieu and/or ASR have provided a sufficient drought supply, and to the "first flush" constraint impacting the City's ability to pump water from Felton to Loch Lomond under critically dry year conditions.

## *Section 4.09 Implementation Plan and Timeline*

As part of the process for developing the WSAC Agreement, City Staff and the technical team developed a Gantt chart shown in Figure 12. This Gantt chart, together with the Decision Node Table (Table 16) and the Staggered Adaptive Pathways Map (Figure 11) comprise the Implementation Plan and Timeline.

**Figure 12 – Gantt Chart: Implementation Plan and Timeline**

Figure 12 Gantt Chart
Implementation Plan and Timeline

| | Node | Activity | Duration (years) | 2016 Year 1 | 2017 Year 2 | 2018 Year 3 | 2019 Year 4 | 2020 Year 5 | 2021 Year 6 | 2022 Year 7 | 2023 Year 8 | 2024 Year 9 | 2025 Year 10 | 2026 Year 11 | 2027 Year 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Q1 Q2 Q3 Q4 | Q1 Q2 Q3 Q4 | Q1 Q2 Q3 Q4 | Q1 Q2 Q3 Q4 | Q1 Q2 Q3 Q4 | Q1 Q2 Q3 Q4 | Q1 Q2 Q3 Q4 | Q1 Q2 Q3 Q4 | Q1 Q2 Q3 Q4 | Q1/2 Q3/4 | Q1/2 Q3/4 | Q1/2 Q3/4 |
| strategy 1 | Element 1 - In lieu | Both near term with SqCWD using North Coast & lareger project with SqCWD & SVWD using SLR water | | | | | | | | | | | | | |
| | 1.1D | Near term: Develop Agreements, Complete CEQA, Resolve any Infra. Issues | 0.5 | 1.1 | | | | | | | | | | | |
| | 1.2M | Evaluate larger project(s) with other agencies; affirm return water volumes & water rights | 3 | | | 1.2 | | | | | | | | | |
| | 1.3W/D | Completion of agreements, water rights, planning/prelim design, siting study & CEQA | 1 | | | | | 1.3 | | | | | | | |
| | 1.4W | Infrastructure Improvements (see below for potential projects) & return water to SCWD | 4 | | | | | | | 1.4 | | | | | |
| | 1.5D/W | Assess performance | NA | | | | | | | | | | 1.5 | | |
| | Element 2 - ASR (City, SqCWD and/or SVWD, i.e., Purisima & SM) + shared infrastructure (in lieu & ASR) | | | | | | | | | | | | | | |
| | Phase 1 2.1M | Complete & use groundwater model | 0.5-2 | | | | | | | | | | | | |
| | Higher-level Feasibility | Identify/select existing wells for potential pilot testing | 0.25 | | | | | | | | | | | | |
| | | Perform site specific injection capacity & geochemical analyses | 0.5 | | | | | | | | | | | | |
| | | Develop Pilot Program & identify potential sites for new ASR well(s) | 0.75 | | | 2.1 | | | | | | | | | |
| | Phase 2 2.2D | Retrofit existing wells | 0.25 | | | | | | | | | | | | |
| | Pilot Testing | Perform injection well hydraulic testing | 0.25 | | | | | | | | | | | | |
| | | ISR cycle testing | 1-2 | | | | | 2.2 | | | | | | | |
| | | Develop ASR program | 1 | | | | | | | | | | | | |
| | Phase 3 2.3M/W | Procure properties | 1 | | | | | | | | | | | | |
| | Implementation | Design Project (includes City Administration) | 1 | | | | | | | | | | | | |
| | | CEQA | 0.5 | | | | | | | | | | | | |
| | | Construct | 1.5 | | | | | | | 2.3 | | | | | |
| | 2.4D/W | Assess performance | 2 | | | | | | | | | 2.4 | | | |
| | 2.5W | Storage target achieved | NA | | | | | | | | | | | | 2.5 |
| | Infrastructure Improvements for Long term in lieu and/or ASR | | | | | | | | | | | | | | |
| | | Design/build pipeline in Santa Cruz to Beltz Wells | 1.5 | | | | | | | | | | | | |
| | | Tait Street Diversion Improvements | 3 | | | | | | | | | | | | |
| | | Graham Hill WTP Improvements | 4 | | | | | | | | | | | | |
| | | Design & build Soquel Creek transfer (back), Scotts Valley transfer (to) infrastructure | 2 | | | | | | | | | | | | |
| | | Pump Station (Soquel to City) | 1.5 | | | | | | | | | | | | |
| | | Intertie No. 1 Pipeline (City to Scotts Valley) | 2 | | | | | | | | | | | | |
| | | Pump Station (City to Scotts Valley) Intertie No. 1 | 2 | | | | | | | | | | | | |
| strategy 2 | Element 3 - Advanced Treated Recycled Water or Desalination | | | | | | | | | | | | | | |
| | 3.1M | Define Recycled Water project alternatives and status of DPR regulations | 1 | 3.1 | | | | | | | | | | | |
| | 3.2D | Select preferred Element 3 | 1 | | 3.2 | | | | | | | | | | |
| | 3.3D | Prelim design, CEQA (prepare Draft EIR), permits | 3 | | | | | 3.3 | | | | | | | |
| | 3.4M | Complete Design , CEQA, permits, property acquistion | 2 | | | | | | | 3.4 | | | | | |
| | 3.5W | Complete construction/start up | 2 | | | | | | | | | | 3.5 | | |

These items will be evaluated along with Elements 1 and 2 and implemented as needed.

**Table Notes & Select Assumptions**

This table approximates activities, costs, durations and sequencing of each element, all of which are subject to change.
Elements are shown to start in Q1 - 2016. This may or may not occur depending upon agreements, contracts, etc.
Rehab/replacement of the Newell Creek Pipeline is part of the existing CIP and not shown here.
Some infrastructure improvements may not be required if other pursuits are successful. E.g., evaluation of Ranney collectors may substitute GHWTP Improvements.
CEQA is used generically, implies compliance with Califorina Environmental Quality Act.
Pilot ASR work assumes major infrastructure not required. E.g., intertie to Scotts Valley or new well(s).
Element 2 includes 8 wells for in lieu plus 8 additional wells for ASR.

**Legend**

ASR = Aquifer Storage and Recovery
CEQA = California Environmental Quality Act
DDW = Division of Drinking Water
DPR = Direct Potable Reuse
EIR = Environmental Impact Report
GHWTP = Graham Hill Water Treatment Plant
IPR = Indirect Potable Reuse
ISR = Injection, Storage, Recovery
SCWD = Santa Cruz Water Department
SqCWD = Soquel Creek Water District
SVWD = Scotts Valley Water District

△ Decision Node
◇ Milestone Node
□ Some amount of water returned to SCWD
■ Full required amount of water returned to SCWD

**Appendix 8**
**Cost Data and Cost Analyses**

## Overview

This Appendix describes key activities undertaken by City staff and the project technical team to support the Water Supply Advisory Committee (WSAC or Committee) as it evaluated alternatives and later defined the recommended water resources plan and associated costs (capital, operations and maintenance [O&M], and present value).

## Progression: Ideas to Building Block Development to a Robust Adaptive Program

Figure A8-1 presents an overall flow schematic for the progressive development that moved from public and staff ideas offered at the Strategies and Ideas Convention (October 2014), through consolidated alternatives (CAs) to building blocks (BBs), portfolios, and final elements and strategies.

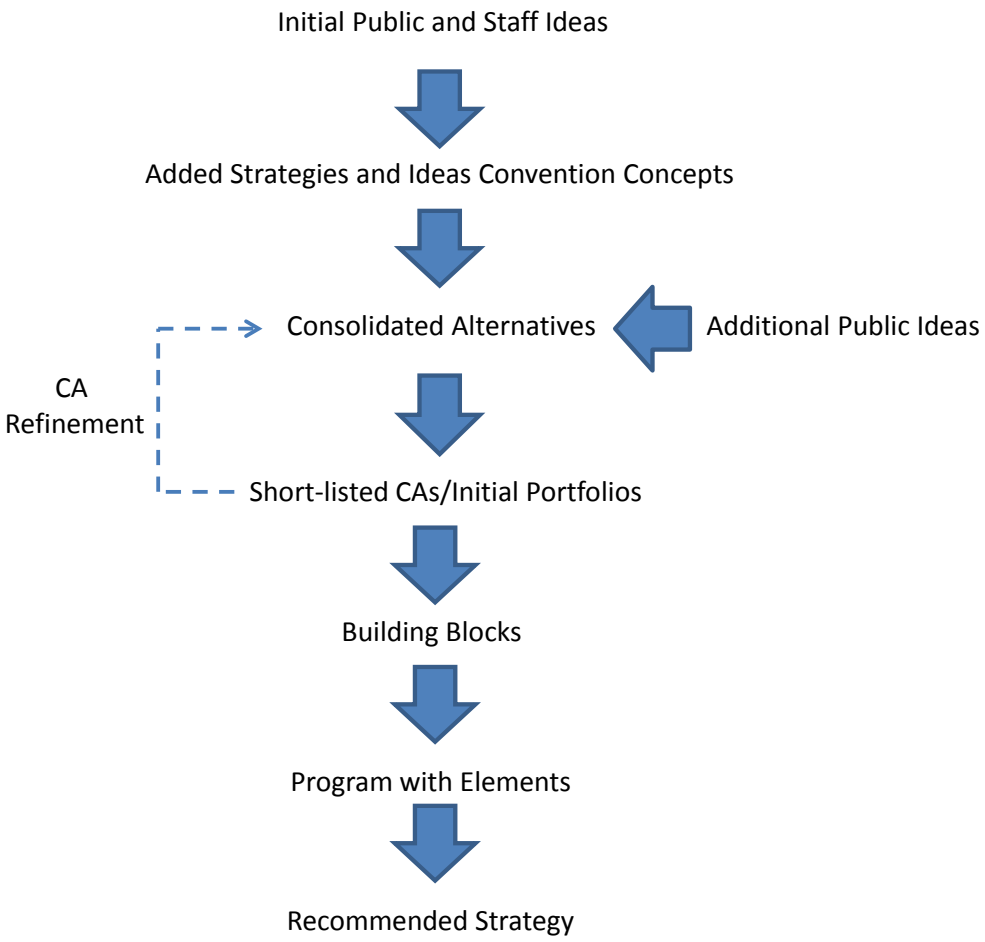



**Figure A8-1 Overall flow schematic for the progressive development of the Proposed Water Supply Program**

The April/May 2015 WSAC meeting marked the start of the modeling of the manner in which supply/ infrastructure alternatives address the reliability issues identified to that point. Analyses were performed on the following Consolidated Alternatives (CAs):

- Harvesting Winter Flows (CA-9, CA-16, CA-18)
- Ranney Collectors and Additional Storage (CA-19)
- North Coast Reclaimed Water Exchange (CA-13)
- Indirect Potable Reuse (CA-10)
- Additional Water Conservation (Program CRec) (CA-03)

By the June 2015 WSAC meeting, the Consolidated Alternatives considered above had evolved into several portfolios. All of the portfolios included the CRec conservation programs (CA-3). In addition, each portfolio included a Plan A and a Plan B. The initial supply/infrastructure additions represented by Plan A depended in whole or in part on storing excess winter flows in groundwater aquifers. The Plan B additions consisted of drought-proof supplies that did not vary with streamflow.

The portfolios were refined in several iterations, and the final set that was discussed at the June meeting was intended to enable the Committee to wrestle with different adaptive approaches to dealing with the uncertainties associated with all of the alternatives, particularly the abilities of the regional aquifers to store and allow recovery of significant volumes of water. Resolution of these uncertainties requires a robust program of groundwater modeling, analysis, and testing, and the portfolios recognized the significant risk of simply relying on the Plan A alternatives.

Based on WSAC discussions around these potential portfolios assembled from parts of the CAs, City staff and the Project Team developed BBs that WSAC combined into its preferred/recommended Elements. In this process, CAs were refined and consolidated into BB portfolios that could accomplish key water production, transfer and return goals. Elements from the BB portfolios were then extracted and further refined as separate potential projects. These elements were as follows:

1. In lieu recharge to Soquel Creek Water District (SqCWD) and Scotts Valley Water District (SVWD),
2. ASR as a supplement or in place of in lieu recharge to SqCWD and SVWD, and
3. Advanced Treated Recycled Water or Desalination.

The Elements form an adaptive program that the City, likely with cooperation with adjacent agencies, will implement and modify based on relative success of the Elements. Attachment 1 presents a summary of the recommended elements, including estimated capital costs, energy use, yield, etc., of the Elements in this Plan. Attachment 2 is a Gantt Chart timeline for

implementation. Attachment 3 is the companion piece describing the decision points and milestones. And Attachment 4 includes the three subway diagrams that can be used with the other attachments to understand in the implementation plan.

**Key Physical Components**

The City plans to use existing facilities wherever possible and build new facilities as needed to augment its existing supply. Key existing components include:

- The City's diversions (North Coast streams and San Lorenzo River via Tait Street and Felton),
- Beltz Wells,
- Loch Lomond Reservoir,
- Graham Hill Water Treatment Plant (GHWTP),
- Associated storage and conveyance infrastructure (raw water and treated water pipelines, pumping stations and distribution system reservoirs),
- The City's wastewater treatment plant (WWTP) and ocean effluent outfall.

Potential new facilities include:

- Upgrades to the GHWTP,
- Modifications to diversions (e.g., Ranney collectors and/or upgraded Felton and Tait Street facilities, and replacement of the pipeline from Felton Pump Station to the Newell Creek Dam/Loch Lomond),
- New wastewater effluent advanced purification facilities (likely at the WWTP),
- Replacement or addition of new infrastructure (both within the City and connecting to/within the Soquel Creek Water District and Scotts Valley Water District), and
- New wells within the City, Soquel Creek Water District (SqCWD), and/or Scotts Valley Water District (SVWD).

The diagrams in Figures A8-2, A8-3, and A8-4 show examples of how the pieces could fit together into functioning systems.

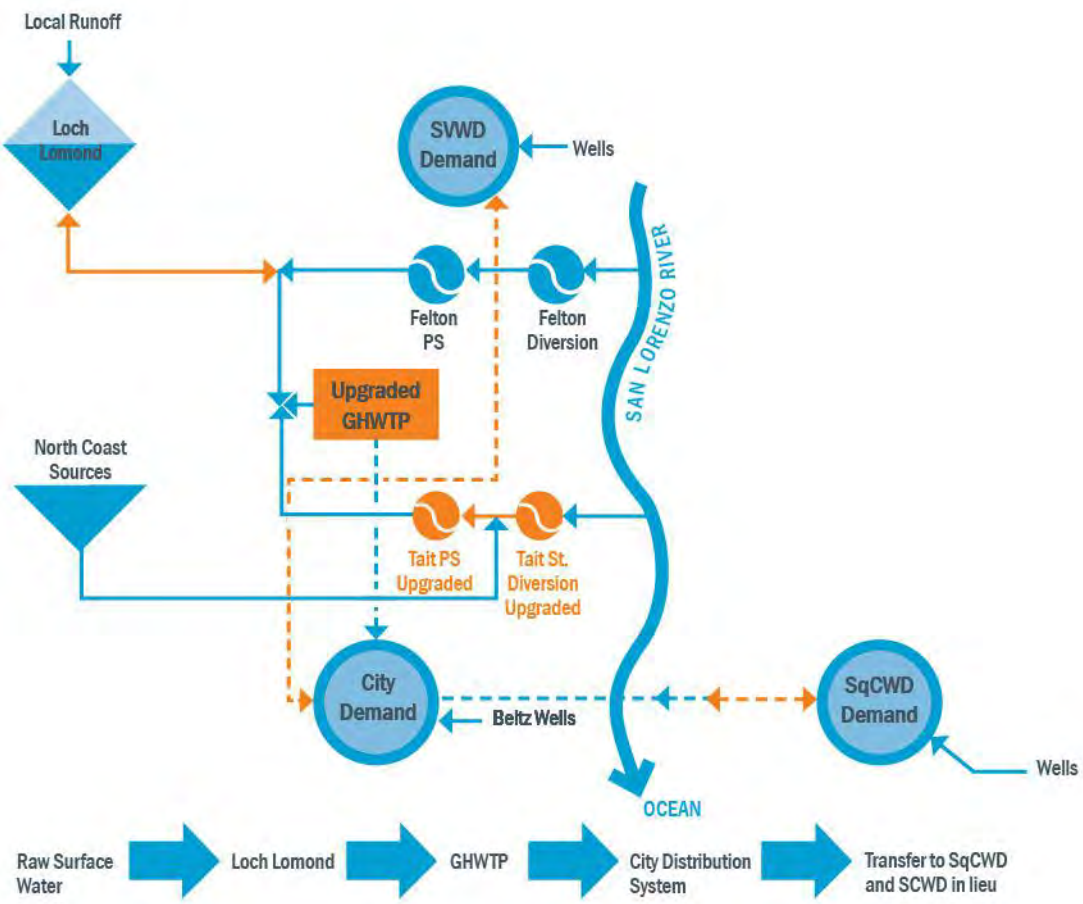



**Figure A8-2. Illustration of the Conceptual Approach for Element 1, In lieu Recharge**

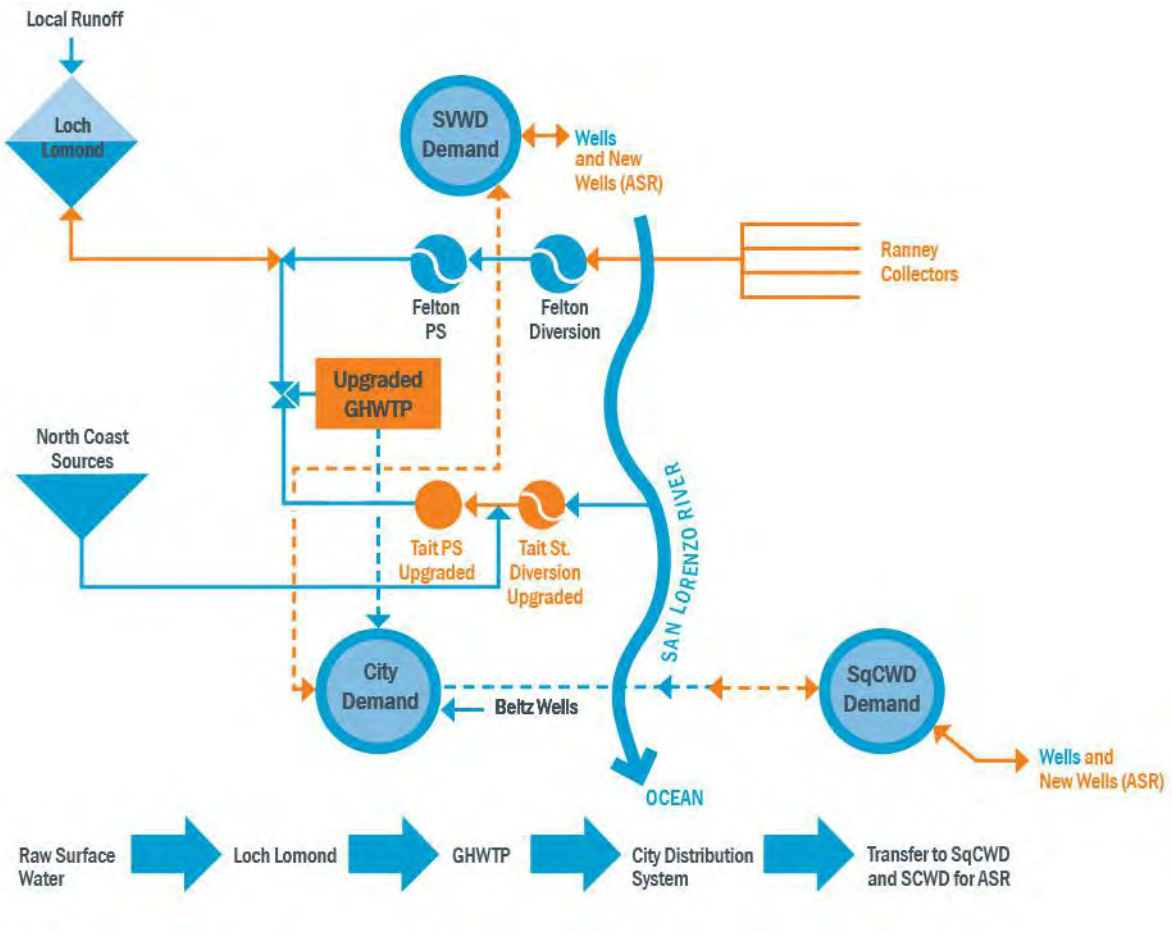



**Figure A8-3. Illustration of the Conceptual Approach for Element 2, ASR.**

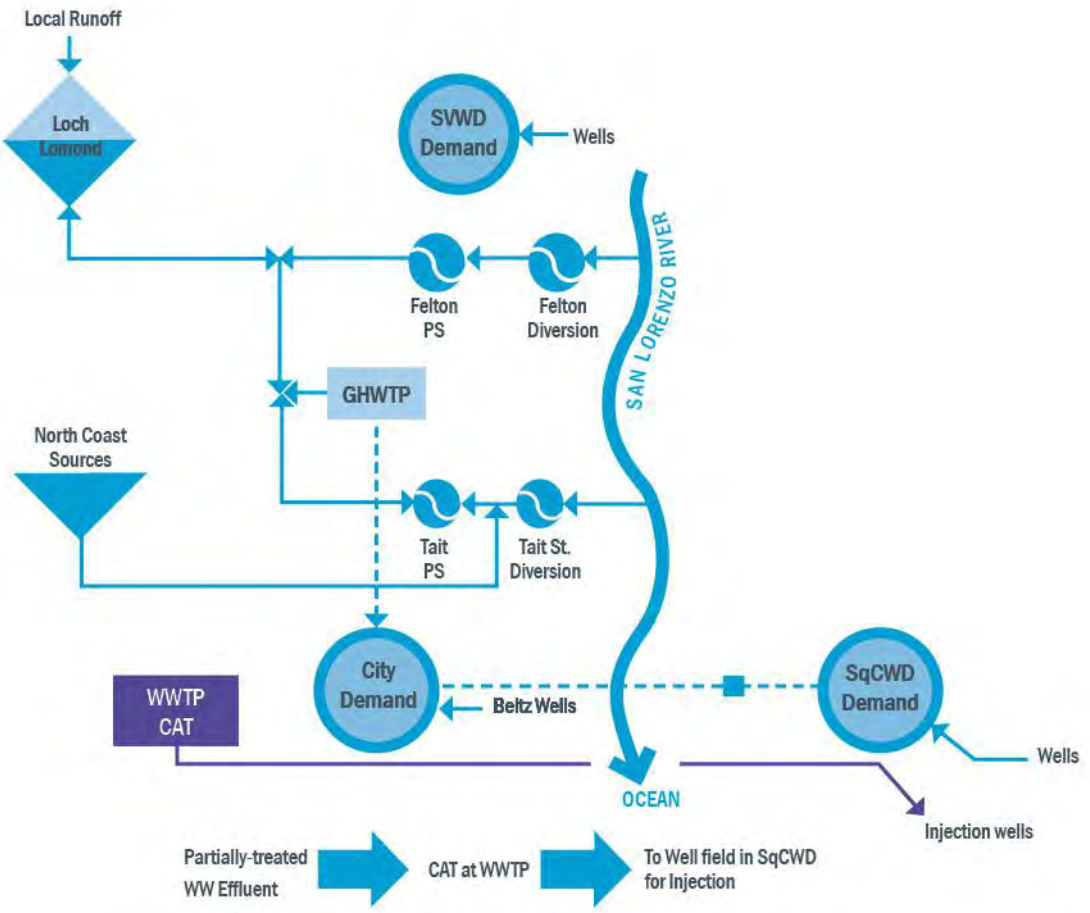



**Figure A8-4. Illustration of the Conceptual Approach for Element 3a, Potable Reuse via Groundwater Recharge—i.e., Indirect Potable Reuse**

**Cost Estimating**

The technical team developed costs (capital, operations and maintenance [O&M] and present value) at several stages of potential program component development**.** All costs, from the Portfolio stage through the original Building Block concepts (which were expanded on by committee members) to the final Recommended Project Elements were based on the conceptual-level construction and operating costs on project components like those shown in the schematics above. Information available in previous technical studies conducted by the City, Santa Cruz County, SVWD, and SqCWD and previous projects/studies by Brown and Caldwell (BC) were used to inform this work. For example, the 2015 Pueblo ASR report informed the development of the ASR well number and cost estimates; the new conveyance between Soquel Creek Water District and the City is based on the alignment for a potential intertie and pump station developed for the City by Kennedy Jenks; and the treatment train concept for this work was based on the most exhaustive complete advanced treatment (CAT) process being piloted in California as of Summer 2015: nitrification of the wastewater

effluent—ozone with biologically active carbon ($O_3$/BAC)—microfiltration (MF)—reverse osmosis (RO)—advanced oxidation ultraviolet light with peroxide (UV-AOP) conditioning of the product water, as illustrated in Figure A8-5. This process train is very robust since regulations for potable reuse via reservoir augmentation and direct reuse are still in flux and the City may wish to pursue one of these options. The more robust process train also responds to concerns expressed by citizens at WSAC meetings. The proposed train would ensure a greater removal of constituents such as emerging contaminants of concern (e.g., pharmaceuticals).

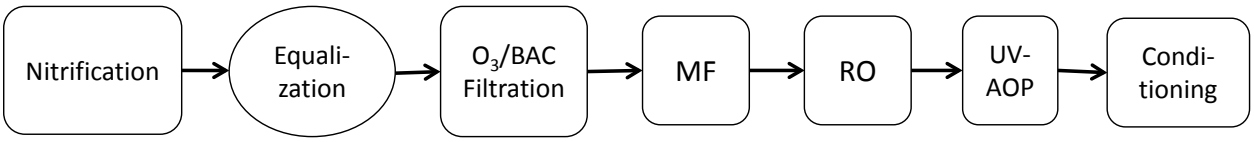



**Figure A8-5. Illustration of the CAT Conceptual Approach for Element 3a, Potable Reuse**

Table A8-1 below describes the final project elements. The cost estimates for Elements 1, 2 and 3 all contain a range of uncertainty. For example, while it is possible that the final cost for implementing Strategy 1 may be substantially less, it is also possible the costs may be more. Focusing only on Strategy 1, the factors that may lead to lower costs include the following:

1. It is beyond the scope of the WSAC to recommend the actual design of these Elements. For example, in lieu recharge (Element 1) might be implemented in many different ways, depending on the interests of neighboring districts, the constraints of water treatment, the constraints of existing distribution pipelines, etc. Similarly, direct injection (Element 2) may be conducted by the City alone, or in conjunction with neighboring districts, focused on one aquifer strata, or focused on several strata, etc. I.e., there are many unknowns that must be answered to define the final project.
2. The Project Elements Summary does not include the revenue from sale of water to neighboring districts, or other means of potential cost-sharing. It is premature to estimate that cost sharing contribution or possible revenues back to Santa Cruz.
3. The cost of upgrade of GHWTP, $62 million, is the largest single line item on the Gantt Chart. The purpose of this expenditure is to allow treatment of more winter water from the San Lorenzo River for the purpose of maximizing Elements 1 and 2. To be able to produce and deliver more water in the winter, we may need to deal with water with turbidity levels that are beyond that which can be effectively treated by the GHWTP. Lower cost options for addressing this purpose may be available and include: a) using existing GHWTP treatment capacity, b) constructing a Ranney Collector to reduce turbidity, and/or c) installation of a small-scale satellite treatment plant. The information needed to assess the feasibility of these alternatives is currently

unavailable. A principal piece of needed data is an understanding of the current GHWTP's ability to treat water at the quality and quantity needed for Elements 1 and 2, followed by an understanding of the most cost-effective way of meeting treatment goals associated with these elements where the GHWTP might fall short.

4. The cost of upgrading the Tait St. Diversion, $14 million, is included in the cost estimate and is a placeholder for achieving increased diversion capacity on the San Lorenzo River for the purposes of maximizing Elements 1 and 2. However, with the City adoption of the aquifer recharge strategy and the completion of a Habitat Conservation Plan, the expectation is that state and federal fisheries agencies will remove their long-standing protest of the City's water rights application to use Felton Diversion for direct pumping to Graham Hill Treatment Plant. State approval of this water rights revision may allow the City to use the Felton Diversion for additional winter water diversion, rather than expand the Tait St. Diversion.
5. Current calculations are based on a 30-year life-cycle and do not account for residual value in capital expenditures beyond 30 years. Longer-lived infrastructure, such as pipelines between Santa Cruz and neighboring districts, likely has value that is not included in the cost accounting.
6. Costs could be significantly greater in order to generate yield sufficient to meet the gap, e.g., final pipeline routes could be longer or geological conditions could require more injection wells.
7. Strategy 1 will be implemented in incremental fashion. Initial expenditures are intended to define the project(s) and its feasibility at meeting the Plan's goals in the most cost effective way possible. Subsequent expenditures would be made based on feasibility and cost effectiveness with little risk of creating stranded assets.

## Table A8-1. Project Element Capital Cost Components and Assumptions

| Element Number/Type | Capital Cost Components | Basis for Assumptions |
|---|---|---|
| 1 – In lieu | <u>Existing Infrastructure Improvements</u><br>• Tait Street Diversion Improvements<br>• Graham Hill WTP Improvements<br><u>Pumps and Pipelines</u><br>• 3,600 gpm Pump Station (City to Scotts Valley)at Intertie No. 1<br>• 16-inch Intertie 1 Pipeline (City to Scotts Valley), 3,600 linear feet (LF)<br>• 3,600 gpm Pump Station (Soquel to City) at SqCWD Intertie<br>• 16-inch Intertie Pipeline (City to Soquel Creek), 25,000 LF<br><u>Wells</u><br>• 4 350-gpm extraction wells in SVWD<br>• 4 350-gpm extraction wells in SqCWD<br>• Iron & manganese treatment, 8 wells<br>• Land acquisition for wells, 4 sites in SqCWD and 4 sites in SVWD | • In lieu is based on winter demands for SqCWD and SVWD.<br>• Water could be transferred to wells within the City, to SqCWD, and to SVWD.<br>• Infrastructure is sized to accommodate 2.5-mgd (million gallons per day) peak flow between the City and SVWD and between the City and SqCWD. This sizing is to allow inclusion additional flows for ASR in the future.<br>• The ultimate number and distribution of wells between agencies will be determined during project development.<br>• The Tait Street and GHWTP improvements are based on current information that indicates that these facility upgrades are needed to treat a larger volume of higher turbidity water. This will be better defined moving forward.<br>• It is assumed that the wells will all have a peak extraction flow rate of 350 gpm.<br>• It is assumed that on-site iron and manganese treatment will be needed at each well.<br>• Well footprints are estimated at 0.1 acre each.<br>• |
| 2 – ASR | <u>Pumps and Pipelines</u><br>• In-City pipeline to Beltz Wells, 4,000 LF<br><u>Wells</u><br>• 2 350-gpm Wells in SVWD) | • ASR is based on the assumption that there is adequate capacity in the basin to store and produce water as supplied from available winter flows. It is also assumed that early project activities will include field work to evaluate the validity of these initial assumptions (i.e., how well ASR is likely to work in terms of both storage capacity and future yield).<br>• The project elements for the ASR program build on the project elements already developed in |

| | | |
|---|---|---|
| | • 2 350-gpm Wells in SqCWD<br>• 4 350-gpm Wells in Santa Cruz<br>• Iron & manganese treatment, 4 wells<br>• Land acquisition, 0.1 ac. each in SVWD and SqCWD | Element 1.<br>• Water could be transferred to wells within the City, to SqCWD, and to SVWD.<br>• Infrastructure is sized to accommodate 2.5-mgd peak flow between the City and SVWD and between the City and SqCWD.<br>• The ultimate number and distribution of wells between agencies will be determined during project development.<br>• It is assumed that the wells will all have a peak injection flow rate of 250 gpm and a peak extraction flow rate of 350 gpm.<br>• It is assumed that on-site iron and manganese treatment will be needed at each well.<br>• Well footprints are estimated at 0.1 acre each. |
| 3 – Indirect potable reuse via groundwater recharge | CAT Process<br>• Nitrification (3.9 mgd)<br>• Ozone/BAC Filters (3.9 mgd)<br>• Microfiltration (3.9 mgd)<br>• Reverse Osmosis (3.5 mgd)<br>• Advanced Oxidation (Peroxide + UV) (3.0 mgd)<br>• Conditioning Facilities (3.0 mgd)<br>• Effluent Diffuser Modification<br><u>Pumps and Pipelines</u><br>• 2,700 gpm Pumping System—WWTP to CAT<br>• Pipeline Installation—WWTP to CAT, 200 LF<br>• Equalization Basin, 0.5 million gallons<br>• 2,100 gpm Pumping System—WWTP to Soquel Creek<br>• 16-inch Pipeline to Wells, 20,100 LF<br>• 16-inch Pipeline under San Lorenzo River, 350 LF<br>• 16-inch Pipeline Under Woods Lagoon, 445 LF | • Potable reuse capacity is designed for 3-mgd product water 365 days a year based on treating only City of Santa Cruz flows. (I.e., conservatively assuming raw sewage and/or effluent from SqCWD and SVWD was unavailable.)<br>• Infrastructure for potable reuse treatment is identical for all potable reuse alternatives. Treatment is on-site at the WWTP. Costs to treat blended water at GHWTP not included (~$2.7M/yr for 3 mgd daily flow)<br>• Groundwater recharge is assumed to occur near the coast. |

| | | |
|---|---|---|
| | • 16-inch Pipeline Installation—transmission line to well 1, 2,640 LF<br>• 14-inch Pipeline Installation—<br>well 1 to well 2, 2,640 LF<br>• 12-inch Pipeline Installation—<br>well 2 to well 3 to well 4, 5,280 LF<br>• 10-inch Pipeline Installation (WWTP to wells 5-6, 10"), 5,280 LF<br>• 8-inch Pipeline Installation—well 6 to well 7, 2,640 LF<br>• 6-inch Pipeline Installation—well 7 to well 8, 2,640 LF<br><u>Wells</u><br>• 8 350-gpm Injection Wells at SqCWD | |
| 4 – City desalination | • City Desalination Plant Capital Cost (from earlier Santa Cruz work)<br>• Effluent Outfall Modifications | • The City desalination option capacity is 3 mgd product water 365 days a year.<br>• Cost includes property rights acquisition.<br>• Water from the facility would be added in at Bay Street has been added (instead of into the distribution system at a lower point). |

Capital Costs.

The capital cost estimates represent an order-of-magnitude (AACEI Class 5) approach. For an order of magnitude estimate the planners, hydrogeologists and engineers have defined major project components (see examples above), estimated approximate required capacities, established preliminary design criteria, and selected rough locations for facilities and routings for connection infrastructure such as pipelines. BC used capital cost information from other similar projects (for example, City of San Diego Pure Water and Orange County Sanitation District/Orange County Water District Groundwater Replenishment Supply—GWRS) and many Northern California pumping stations and pipelines from previous BC planning and design assignments. Pueblo Water Resources supplied information about well construction costs. In terms of costs, Class 5 planning-level estimates, which include a 50 percent contingency factor, are also accompanied by an accuracy range of -30% to +50%. For example, a project presented with a $100M cost including contingency allowance ($66.7 million plus $33.3 million = $ 100 million) likely would have a final cost between $70 million and $150 million. Table A8-2 and Figure A8-6 below summarize the AACE Estimate Classification System.

**Table A8-2 AACE Estimate Classification System, adapted from AACE RP No. 18R-97, *Cost Estimate Classification System – As Applied in Engineering, Procurement and Construction for the Process Industries* (1998)**

| **Estimate Class** | **Primary Characteristic** | **Secondary Characteristic** | | | |
|---|---|---|---|---|---|
| | **Level of Project Definition** (% complete) | **End Use** | **Methodology** | **Expected Accuracy Range** (Typical variation in low and high ranges) | **Preparation Effort** (Typical degree of effort relative to least cost index of 1) |
| Class 5 | 0-2% | Concept Screening | Capacity factored, parametric models, judgement or analogy | L: -20% to -50% H: +30% to 100% | 1 |
| Class 4 | 1-15% | Study or Feasibility | Equipment factored or parametric models | L: -15% to -30% H: +20% to +50% | 2 – 4 |
| Class 3 | 10-40% | Budget Authorization or Control | Semi-detailed unit costs with assembly-level line items | L: -10% to -20% H: +10% to +30% | 3 – 10 |
| Class 2 | 30-70% | Control or Bid/Tender | Detailed unit cost with forced detailed take-off | L: -5% to – 15% H: +5% to 20% | 4 – 20 |
| Class 1 | 50-100% | Check Estimate or Bid/Tender | Detailed unit cost with detailed take-off | L: -3% to – 10% H: +3% to 15% | 5 - 100 |

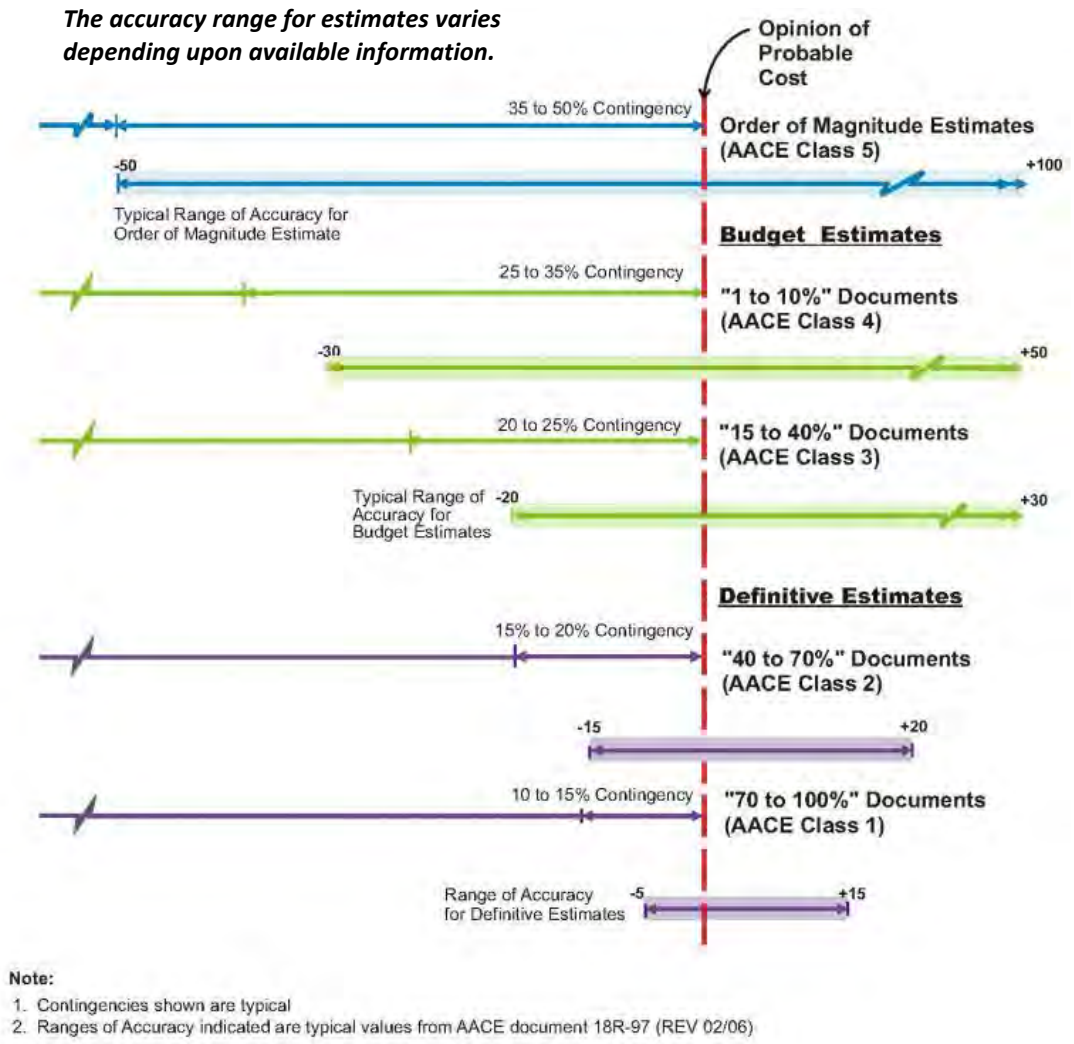



**Figure A8-6 Opinions of Probable Cost Typical Contingencies and Ranges of Accuracy**

The standard cost multipliers used on the construction subtotal (1.5X the base capital materials cost) in the capital estimates included:

- Engineering and Administration 20%
- Legal 5%
- Geotechnical Investigation 1%
- Permitting - CEQA/NEPA 5%

Project sizing, e.g., flow rate for a pumping station or pipeline, came from a combination of Confluence® model runs (for available raw water from the City's current sources) and assessment of available resources such as raw wastewater flows and estimated recovery of

recycled water after allowing for production losses. For this project, the reader should note that each estimated construction cost includes a contingency allowance for both "known unknowns" and "unknown unknowns." Known unknowns include items such as site geotechnical conditions (at most sites no investigations have occurred yet but some sites such as the WWTP are built over originally swampy ground) and existing potential utility interferences. Unknown unknowns could be things such as endangered species habitat that requires rerouting/relocation of facilities or potential well site exploration that would show unsuitable underlying geology. The contingency allowance was set at 50 percent to reflect the very early conceptual level for the work.

Capital costs also recognize that the City will expend considerable funds in its planning, design, and facilities permitting.

O&M Costs

O&M costs include a wide variety of ongoing project costs. CAT-specific treatment O&M costs were based on South District WWTP (Miami-Dade Sanitation District Miami, FL) costs prepared by BC. Basic O&M cost elements included:

- Electricity to run equipment and to pump (based on elevation lift and frictional losses) at $0.013/kW-hr,
- Infrastructure and mechanical spare parts, equipment repairs and replacement:
  - Pumping Systems: Pump replacement every 15 years + pumping system replacement every 30 years.
  - Pipelines: Annual O&M 1.5% of capital cost + 60-year replacement.
  - Storage Tank: Annual O&M at 0.5% of capital cost + painting every 20 years + 60-year replacement.
  - Treatment Processes Nitrification, Ozone/BAC, Conditioning Facilities – Annual O&M 1.5% of capital cost + 60-year replacement for full unit.
  - Treatment Processes MF, RO, and UV-AOP: Microfiltration and RO based on expected average membrane life and company warranty, UV and Ballast based on average life and company warranty. This also includes 60-year replacement for full unit.
- Treatment chemicals (e.g., greensand and chlorine for the wellhead treatment systems, anti-scalant for the RO system, caustic for pH adjustment post-RO), and
- Cost of treating water through the GHWTP (if the City would choose direct potable reuse later in project implementation).

The O&M costs have similar uncertainty to capital costs.

Unit Costs

BC based unit costs on those prepared by BC for North City Water Reclamation Plant (NCWRP), Harbor Drive Advanced Water Purification Facility (HD AWPF), and North City Water Reclamation Plant, NCWRP Upgrades/Improvements. BC used the sizing criteria from San Diego's Pure Water program for unit processes with a general assumption that the City could modify the existing highly under-loaded SC TF/SC WWTP to achieve nitrification. BC knows the effluent flow rates available and general water quality. The cost curves and the six-tenth rule served as the basis for adjusting estimated capital costs for facility scale changes. For final analysis, a 3-mgd output facility was considered that would treat only City wastewater.

**Why was "yield" selected as the basis of the cost comparison?**

An important metric for evaluating different water supply (and conservation) enhancement options can be developed by examining the cost per some unit of water-related benefit provided. Two water-related benefit measures that might be applied in this context are:

1. ***Yield*** is defined within the WSAC context as the amount by which a water option, or a portfolio of options, decreases the gap between peak season demand and the supply of water available in that peak season. Yield is typically measured in terms of the estimated millions of gallons (mg) by which the gap is reduced over the peak season. Yield may also be portrayed in terms of the size of the remaining peak season gap in a given projected water year (measured in MG, and/or in terms of the percent of peak season demand remaining unmet). Yield estimates reflect how the water supply components operate together as part of the overall SCWD *system*, and yield estimates are generated through application of the *Confluence* model.
2. ***Production*** is the volume of water potentially generated when operating at full design capacity by a water supply option, and is typically described in terms of volume produced in a typical day (e.g., 3 mgd). Production also may be described as how much water would likely be produced over a year (e.g., a 3 mgd facility producing water at that rate for 365 days would produce almost 1,100 MG per year). Production can be a somewhat hypothetical measure of the actual amount of water generated, as many options do not operate at full scale every day of the year (e.g., they may be constrained by the amount of river flows, and/or limited by other components of the overall water system). Production estimates do not account for how components of the overall system interact, but they are useful for scaling the size of the necessary infrastructure and estimating annual operation and maintenance costs.

Either of these water measures can be applied in a "unit cost" metric – i.e., one can use a cost per yield metric and/or a cost per production metric or both.

Of these two possible metrics, the "cost per yield" version was selected by the WSAC as the most informative and relevant during the evaluation phase. This is because "yield" reflects the true value to the community of the water generated by an alternative–it reflects how much an option (or portfolio of options) helps address water shortages in the times of year when shortages otherwise would arise and result in curtailments being imposed on the Water Department's customers.

In contrast, water "production" reflects how much water might theoretically be generated in total, but not necessarily how much water would be truly generated, nor how much of the water shortage problem it might help address.

- **How will "Annualized Cost per Average Year Yield" be used with other metrics in comparing projects?**

A metric selected by WSAC for evaluating options is the Annualized Cost per Average Year Yield (ACAYY). This metric applies the estimated total annualized cost of an option (the annualized capital expense, such as would be incurred through bond repayments, plus the annual operation and maintenance costs), divided by the estimated average year yield (AYY).

The total annualized costs portion of the metric provides a useful approximation of how much the community will pay each year for the alternative. The AYY portion of the metric reflects the estimated value realized by the community (in terms of yield–the amount by which water shortage problems are resolved) averaged across projected future water year outcomes. This metric thus provides an indication of costs borne relative to the benefit received by rate payers.

This metric will be used to help guide deliberations about how the preferred water plan elements may be adjusted over time, as more information becomes available through the initial stages of investigation and implementation. For example, if technical or institutional complications (or simplifications) arise that render the expected cost of a preferred alternative considerably higher (or lower) than initially estimated, and/or result in lower (or higher) anticipated water yields, then the expected ACAYY cost per yield metric for that element will increase (or decrease). If the increase (or decrease) in ACAYY is sufficiently large, then the unit cost information will be considered—along with other factors—with respect to whether there should be some change in the portfolio moving forward (e.g., to enlarge or reduce the scale of one element as compared to another).

It is important to note that there is <u>not</u> a hard cut-off value for ACAYY for when an alternative may be modified or dropped from further consideration. WSAC opted for a benchmark of a 130% difference in the ACAYY unit cost metric, for comparing one portfolio element against another, as a basis for whether or not an adaptive change in strategy should be *considered*.

However, WSAC also clearly indicated that an ACAYY beyond the 130% level should not necessarily result in a change in strategy. WSAC also noted that some options provide ancillary benefits that are not necessarily reflected in the ACAYY metric (e.g., aquifer restoration may enhance instream flows), and such additional benefits may justify a higher unit cost compared to the ACAYY of other options.

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**List of Attachments**

Attachment 1 Project Element Summary

Attachment 2 Gantt Chart, Implementation Plan and Timeline

Attachment 3 Table of Decision Nodes and Related Milestones

Attachment 4 Subway Diagrams

**Project Elements Summary**

| | Element | 1 | 2 | 3a | 3b | 3c | 3d |
|---|---|---|---|---|---|---|---|
| | Building Block Approach | In-Lieu | ASR and In-Lieu Combined* | DPR Small (3 mgd) | IPR-Loch (3 mgd) | IPR-GW (3 mgd) | Local Desal (3mgd) |
| a | Capital Cost ($ M) | 131 | 159 | 89 | 132 | 119 | 147 |
| b | Annual O&M cost ($ M/yr) | 2.6 | 3.7 | 3.5 | 5.2 | 4.2 | 3.9 |
| c | Total Annualized Cost ($ M/yr) | 11.6 | 14.6 | 9.6 | 14.3 | 12.4 | 14.0 |
| d | Present Value Costs ($M) | 185 | 237 | 162 | 241 | 207 | 229 |
| h | Worst Year Yield (MG) | 750 | 760 | 810 | 660 | 740 | 810 |
| i | Average Year Yield (MG) | 350 | 380 | 440 | 430 | 380 | 440 |
| j | Worst year yield unit cost (Total Ann Cost/Wst Yr Yield) | 15,500 | 19,300 | 11,900 | 21,600 | 16,700 | 17,300 |
| k | ACAYY** (Total Ann Cost/Ave Yr Yield) | 33,200 | 38,500 | 21,900 | 33,200 | 32,600 | 31,800 |
| l | Worst Year Peak Season Shortage (MG) | 480 | 470 | 420 | 570 | 490 | 420 |
| m | Worst Year Peak Season Shortage (%) | 25% | 24% | 22% | 29% | 25% | 22% |
| n | Average Year Peak Season Shortage (MG) | 120 | 90 | 30 | 40 | 90 | 30 |
| o | Average Year Peak Season Shortage (%) | 6% | 5% | 2% | 2% | 5% | 2% |

* Both the costs and yields in this column reflect the combined costs of implementing both in-lieu and ASR.

**ACAYY = Annualized Cost per million gallons of Average Year Yield

**NOTES:**

1 All estimates are preliminary, rounded, and subject to revision and refinement as more detailed analysis is developed.

2 Total annualized costs based on amortizing capital outlays using a capital recovery factor of 0.0688 (reflecting a 30-year bond term at a 5.5% rate of interest to estimate the annual payment), and adding annual O&M costs.

3 Present Value Costs calculated based on capital outlays occuring in first year, followed by 30 years of annual O&M expense, discounted to present worth using a 2.5% real discount rate. No inflation escalation included.

4 ASR costs and yields reflect the *combined* cost and yields associated with adding ASR to the In-lieu program. Energy use for the combined ASR and In-Lieu elements reflect a volume-weighted average across the two elements.

5 Potential for revenues from water sales, cost sharing, and grant funding are not reflected.

6 All Element 3 options scaled at 3 mgd, reflecting potential reuse production based soley on City of Santa Cruz effluent flows.

7 See additional notes on following page.

***C = Averaged Costs (All BBs)***

| | -30% | Mean | +30% |
|---|---|---|---|
| Worst Yr | 11,935 | 17,050 | 22,165 |
| Avg Yr | 22,307 | 31,867 | 41,427 |
| median | | 32,900 | 1.03 |

***C' = Averaged Costs (Element 3 BBs)***

| | -30% | Mean | +30% |
|---|---|---|---|
| Worst Yr | 11,813 | 16,875 | 21,938 |
| Avg Yr | 20,912 | 29,875 | 38,837 |
| median | | 32,200 | 1.08 |

***C'' = Averaged Costs (Element 1 & 2 BBs)***

| | -30% | Mean | +30% |
|---|---|---|---|
| Worst Yr | 12,180 | 17,400 | 22,620 |
| Avg Yr | 25,095 | 35,850 | 46,605 |
| median | | 35,850 | 1 |

**ADDITIONAL NOTES**

**Elements 1&2: In lieu/ASR:** Capital Costs

1. Infrastructure is sized to accommodate In-lieu plus ASR (to allow peak flow for recharge of 5 mgd -- 2.5 mgd out to Soquel Creek and 2.5 mgd to Scotts Valley).
2. All infrastructure costs needed for the in lieu program are included in the in lieu option. The ASR capital costs added to the in-lieu costs for the combined option include only additional elements that would be needed for doing recharge and recovery: pipeline to Beltz wells, upgrade of in lieu extraction wells to allow for injection, and additional wells and treatment of the extracted water.
3. In a departure from previous Building Blocks, in the ASR option, a pipeline to the Beltz Wells and 4 wells in Santa Cruz are included. This addition is to allow flexibility in where the water is moved.
4. The capital costs associated with in lieu and ASR include $62M for upgrading the GHWTP and $14M to upgrade the San Lorenzo River Tait Street Diversion. Feasibility studies will evaluate whether there are alternative(s) to these two large projects to meet the same goals at a lower cost. One alternative, as it relates to ASR & in lieu combined, may be installing Ranney Collectors at Felton Diversion. Together with a modified water right to allow for direct diversion from Felton Diversion to GHWTP. This change could lower the cost of this strategy by as much as ~$60M. This would result in an Average year yield unit cost of $27,700.

O&M Costs

1. Operations for recharge and for recovery are set at 180 days each for both in lieu and ASR. That means moving water out for 180 days and moving water back for 180 days. Real-world costs will vary over time.
2. Flow rates are similar to previous building block scenarios. Cost includes both sending water out to SqCWD and SVWD and later sending water back to SCWD.
3. Average flow rate for costing in lieu returns = 4 mgd, split evenly between Soquel Creek and Scotts Valley.
4. Average flow rate for costing ASR = 5 mgd out (same volume would be available for transfer whether it was in lieu or ASR, and this also maintains consistency), split evenly between SqCWD and SVWD. Flow back would be 80% of that volume, or 4 mgd split evenly between SqCWD and SVWD. Real-world recovery will vary from well-to-well.
5. Well extraction pumping in SVWD or SqCWD is ***not*** included - it is roughly balanced out by the energy savings of not running wells in SqCWD and in SVWD when in lieu water is being sent.
6. Cost and energy use estimates for combined In-lieu and ASR would be higher if less water were directed to in-lieu and instead directed to ASR (e.g., more water injected if more goes to ASR).

**Element 3**

General assumptions

1. Potable reuse capacity is designed for 3-mgd *product water 365 days a year* based on treating only City of Santa Cruz flows. (I.e., conservatively assuming effluent from SqCWD and SVWD are unavailable.)
2. Infrastructure for potable reuse treatment is identical for all potable reuse alternatives. Treatment is on-site at the WWTP. Costs to treat blended water at GHWTP not included (~$2.7M/yr).

***Element 3a: DPR***

1. DPR water blends with raw water near Bay Street Reservoir. Energy calculation uses very conservative estimate that existing pressure pipe will not be changed.(A pipeline improvement would decrease energy needs.)
2. It is reasonable to assume that the City would investigate pipeline improvements and a lower-pressure operating scenario might be found. This change could significantly reduce the energy cost per MG.

***Element 3b: IPR to Loch Lomond***

1. A very significant portion of energy use is embedded in the pumping costs to move water ~800 vertical feet up to Loch Lomond.

***Element 3c: IPR for Groundwater Recharge***

1. Groundwater recharge is assumed to occur near the coast.
2. Eight wells included for 3 mgd capacity scenario used here.

***Element 3d: Local Desal***

1. The City desalination option capacity is 3 mgd product water 365 days a year.
2. Cost now includes property rights acquisition.
3. An O&M cost element for lifting the water to Bay Street has been added (instead of into the distribution system at a lower point).

| | Item | Units | Quantity | Cost, dollars | |
|---|---|---|---|---|---|
| | | | | Cost per unit | Cost |
| **Treatment Processes** | | | | | |
| 1 | Nitrification (6.1 mgd) | LS | 1 | 1,500,000 | 1,500,000 |
| 2 | Ozone/BAC Filters (6.1 mgd) | LS | 1 | 9,000,000 | 9,000,000 |
| 3 | Microfiltration (6.1 mgd) | LS | 1 | 14,000,000 | 14,000,000 |
| 4 | Reverse Osmosis (5.5 mgd) | LS | 1 | 20,000,000 | 20,000,000 |
| 5 | Advanced Oxidation (Peroxide + UV) (4.7 mgd) | LS | 1 | 3,250,000 | 3,250,000 |
| 6 | Conditioning Facilities (4.7 mgd) | LS | 1 | 1,432,500 | 1,432,500 |
| 7 | Effluent Diffuser Modification | LS | 1 | 1,000,000 | 1,000,000 |
| | | | | **Site Work Subtotal** | **50,182,500** |
| **Pumps and Pipes** | | | | | |
| 8 | Pumping System (WWTP to CAT) | GPM | 4,300 | 400 | 1,720,000 |
| 9 | Pipeline Installation (WWTP to CAT) | LF | 200 | 600 | 120,000 |
| 10 | Pumping System (CAT to Bay St. Reservoir) | GPM | 3,200 | 400 | 1,280,000 |
| 11 | Pipeline Installation (CAT to Bay St. Reservoir) | LF | 6,000 | 440 | 2,640,000 |
| 12 | Equalization Basin | LS | 1 | | 500,000 |
| | | | | **Pipeline, Pumps, Dam, Appurtenances Subtotal** | **6,260,000** |
| | | | | **Construction Subtotal** | **56,442,500** |
| | Contingency | percent | 50 | --- | 28,221,250 |
| | | | | **Subtotal** | **84,663,750** |
| | Engineering and Administration | percent | 20 | --- | 16,932,750 |
| | Legal | percent | 5 | --- | 4,233,188 |
| | Geotechnical Investigation | percent | 1 | --- | 846,638 |
| | Permitting - CEQA/NEPA | percent | 5 | --- | 4,233,188 |
| | Other | percent | 0 | --- | 0 |
| | | | | **Subtotal** | **26,245,763** |
| | Line Maintenance Facility Relocation | | | | **5,200,000** |
| | | | | **Total Project Cost** | **116,200,000** |

| Operation and Maintenance Cost for Building Block 3 | |
|---|---|
| **Parameter** | **Value** |
| Nitrification Tower Rework & Pipeline capital cost ($) | $2,947,500 |
| Nitrification Tower electricity cost ($/year) | $28,470 |
| Nitrification Tower O&M Cost | 1.5% |
| Annual O&M cost ($/year) | $44,212.50 |
| Nitrification Tower Replacement | 60 |
| Nitrification Tower Replacement Cost ($/year) | $49,125 |
| Total Nitrification Tower electricity, O&M and replacement cost ($/year) | **$121,808** |
| | |
| **Ozone/BAC Filters** | |
| Ozone/BAC Filter capital cost ($) | $17,685,000 |
| Ozone/BAC electricity cost ($/year) | $48,916 |
| Ozone/BAC O&M Cost | 1.5% |
| Ozone/BAC Filter annual cost ($/year) | $265,275 |
| Ozone/BAC Filter replacement | 60 |
| Ozone/BAC Filter replacement cost ($/year) | $294,750 |
| Total Ozone/BAC Filter O&M and replacement cost ($/year) | **$608,941** |
| | |
| **Microfiltration** | |
| Microfiltration system installation cost ($) | $27,510,000 |
| Electricity consumption cost ($/year) | $250,536 |
| Microfiltration maintenance cost ($/year) | $51,429 |
| Chemical/Cleaning Cost | $207,386 |
| Microfiltration system replacement | 60 |
| Microfiltration system replacement cost ($/year) | $458,500 |
| Total Microfiltration system O&M and replacement cost ($/year) | **$967,851** |
| | |
| **Reverse Osmosis** | |
| RO system installation cost ($) | $39,300,000 |
| Electricity Consumption Cost ($/year) | $740,220 |
| RO System maintenance cost ($/year) | $136,080 |
| Chemical/cleaning cost | $193,389 |
| RO system replacement | 60 |
| RO system replacement cost ($/year) | 655,000 |
| Total RO system O&M and replacement cost ($/year) | **$1,724,689** |
| | |
| **Peroxide/UV Disinfection** | |
| UV system installation cost ($) | $6,386,250 |
| Electricity Consumption Cost ($/year) | $182,208 |
| Maintenance/Replacement UV & Ballast cost ($/year) | $73,234 |
| Hydrogen Peroxide | $67,634 |
| UV system replacement | 30 |
| UV system replacement cost ($/year) | $212,875 |
| Total UV system replacement cost ($/year) | **$535,951** |
| | |

| Conditioning Facilities | |
|---|---|
| Conditioning facilities installation cost ($) | $2,814,863 |
| Electricity Consumption Cost ($/year) | $28,470 |
| Maintenance cost ($/year) | 1.5% |
| Maintenance cost ($/year) | $42,223 |
| Conditioning facility replacement | 30 |
| Conditioning facility replacement cost ($/year) | $93,829 |
| Total Conditioning facility O&M and replacement cost ($/year) | **$164,522** |
| | |
| **Pumping System (WWTP to CAT)** | |
| Pumping System | $3,379,800 |
| Electricity Consumption Cost ($/year) | $64,912 |
| Pump replacement interval | 15 |
| Pump replacement cost ($) | $250,000 |
| Pump replacement cost ($/year) | $16,667 |
| Pumping System Replacement | 30 |
| Pumping System Replacement cost ($/year) | $112,660 |
| Total Pump and Pumping System O&M and Replacement cost ($/year) | **$194,238** |
| | |
| **Pipeline (WWTP to CAT)** | |
| Pipeline capital cost ($) | 235,800 |
| Pipeline O&M Cost | 1.5% |
| Pipeline annual cost ($/year) | $3,537 |
| Pipeline replacement | 60 |
| Pipeline replacement cost ($/year) | $3,930 |
| Total Pipeline O&M and replacement cost ($/year) | **7,467** |
| | |
| **Pumping System (CAT to Bay St. Reservoir)** | |
| Pumping System | $2,515,200 |
| Electricity Consumption Cost ($/year) | $580,788 |
| Pump replacement interval | 15 |
| Pump replacement cost ($) | $250,000 |
| Pump replacement cost ($/year) | $16,667 |
| Pumping System Replacement | 30 |
| Pumping System Replacement cost ($/year) | $83,840 |
| Total Pump and Pumping System O&M and Replacement cost ($/year) | **$681,295** |
| | |
| **Pipeline (CAT to Bay St. Reservoir)** | |
| Pipeline capital cost ($) | 5,187,600 |
| Pipeline O&M Cost | 1.5% |
| Pipeline annual cost ($/year) | $77,814 |
| Pipeline replacement | 60 |
| Pipeline replacement cost ($/year) | $86,460 |
| Total Pipeline O&M and replacement cost ($/year) | **164,274** |
| | |
| **Equalization Basin** | |
| Steel Equalization Tank | $982,500 |

| | |
|---|---|
| Operation and Maintenance | $4,913 |
| Painting Cost ($) | $150,000 |
| Painting interval | 20 |
| Painting Cost ($/year) | $7,500 |
| Tank replacement | 60 |
| Tank replacement cost ($/year) | $16,375 |
| Total tank painting, O&M, and replacement cost ($/year) | **$28,788** |
| | |
| **Sampling/Water Quality Analysis** | |
| Sampling/Water Quality Analysis | **$25,999.12** |
| | |
| **Total Annual O&M Cost** | **$5,200,000** |

# Figure 12 Gantt Chart
# Implementation Plan and Timeline

| | Node | Activity | Duration (years) | 2016 Year 1 Q1 Q2 Q3 Q4 | 2017 Year 2 Q1 Q2 Q3 Q4 | 2018 Year 3 Q1 Q2 Q3 Q4 | 2019 Year 4 Q1 Q2 Q3 Q4 | 2020 Year 5 Q1 Q2 Q3 Q4 | 2021 Year 6 Q1 Q2 Q3 Q4 | 2022 Year 7 Q1 Q2 Q3 Q4 | 2023 Year 8 Q1 Q2 Q3 Q4 | 2024 Year 9 Q1 Q2 Q3 Q4 | 2025 Year 10 Q1/2 Q3/4 | 2026 Year 11 Q1/2 Q3/4 | 2027 Year 12 Q1/2 Q3/4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| strategy 1 | Element 1 - In lieu | Both near term with SqCWD using North Coast & lareger project with SqCWD & SVWD using SLR water | | | | | | | | | | | | | |
| | 1.1D | Near term: Develop Agreements, Complete CEQA, Resolve any Infra. Issues | 0.5 | 1.1 | | | | | | | | | | | |
| | 1.2M | Evaluate larger project(s) with other agencies; affirm return water volumes & water rights | 3 | | | 1.2 | | | | | | | | | |
| | 1.3W/D | Completion of agreements, water rights, planning/prelim design, siting study & CEQA. | 1 | | | | | 1.3 | | | | | | | |
| | 1.4W | Infrastructure Improvements (see below for potential projects) & return water to SCWD | 4 | | | | | | | 1.4 | | | | | |
| | 1.5D/W | Assess performance | NA | | | | | | | | | | 1.5 | | |
| | Element 2 - ASR (City, SqCWD and/or SVWD; i.e., Purisima & SM) + shared infrastructure (in lieu & ASR) | | | | | | | | | | | | | | |
| | Phase 1 2.1M | Complete & use groundwater model | 0.5-2 | | | | | | | | | | | | |
| | Higher-level Feasibility | Identify/select existing wells for potential pilot testing | 0.25 | | | | | | | | | | | | |
| | | Perform site specific injection capacity & geochemical analyses | 0.5 | | | | | | | | | | | | |
| | | Develop Pilot Program & identify potential sites for new ASR well(s) | 0.75 | | | 2.1 | | | | | | | | | |
| | Phase 2 2.2D | Retrofit existing wells | 0.25 | | | | | | | | | | | | |
| | Pilot Testing | Perform injection well hydraulic testing | 0.25 | | | | | | | | | | | | |
| | | ISR cycle testing | 1-2 | | | | | 2.2 | | | | | | | |
| | | Develop ASR program | 1 | | | | | | | | | | | | |
| | Phase 3 2.3M/W | Procure properties | 1 | | | | | | | | | | | | |
| | Implementation | Design Project (includes City Administration) | 1 | | | | | | | | | | | | |
| | | CEQA | 0.5 | | | | | | | | | | | | |
| | | Construct | 1.5 | | | | | | | 2.3 | | | | | |
| | 2.4D/W | Assess performance | 2 | | | | | | | | | 2.4 | | | |
| | 2.5W | Storage target achieved | NA | | | | | | | | | | | | 2.5 |
| | Infrastructure Improvements for Long term in lieu and/or ASR | | | | | | | | | | | | | | |
| | | Design/build pipeline in Santa Cruz to Beltz Wells | 1.5 | | | | | | | | | | | | |
| | | Tait Street Diversion Improvements | 3 | | | | | | | | | | | | |
| | | Graham Hill WTP Improvements | 4 | | | | | | | | | | | | |
| | | Design & build Soquel Creek transfer (back), Scotts Valley transfer (to) infrastructure | 2 | | | | | | | | | | | | |
| | | Pump Station (Soquel to City) | 1.5 | | | | | | | | | | | | |
| | | Intertie No. 1 Pipeline (City to Scotts Valley) | 2 | | | | | | | | | | | | |
| | | Pump Station (City to Scotts Valley) Intertie No. 1 | 2 | | | | | | | | | | | | |
| strategy 2 | Element 3 - Advanced Treated Recycled Water or Desalination | | | | | | | | | | | | | | |
| | 3.1M | Define Recycled Water project alternatives and status of DPR regulations | 1 | 3.1 | | | | | | | | | | | |
| | 3.2D | Select preferred Element 3 | 1 | | 3.2 | | | | | | | | | | |
| | 3.3D | Prelim design, CEQA (prepare Draft EIR), permits | 3 | | | | | 3.3 | | | | | | | |
| | 3.4M | Complete Design , CEQA, permits, property acquistion | 2 | | | | | | | 3.4 | | | | | |
| | 3.5W | Complete construction/start up | 2 | | | | | | | | | | 3.5 | | |

These items will be evaluated along with Elements 1 and 2 and implemented as needed.

**Table Notes & Select Assumptions**

This table approximates activities, costs, durations and sequencing of each element, all of which are subject to change.
Elements are shown to start in Q1 - 2016. This may or may not occur depending upon agreements, contracts, etc.
Rehab/replacement of the Newell Creek Pipeline is part of the existing CIP and not shown here.
Some infrastructure improvements may not be required if other pursuits are successful. E.g., evaluation of Ranney collectors may substitute GHWTP Improvements.
CEQA is used generically; implies compliance with Califorina Environmental Quality Act.
Pilot ASR work assumes major infrastructure not required. E.g., intertie to Scotts Valley or new well(s).
Element 2 includes 8 wells for in lieu plus 8 additional wells for ASR.

**Legend**

ASR = Aquifer Storage and Recovery
CEQA = California Environmental Quality Act
DDW = Division of Drinking Water
DPR = Direct Potable Reuse
EIR = Environmental Impact Report
GHWTP = Graham Hill Water Treatment Plant
IPR = Indirect Potable Reuse
ISR = Injection, Storage, Recovery
SCWD = Santa Cruz Water Department
SqCWD = Soquel Creek Water District
SVWD = Scotts Valley Water District

Decision Node
Milestone Node
Some amount of water returned to SCWD
Full required amount of water returned to SCWD

## Overview of Decision Nodes and Related Milestones along Adaptive Pathway Diagram

| NODE | ABBREVIATED DESCRIPTION | ENDING YEAR |
|---|---|---|
| **In-Lieu (Element 1)** | | |
| 1.1D △ | Near Term: Initiation of near term water transfer/sale to SqCWD using North Coast water; agreements in place, and CEQA completed. | c. 2016 |
| 1.2M ◇ | Larger Project: Understanding the feasibility of a potentially larger water transfer/exchange project with SqCWD and/or SVWD using North Coast and San Lorenzo River waters. Includes quantifying return water (using groundwater models) from SqCWD and/or SVWD to Santa Cruz as well as understanding of water rights and inter-agency collaboration. | c. 2018 |
| 1.3W/D □ △ | Larger Project: Completion of agreements specifying terms of transfers to/from SqCWD and/or SVWD, water right modifications, planning/prelim design; complete assessments of cost, yield and schedule; and define CEQA. Decision point for proceeding on final design of associated infrastructure improvements. | c. 2019<br>c. 2020 |
| 1.4W □ | Larger Project: Potential for return of water from SqCWD, and/or SVWD, to SCWD with the construction of infrastructure/treatment improvements. | c. 2022 |
| 1.5D/W △ ■ | Assess in-lieu performance: amount to SqCWD, SVWD, and SCWD; reduced groundwater pumping, groundwater elevations, etc. | c. 2025 |
| **Aquifer Storage and Recovery, ASR (Element 2) Includes evaluation of Purisima and Santa Margarita** | | |
| 2.1M ◇ | High level feasibility work: use of groundwater model; completion of site specific injection capacity and geochemical analyses; development of pilot program. | c. 2017 |
| 2.2D △ | Completion of all administrative items to conduct pilot testing (e.g., CEQA/permits/agreements and well modifications), completion of pilot testing, and assessment of probable ASR system performance, cost and schedule to complete build out of ASR system. | c. 2020 |
| 2.3M/W ◇ □ | Develop/construct ASR wells, ready to operate. | c. 2022 |
| 2.4D/W △ □ | Assess ASR performance against projections and ability to meet project goals. | c. 2024 |
| 2.5W ■ | Aquifer storage target attained (ability to sustain return flows to SCWD at desired levels). | c. 2027 |
| **Advanced Treated Recycled Water or Desalination (Element 3)** | | |
| 3.1M ◇ | Identify recycled water alternatives; increase understanding of recycled water (regulatory framework, feasibility, funding opportunities, public outreach and education) | c. 2016 |
| 3.2D △ | Complete high level feasibility studies, as-needed demonstration testing, and conceptual level designs of alternatives;, define CEQA processes; and continue public outreach and education. Select preferred Element 3. | c. 2017 |
| 3.3D △ | Preliminary design, CEQA (including preparation of draft EIR), and apply for approvals and permits (except building permit). | c. 2020 |
| 3.4M ◇ | Complete property acquisition, final design, complete CEQA and all permits. | c. 2022 |

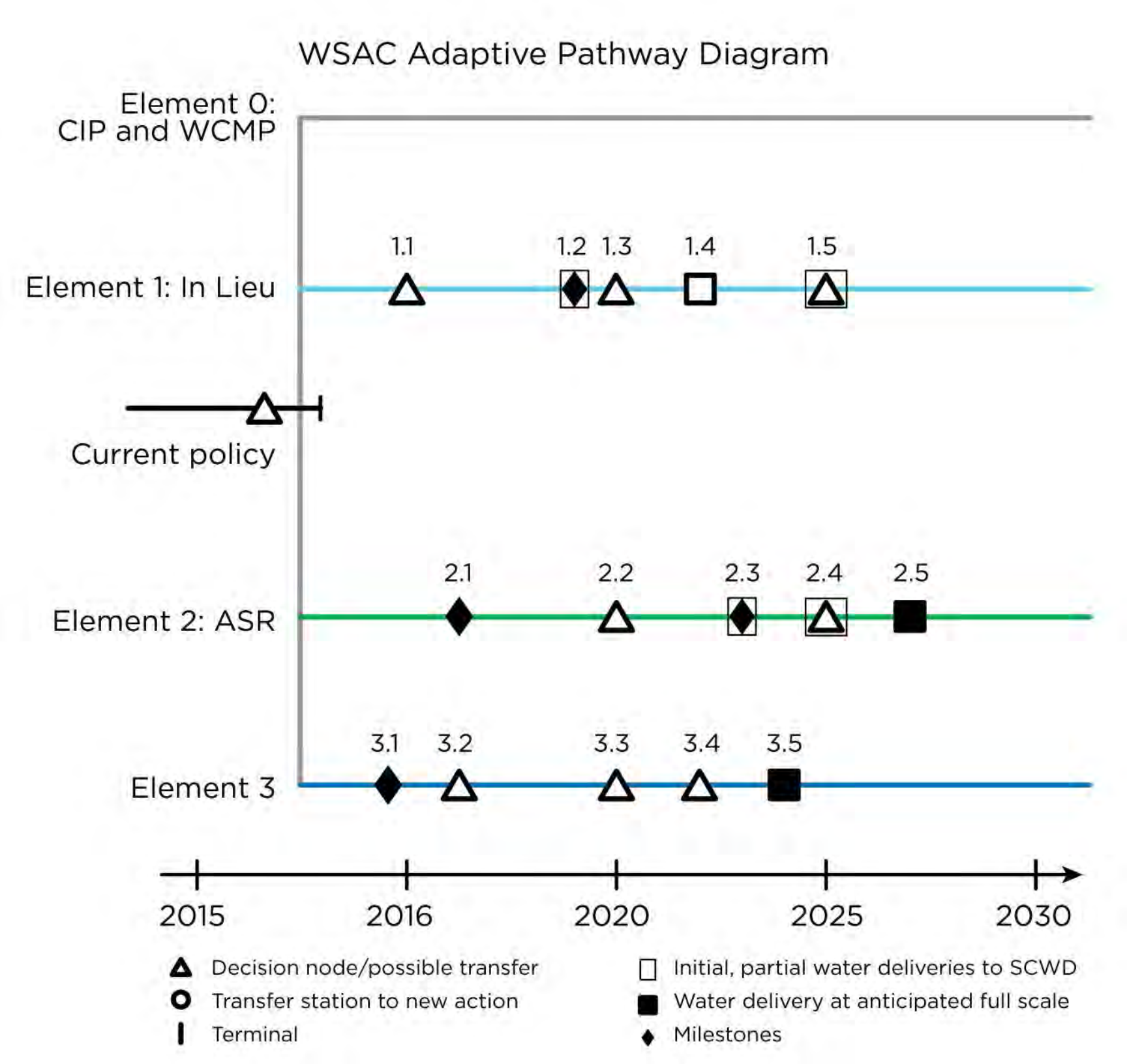
| | | |
|---|---|---|
| 3.5W  | Construction completed: plant start-up, water production begins | c. 2024 |

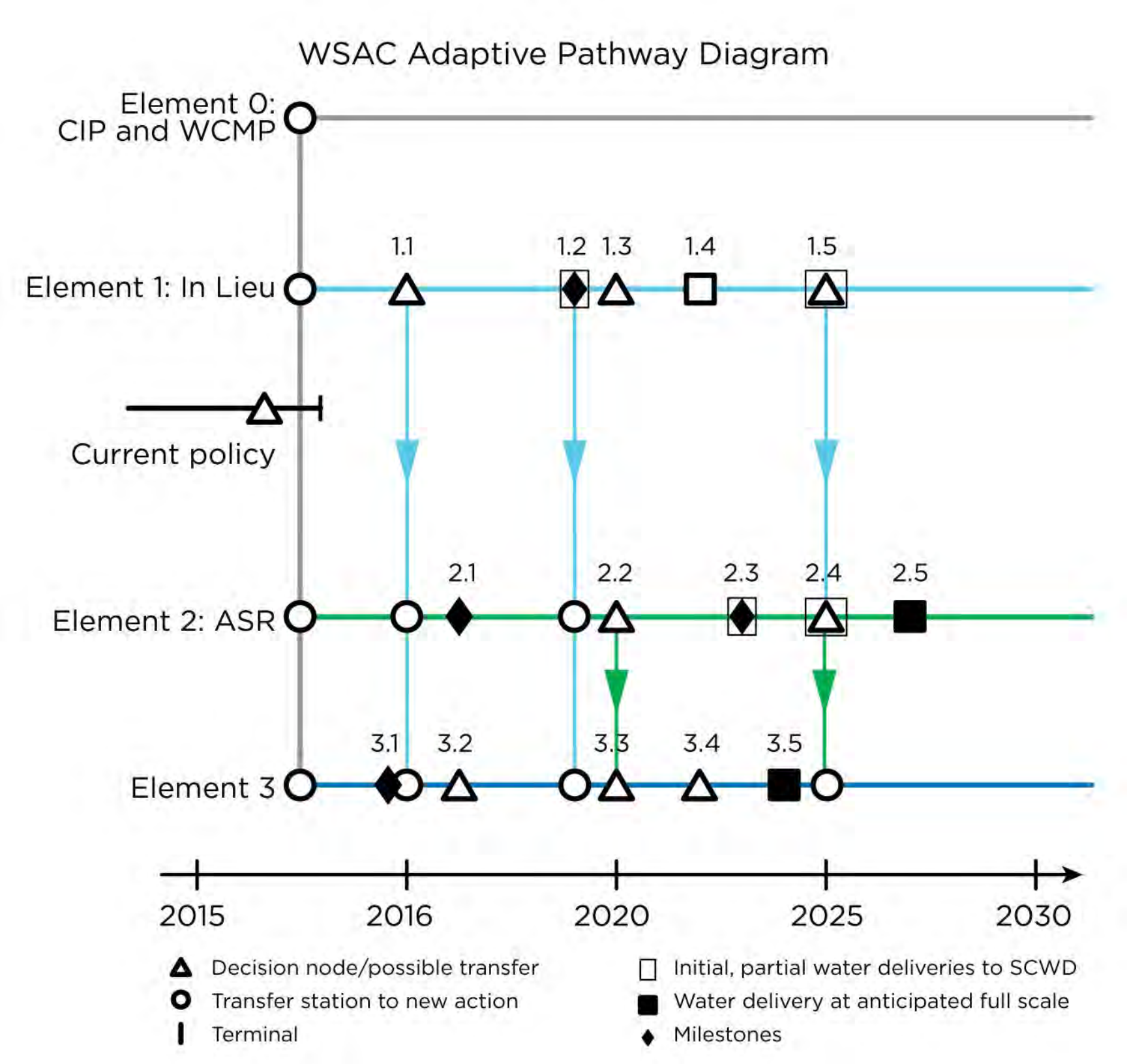
**Abbreviations**

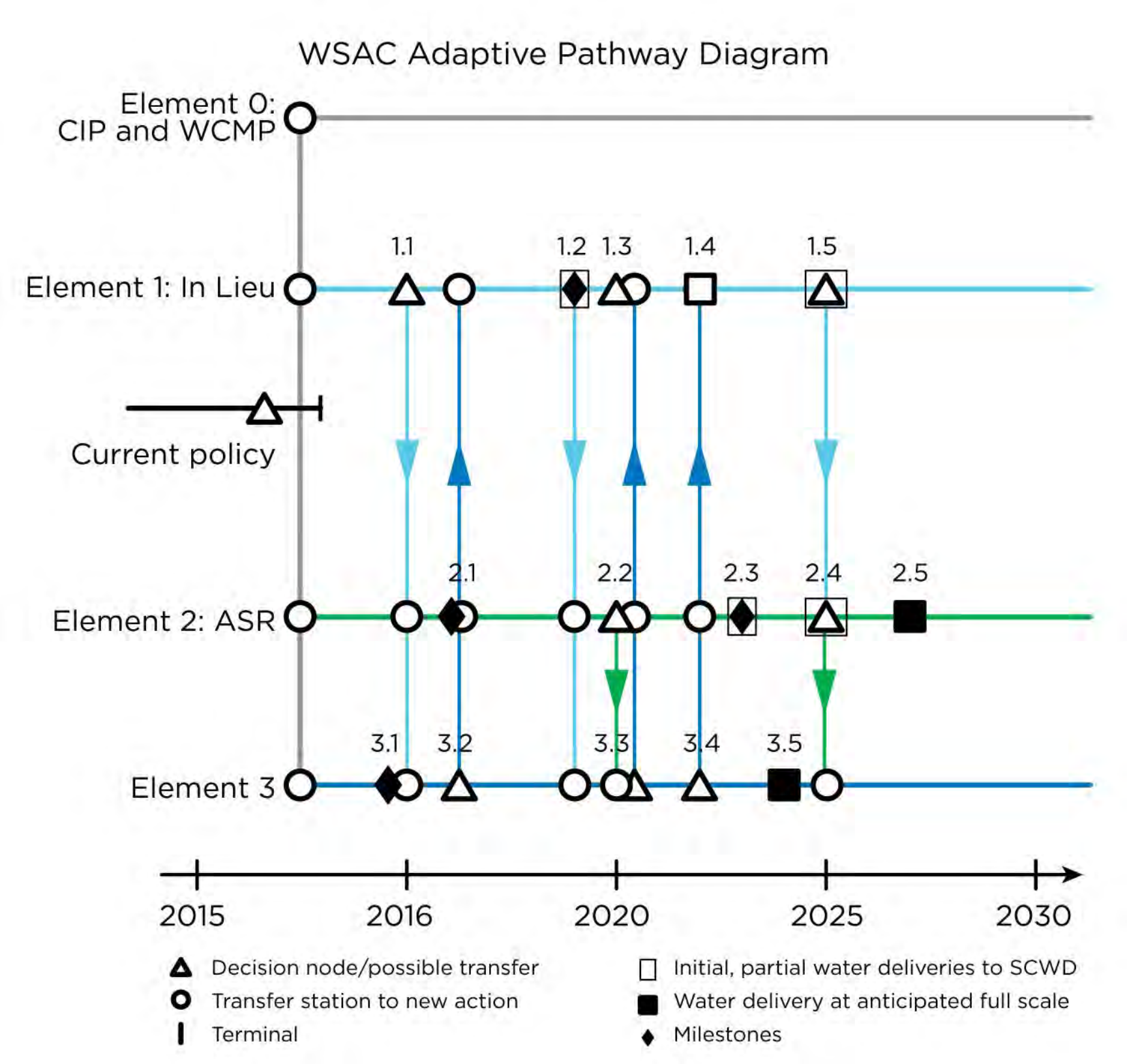
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SVWD = Scotts Valley Water District

**Notes**

- This table is intended as a companion piece to the implementation Gantt chart and subway map. Gantt chart contains additional activity detail(s) for each node.
- Node types
  D = decision node (triangle on subway chart)
  M = milestone (diamond on the subway chart), furthering the understanding of feasibility.
  W = water production potentially available (squares on the subway chart; open square indicates some water; solid square represents full goal being met).
- Node types have been assigned based on a set of assumptions as to how the implementation will proceed. However, if a threshold is being tripped, the node becomes a decision node regardless of its current designation.
- Ending Year refers to when all work associated with reaching node and/or achieving goal(s) will be accomplished. Dates shown are approximate based on current information and project understanding. Dates may adjust depending on: volumes of water available due to winter precipitation levels (which may limit amount of in-lieu and ASR); ability to establish agreements, permits, etc.; and ability to implement workload.


WSAC Adaptive Pathway Diagram
Element 0:
CIP and WCMP
Element 1: In Lieu
1.1
1.2
1.3
1.4
1.5
Current policy
Element 2: ASR
2.1
2.2
2.3
2.4
2.5
Element 3
3.1
3.2
3.3
3.4
3.5
2015
2016
2020
2025
2030
Decision node/possible transfer
Transfer station to new action
Terminal
Initial, partial water deliveries to SCWD
Water delivery at anticipated full scale
Milestones


WSAC Adaptive Pathway Diagram
Element 0:
CIP and WCMP
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2.3
2.4
2.5
3.1
3.2
3.3
3.4
3.5
2015
2016
2020
2025
2030
Decision node/possible transfer
Transfer station to new action
Terminal
Initial, partial water deliveries to SCWD
Water delivery at anticipated full scale
Milestones

# Water Shortage Contingency Plan



**Prepared by:**

**City of Santa Cruz Water Department**

**March 2009**

City of Santa Cruz Water Department

# Water Shortage Contingency Plan

SANTA CRUZ CITY COUNCIL

Cynthia Mathews, Mayor
Mike Rotkin, Vice Mayor
Katherine Beiers
Ryan Coonerty
Don Lane
Tony Madrigal
Lynn Robinson

WATER COMMISSION

Howard Whitney, Chair
Susan O'Hara, Vice Chair
Brent Fouse
Laura Kasa
Charlie Keutmann
Mike McClellan
Andrew Schiffrin

Bill Kocher, Water Director

*Prepared by*
Toby Goddard
Water Conservation Manager

*assisted by*
Aerin Martin
Water Conservation Representative

March 2009

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*Cover graphic courtesy of the California Department of Water Resources*

# Executive Summary

This report constitutes the first comprehensive review and update of the City's Water Shortage Contingency Plan since the early 1990's. The project is an outgrowth of the City's 2005 Urban Water Management Plan, which recognized the many changes in regional conditions and local water supply planning that had taken place over the previous decade, and identified the need to better prepare for the possibility of future water shortages in advance of the next major drought.

## Introduction

This section provides background information about the City water system and the City's Integrated Water Plan, explains the purposes and goals of this plan, summarizes state regulations that pertain to water shortage contingency planning, and describes the process and principles that were used to guide the preparation of this document.

The last time the Santa Cruz area was confronted with a serious water shortage was during a statewide drought that lasted from 1987 through 1992. The exceptional drought of 1976-77, however, remains the most severe event on record. In 2003, the City adopted a long range planning document known as the "Integrated Water Plan", the goal of which was to reduce near term drought shortages and provide a more reliable public water supply through the year 2030. One component of this plan deliberately involves cutting back or "curtailing" system water demand by 15 percent in dry years when water is in short supply.

This plan was developed to fulfill two fundamental purposes:

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

2. To describe how the City would respond if faced with much larger shortages in water supply ranging as high as 50 percent (not only because, as a public water supplier, the City is required to do so by state law, but also because the City remains vulnerable in the near term to a critical water shortage of this magnitude until it secures a new source of supply for drought protection).

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

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

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

3. To budget water use so that supply will be available for the most essential purposes for the entire duration of the water shortage.

Development of this plan was a collaborative effort among the City Water Department staff, the City's Water Commission, City Council, and the public. The process included reviewing the City's existing ordinance and water shortage plans from many other water agencies, addressing various planning and policy issues, and taking into account state regulations. The Water Commission provided its input and recommendations throughout the entire process. The final step will be to prepare an ordinance that incorporates the structure and policy recommendations embodied in this plan. This ordinance would then be adopted and go into effect only if necessary in an actual water shortage following appropriate public notification and public hearing before City Council.

**Assessing Water Supply and Demand**

This section describes the key hydrologic factors affecting the City's water supply and discusses the process staff uses to determine whether a water shortage is expected in the year ahead.

The City of Santa Cruz relies on surface flows in coastal streams and the San Lorenzo River for most of its annual water supply needs. The yield of these sources in any given year is directly related to the amount of rainfall received and runoff generated during the winter season.

After an unusually dry winter or period of consecutive dry years, when a lack of supply appears possible, the Water Department undertakes an analysis to determine whether water supplies will be deficient relative to estimated water needs for the coming dry season. This analysis involves first comparing projected water supply and demand on a monthly basis, assuming no restriction on water

use, to forecast the end of season water level and storage volume in Loch Lomond Reservoir. The Department then evaluates whether the amount of carryover storage in Loch Lomond at the end of the year will be sufficient to meet essential health and safety needs in case the dry weather pattern continues into the following year. If this analysis shows that Loch Lomond Reservoir would be depleted to a dangerously low level, then a decision is made regarding how much reservoir water is available to use in the current year and how much should be banked as a safeguard against the possibility of another dry year. The amount of cutback in demand needed to reduce the rate of reservoir depletion and end the year at a safer level of storage is then determined. If necessary, cutbacks would go into effect in late April or early May and span the entire dry season through the end of October.

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

**Demand Reduction Program**

This section describes the five-stage approach and overall strategy for dealing with water shortages, explains how available water would be allocated among various customer categories according to priority of use, and presents the recommended menu of actions for cutting back water demand during a declared water shortage. This section also covers policies and recommendations regarding enforcement methods, exceptions, and appeals.

**Table ES-1. Five Stage Structure to Water Shortage Contingency Plan**

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

The updated Water Shortage Contingency Plan uses a staged approach that classifies a shortage event into one of five levels spanning a range from less than 5 percent up to 50 percent. The overall concept is that water shortages of different magnitudes require different measures to overcome the deficiency. Because there is so little the City can do in the short run to increase the supply of water, the focus of this plan is primarily on measures that reduce demand. Each stage includes a set of demand reduction measures that become progressively more stringent as the shortage condition escalates. Normally, only one of these five stages would be put into effect early in the year at the recommendation of the Water Director and remain in force for the entire dry season.

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

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

**Table ES-2. Reduction in Water Delivery by Usage Priority**
**(percent of normal deliveries)**

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

## Table ES-3. Water Supply Allocation and Customer Reduction Goals

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

In essence, this allocation system strives to balance available supplies in times of drought as much as possible through cutbacks in outdoor water use. At each level of shortfall, public health and sanitation usage is afforded the highest priority by cutting back on interior usage the least. The importance of water in protecting the City's employment base is also acknowledged through proportionately modest cutbacks to the commercial sector as compared to the overall system shortfall. Irrigation and other outdoor uses in all cases is cut back the most. The larger the water shortage, the greater the cutbacks, but this system of priorities is maintained throughout the range of potential shortages. The heavy reliance on outdoor use reductions makes sense, both from a water system perspective because it reduces peak demands, which is important to preserving storage in Loch Lomond Reservoir, and from a public health and welfare perspective, because irrigation and other outdoor uses are the most discretionary of all uses when drinking water is in short supply.

The remainder of this section discusses the demand reduction measures, communications, publicity, and operational activities that apply to each stage.

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

The recommended approach to reducing water use **Stage 2** involves expanding mandatory water restrictions and limiting landscape irrigation to specified days and times. Large landscape users would be required to adhere to water budgets.

A **Stage 3** water shortage constitutes an emergency situation. The three primary measures being recommended to meet this emergency reduction goal are 1) residential water rationing, 2) mandatory water shortage signage in all commercial buildings, and 3) reduced water budgets for large landscapes.

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

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

## Table ES-4. Summary of Demand Reduction Actions and Measures

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

The City's existing water shortage emergency ordinance contains several provisions for enforcing water use rules and regulations, and a process for issuing exceptions and hearing appeals. These provisions were reviewed by staff and the Water Commission, which put forth several recommendations to be incorporated into the updated water shortage ordinance. Recommendations include revised penalty fees and excess use fees, adding specified findings for authorizing exceptions, and adding an alternative enforcement approach to reduce the likely caseload of appeals.

**Implementation**

This section describes the essential elements of implementing the updated Water Shortage Contingency Plan, discusses the approximate lead time needed to prepare for and activate a demand reduction program, outlines the process for declaring a water shortage, and identifies areas where additional ongoing efforts are necessary to address critical gaps.

Although the Water Department closely monitors rainfall, runoff and reservoir storage all winter, it is not usually until the end of March that the water supply outlook for the year ahead becomes certain. This leaves very little lead time to prepare for implementing the water shortage contingency plan.

Formal action declaring a water shortage is taken by City Council. The legal requirements for such action are covered in Section 350 et.seq. of the California Water Code. The code requires the following process be followed:

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

By municipal code, rules adopted by the City Council establishing water use regulations become effective immediately after their publication in the newspaper.

Effective communication is essential to the success of any water shortage contingency plan in achieving the desired water use reductions. All customers need to be adequately informed about water supply conditions, understand the need to conserve, and know what actions they are being requested or required to take to mitigate the shortage. Even before formal declaration of a water shortage, a public information/media program should be activated to provide customers with as much advance notice as possible. Following Council action, all residents and businesses, not just customers of record, would need to be provided notice of water shortage rules and regulations via a variety of media and communications methods, including print and television media, internet, utility newsletter, and other methods. Public notification and communication will be provided in Spanish language for non-English speakers.

The additional staff needed to carry out this contingency plan and personnel costs are estimated according to stage. These may consist of existing staff reassigned from regular duties in the Water or other City departments, new part-time temporary employees, interns, or some combination of the above. Additional office space and equipment needs are also addressed.

The financial impact of short-term demand reduction was estimated to range from just under $0.6 million in a Stage 1 water shortage alert situation to almost $5.8 million in a Stage 5 critical water shortage emergency. Compared to 2007 revenues of just over $22 million, the Department's net revenue would be reduced to approximately $21.5 million in Stage 1 to less than $16.4 million in Stage 5. Options to lessen or overcome the revenue shortfall include the following:

- Tapping into the Department's Rate Stabilization Fund (currently $2.2 million)
- Deferring planned capital improvements
- Considering possible rate adjustments or surcharges

Implementing this Water Shortage Contingency Plan will require utility billing system software that provides the necessary capabilities and flexibility to quickly shift from normal billing practices to water rationing mode. The newly installed EDEN utility billing module appears to be able to handle the type of computations needed to implement the recommended method for rationing residential customers. It does not, however, have the capability or flexibility to handle large landscape water budgets, or commercial water rationing which is based on some

percentage of past use. This capability will have to be custom developed over time.

Another key challenge involves implementing large landscape water budgets. This is the next major work priority scheduled for the City's Water Conservation Office. These programs have a long development time (1-2 years) due to the need to measure landscape areas, differentiate among plant materials, and integrate water budget data into the billing system. This latter task requires changing the bill design and layout to show water budget information and tying performance relative to the water budget to water pricing. If the City were confronted with a water shortage before large landscape water budgets and budget-based pricing could be implemented, alternative methods to curtail water in the large landscape sector would have to be considered.

The final tasks in updating the City's Water Shortage Contingency Plan include the following steps:

- Involving the community and soliciting public review and input on this document;
- Finalizing and presenting the plan to City Council for adoption;
- Preparing an updated water shortage ordinance;
- Preparing and mailing a Proposition 218 notice about proposed changes to penalty and excess use fees.

As far as critical gaps that require ongoing work, the most important recommendations are to:

1. Continue to work on the new utility billing system so that the database is able to meet the City's requirements for use in water rationing if it becomes necessary, and

2. Focus on developing the large landscape program so that water budgets described above can be used to professionally manage large irrigation accounts the next time a water shortage arises.

3. As much as possible, prepare water shortage notices, announcements, materials, and mailing lists in advance, including bilingual materials for non-English speakers.

# Section 1 INTRODUCTION

This report constitutes the first comprehensive review and update of the City's Water Shortage Contingency Plan since the early 1990's. The project is an outgrowth of the City's 2005 Urban Water Management Plan, which recognized the many changes in regional conditions and local water supply planning that had taken place over the previous decade, and identified the need to better prepare for the possibility of future water shortages in advance of the next major drought.

## 1.1 Background

The City of Santa Cruz water system serves a geographic area that includes the entire City of Santa Cruz, adjoining unincorporated areas of Santa Cruz County, a small part of the City of Capitola, and coastal agricultural lands north of the City. The water service area includes about 90,000 people, some 35,000 households, and an employment base of 45,000 jobs.

The City water system draws almost exclusively on local surface water sources, whose yield varies from year to year depending on the amount of rainfall received and runoff generated during the winter season. In normal and wet years, when rainfall and runoff are abundant, the water system is capable of meeting the community's current total annual water requirements. The system is highly vulnerable to shortage, however, in extended dry periods or critically dry years, when the flow in local streams and river sources runs low. Moreover, like other communities on California's central coast, the Santa Cruz water system is physically and geographically isolated. There are no interconnections with other water suppliers in place to transfer water among adjacent water districts or import emergency supplies from outside the region.

The last time the Santa Cruz area was confronted with a serious water shortage was during a statewide drought that lasted from 1987 through 1992. While this event was notable for its extended duration, the most severe event on record was the critical drought of 1976-77. Both situations were considered to be emergencies whose magnitude or duration had been unanticipated prior to their occurrence and for which little preparation had been made. Operations modeling shows **if an event similar to one in 1976-77 were to recur now, the system would barely be able to meet half the community's normal water requirements in the second year of that drought.**

In 2003, the City adopted a long range document known as the “Integrated Water Plan”, the goal of which was to reduce near term drought shortages and provide a more reliable public water supply through the year 2030. The preferred water supply strategy that evolved from that process consists of 3 components:

1. Reduce water demand in all years through water conservation measures,

2. Increase the water supply through seawater desalination, and

3. Cut back water demand temporarily in drought years

This approach, of cutting back on demand in dry years when water is in short supply, is becoming more commonplace in virtually every region of the country that is faced at times with emergency shortages of deliverable water. Rather than strive to meet 100 percent of customer water demand during periods of extreme drought, more and more urban water utilities are beginning to anticipate and plan for a certain degree of water shortage from time to time, and respond with programs that temporarily reduce water use. Whether for financial, political, or environmental reasons, or simply the recognition that public water systems can never be totally drought-proof, water agencies are deliberately incorporating short-term demand management or “use curtailment” as part of their overall water management strategy.

The City’s Integrated Water Plan envisions satisfying 85 percent of normal water needs during a worst-case scenario like the 1976-77 event, thereby reducing the potential shortfall from the current almost 50 percent to no more than 15 percent. This reliability goal was considered to be the best overall balance between ensuring public health and safety, cost, and impact on the environment, given the many public policy tradeoffs involved. Now, instead of treating any shortage as a water supply emergency situation and responding reactively, the City has effectively accepted the risk of incurring relatively modest shortages every so often, which drives the need for having a fully developed contingency plan and well-defined, measured responses in place.

## 1.2 Purpose and Goals

This Water Shortage Contingency Plan describes the conditions which constitute a water shortage and provides guidelines, actions, and procedures for managing

water supply and demands during a declared water shortage. The primary focus of the plan is on measures that reduce customer demand for water, but it also covers actions that can be implemented to stretch or increase the water supply.

This plan was developed to fulfill two fundamental purposes:

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

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

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

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

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

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

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

## 1.3 State Regulations and Planning Requirements

For California water agencies, there are two main provisions of the California Water Code that pertain to water shortage contingency planning.

Sections 350-359 provide the authority for the governing body of a water agency to declare a water shortage emergency. Once having done so, the local agency is provided with broad powers to implement and enforce regulations and restrictions for managing a water shortage. Water needed for domestic, sanitation and fire protection purposes is given priority and discrimination between consumers using water for the same purpose or purposes is not allowed.

Section 10632 requires water agencies to provide a water shortage contingency analysis as part of their Urban Water Management Plans. The code requires agencies plan for shortages up to a 50 percent reduction in water supply, and to describe the actions and consumption reduction methods that apply to each stage of the plan.

The full text of these two code sections is included in Appendix A.

## 1.4 Planning Process and Water Shortage Management Principles

Development of this plan was a collaborative effort among the City Water Department staff, the City's Water Commission, City Council, and the public.

The project was initiated in 2006 with a work plan that organized the job into 12 individual tasks covering specific topics or issues (Table 1-1). For each task, staff prepared a written report for review and input by the Water Commission at its regularly scheduled meetings. These reports reviewed one or more aspects of the City's existing water shortage emergency ordinance, described alternative methods or approaches used by other water agencies, analyzed the different

**Table 1-1. Water Shortage Contingency Plan Update Work Plan**

| Task | Description |
|---|---|
| Task 1 | Identify Laws, Goals, and Principles |
| Task 2 | Determining Water Supply Availability |
| Task 3 | Declaration of Water Shortage Emergency |
| Task 4 | Review Stages and Associated Terms |
| Task 5 | Allocation of Water |
| Task 6 | Review Allotment Methods |
| Task 7 | Consumption Reduction Methods |
| Task 8 | Water Department Actions |
| Task 9 | Enforcement and Appeals Procedures |
| Task 10 | Draft New Water Shortage Contingency Plan |
| Task 11 | Present Recommended Plan to Water Commission and City Council |
| Task 12 | Draft, Review New Ordinance |

options, and presented a recommendation on the topic for inclusion in this plan. The Water Commission provided its input and recommendations throughout the process. Helpful guidance was obtained from the California Department of Water Resources' recently updated Urban Drought Guidebook. In addition, research involved reviewing the water shortage plans of 21 other urban water utilities from throughout California, and from selected cities in the western United States and across the country (Appendix B).

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

This document synthesizes the results of that process into a single report. It was presented to the Water Commission for review in January 2009, revised, distributed throughout the community, presented again at a public hearing before City Council, and adopted on March 10, 2009. The final plan was then redrafted in the form of an ordinance that was adopted in May 2009 and revised in June 2010. The final, approved water shortage contingency ordinance would then

become effective only as necessary in an actual water shortage following appropriate public notification and public hearing before City Council.

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

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

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

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

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

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

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

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

## 1.5 Relationship Between This Document and Other Plans

This Water Shortage Contingency Plan, as described above, represents one of the three components in the City's Integrated Water Plan. It also constitutes one of several elements in the City's Urban Water Management Plan, as required by State law.

Water supply interruptions and shortages may result from a variety of causes, including facility failure, such as a major pipeline break, earthquake, flood, or other natural disaster. This plan specifically addresses longer-term water shortages that occur as a result of drought conditions that may extend several months or span several years in duration. For shorter term emergency incidents or disasters, the Water Department maintains a separate General Emergency Plan, which is subordinate to and complements the Citywide Emergency Operations Plan, to guide emergency operations response and recovery for shorter term water supply interruptions and outages.

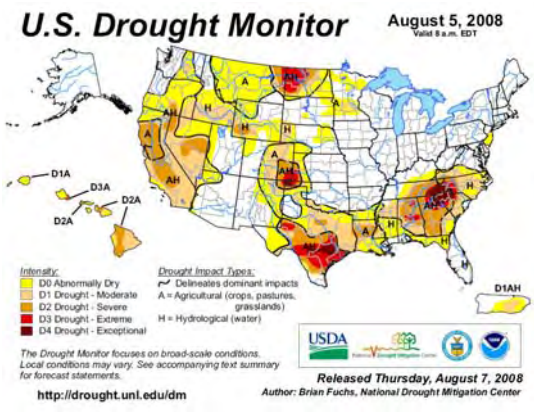
# Section 2 ASSESSING WATER SUPPLY AND DEMAND

Rainfall, runoff, and reservoir storage are the key hydrologic indicators used by the City to evaluate water conditions. This section describes these factors affecting the City's water supply and discusses the forecasting process and management considerations used in dry years to determine whether a water shortage is expected for the year ahead and how much water use must be cut back systemwide in response. As a preface, this section includes a brief discussion on the distinction between the terms drought and water shortage.

## 2.1 Drought vs. Water Shortage

Drought is a normal, naturally occurring but unpredictable climatic phenomenon of varying frequency, duration and severity. Droughts differ from other natural hazards in that they are not distinct weather events, like floods, hurricanes, or tornados. They may have a slow onset, persist and evolve over a period of years, affect a large spatial region, but cause little structural damage. The most difficult aspect of a drought is that no one can tell how long it will last.

**Figure 2-1. National Drought Map**




Five degrees of drought intensity are recognized nationally, including abnormally dry, moderate, severe, extreme, and exceptional.

The California Department of Water Resources describes drought as:

> *"A deficiency of precipitation over an extended period of time resulting in a water shortage for some activity, group, or environmental sector."*

A water shortage, on the other hand, occurs when a particular utility's water supply is insufficient to meet its customers' ordinary drinking water needs.

Besides weather conditions, there are a number of factors that affect water supply availability, including:

- Source yield and reliability
- Infrastructure capacity and operating constraints
- Access to alternative sources
- System demand characteristics

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

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

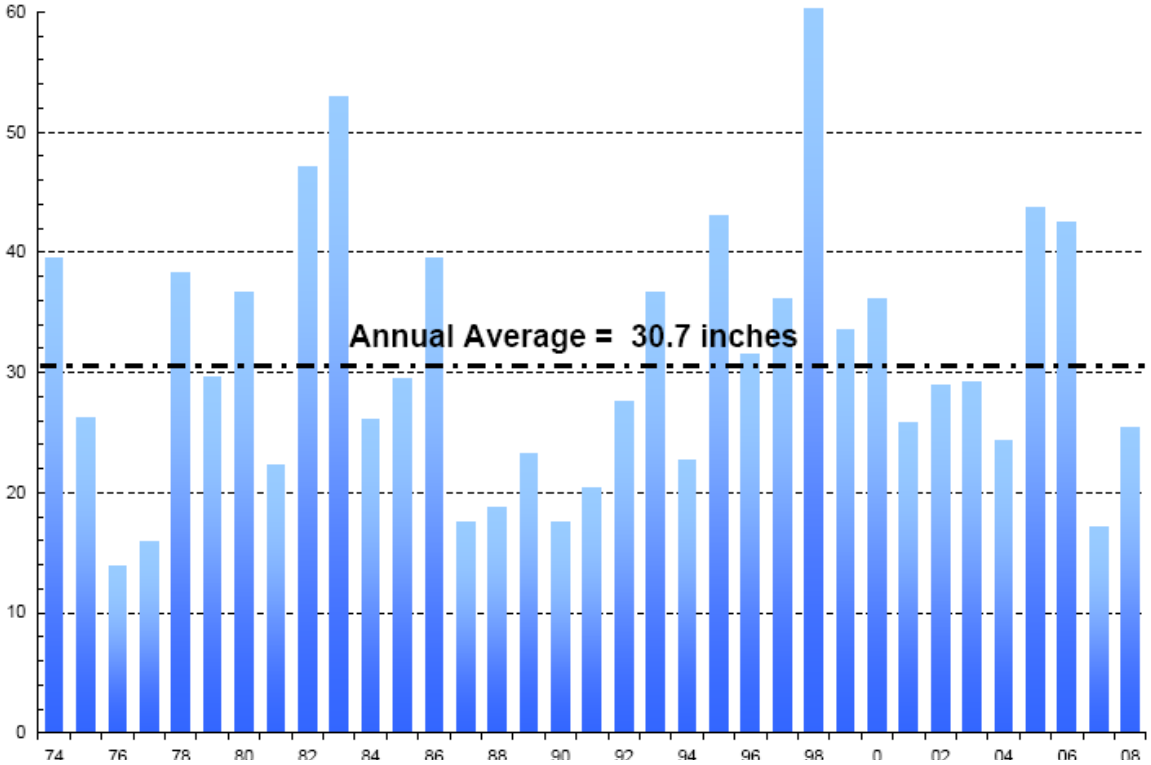
## 2.2 Precipitation

The water supply of the City of Santa Cruz all originates from precipitation that falls in the form of rain on the Pacific Ocean side of the Santa Cruz Mountains during the fall, winter, and early spring. The majority of rainfall normally occurs in a five-month period between November and March. The amount of precipitation that falls is one basic indicator of whether the city is experiencing a wet or dry year. Rainfall amounts on the central coast vary widely from year to year.

Daily rainfall data is collected for water supply purposes at various sites in the Newell Creek watershed, at Ben Lomond, and in the City of Santa Cruz. The Ben Lomond and Santa Cruz sites are both official National Oceanographic and Atmospheric Administration (NOAA) weather observation stations with extended rainfall records.

Annual variation in rainfall at Santa Cruz is illustrated below in Figure 2-2. Long-term average rainfall in the Santa Cruz area is about 30 inches. In the 1987-92 drought, annual rainfall ranged from 17 to 23 inches, and in the 1976-77 drought, annual rainfall amounts in the City measured 14 to 16 inches.

**Figure 2-2. Annual Rainfall at Santa Cruz, 1974-2008 (inches)**




In Ben Lomond, rainfall averages about 49 inches per year. In the 1987-92 drought, annual rainfall ranged from 25 to 32 inches, and in the 1976-77 drought, annual rainfall amounts measured 19 to 21 inches.

The pattern in both timing and distribution of rainfall can be as important in determining water supply availability as the total amount of rainfall received. Years in which the majority of rainfall occurs early in the rainy season or is concentrated in a short time frame tend to produce lower river and stream flows during the peak summer season. Conditions where storms are spread out through the winter season or occur late into spring help sustain higher base flows in the coastal streams and the San Lorenzo River later into the year.

## 2.3 Runoff

Under normal operating conditions, the north coast and San Lorenzo River flows provide about 80 percent of the City's total annual water supply. Accordingly, runoff is a key parameter used to assess the City's water supply condition.

Stream flow in the San Lorenzo River is monitored at two locations using the U.S. Geological Survey (USGS) gauges located at Henry Cowell Redwoods State Park near Felton and downstream next to the Tait Street intake. The gauge in Felton is particularly important for assessing water supply conditions because the river is the City's single largest source and because of the long historic record that exists for the site. Real time flow records are available on the USGS website, http://waterdata.usgs.gov/ca/nwis/uv?11160500. The USGS also prepares printed reports that provide a record of average daily and monthly flows, in cubic feet per second (cfs), and stream discharge, expressed in acre-feet (ac-ft). Monthly flows are charted by the Water Department and compared with the long-term averages and the previous year's flow to assess trends.

On the north coast sources, there were no stream gauges until a few years ago. Flow records are now being gathered for these sources, which will become valuable in future years for assessing water conditions on the north coast.

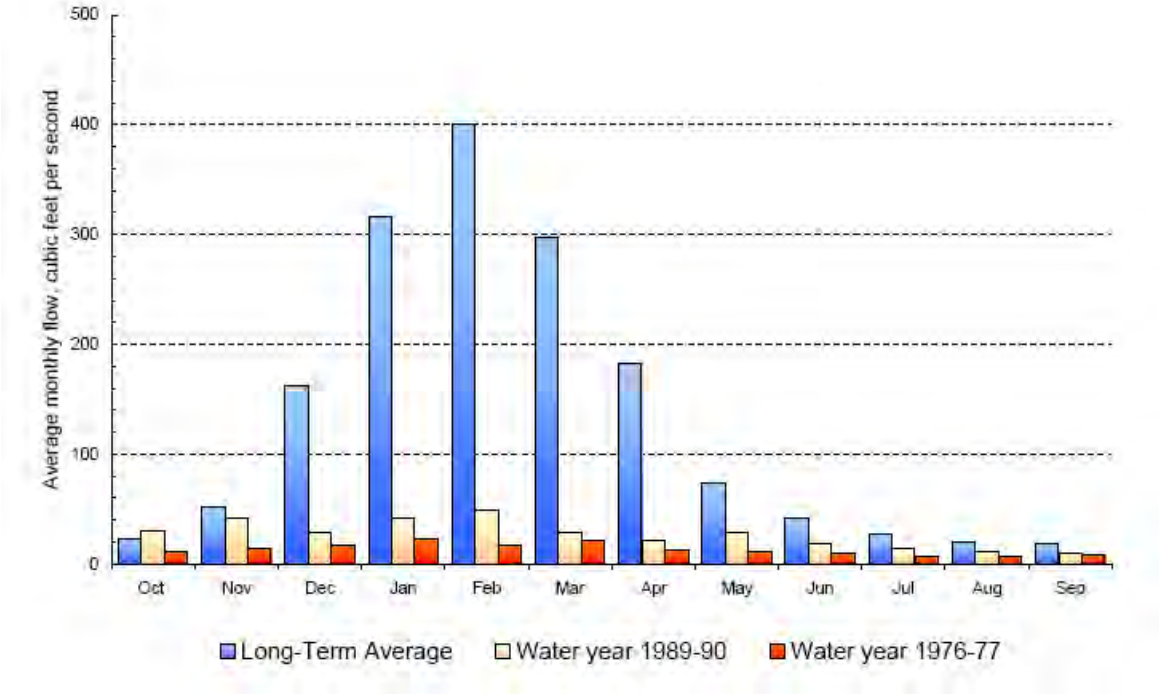
In the San Lorenzo River, runoff fluctuates annually and seasonally, depending on the amount and timing of rainfall. The majority of runoff typically occurs over a three month period from January through March, once the watershed becomes saturated. After the rainy season ends, stream flow in the San Lorenzo River gradually declines over the course of the summer dry season.

In normal years, average monthly runoff ranges from 300 to 400 cfs in winter, and then drops from 70 cfs to 18 cfs over the course of the dry season. As long as the flow in the channel continuously exceeds 12 - 14 cfs, which it typically does in normal years, the water system is capable of making full production within its water rights from the San Lorenzo River all season long.

In dry years, runoff is substantially lower. Figure 2-3 below illustrates the difference between average monthly flow and the flow in the San Lorenzo River during two drought years. Under these conditions, when stream flow in summer declines below 12-14 cfs, production from the river must be scaled back to avoid damaging pumps. In the 1977 drought, the flow in the river dropped to a historic low of about 6 cfs, significantly reducing water production.

The same is true, even more so, for the north coast sources. The stream flow in Laguna and Majors creeks dwindles to extremely low levels in dry years. Liddell Spring is a steadier, more reliable source in dry years than either Laguna or

**Figure 2-3. Monthly Stream Flow in the San Lorenzo River at Felton**




Majors Creek, but does exhibit some decline in flow during dry periods. As such, the spring is a crucial component of the City's water supply in drought years.

## 2.4 Water Year Type

The City uses a water year classification system as a primary index of its water supply conditions. Under this classification system, the water year, which runs from October 1 to September 30, is designated as one of four types, depending on the total annual stream discharge of the San Lorenzo River, measured at Felton, and expressed in acre-feet[1].

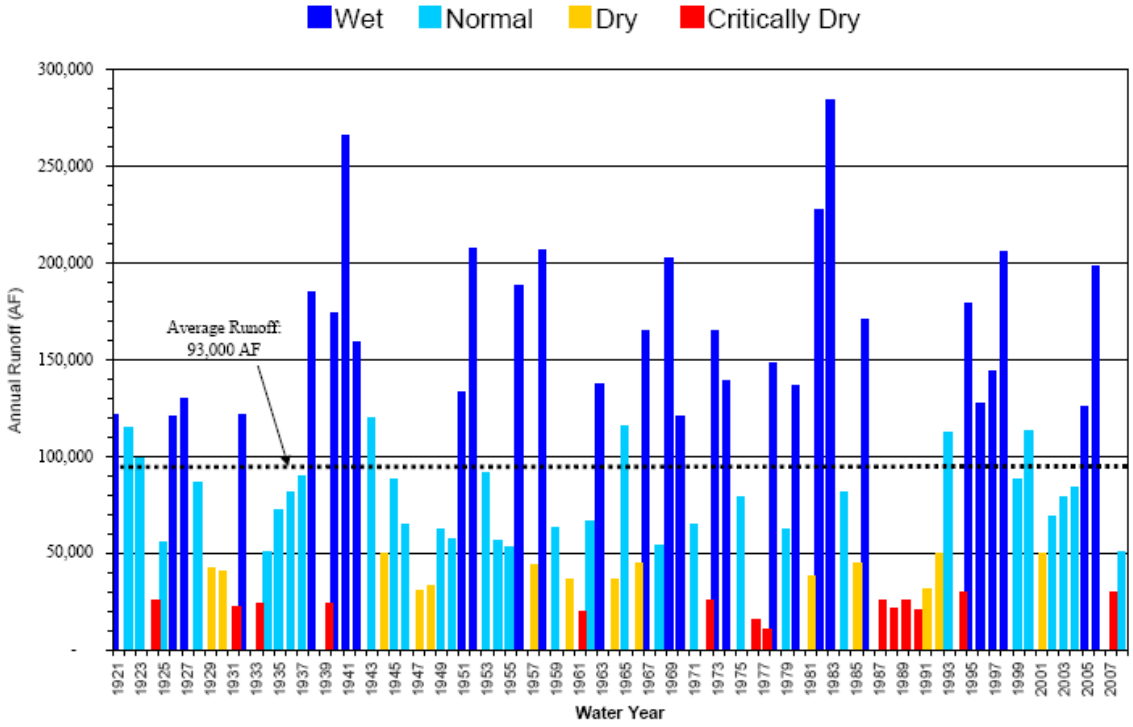
**Table 2-1. Water Year Classification System**

| Classification | Total annual discharge (ac-ft) |
|---|---|
| Wet | > 119,000 |
| Normal | 49,000 - 119,000 |
| Dry | 29,000 – 49,000 |
| Critically Dry | < 29,000 |

[1] An acre-foot of water is equal to 325,851 gallons. One million gallons equals 3.07 acre-feet.

Figure 2-4 below shows the total annual discharge for the San Lorenzo River over the 87 year period from 1921 to 2008, and the classification for each water year. The graph illustrates the dramatic variation in discharge from year to year. Long-term average annual discharge for the San Lorenzo River at Felton is 93,000 acre-feet or almost 30 billion gallons per year. In the long 1987-92 drought, total annual discharge measured between 20,000 and 30,000 acre-feet, and in the 1976-77 drought - the most critical on record - the total annual discharge in the San Lorenzo River dropped to between 10,000 and 14,000 acre-feet.

**Figure 2-4. Total Annual Stream Discharge from San Lorenzo River**




While the current water year type is of primary consideration in assessing water conditions, the previous water year type also has some influence on summer water supply availability. An antecedent year that is classified as wet will help sustain river base flows longer into the year, whereas a previous dry year can cause river flows to decline sooner and lower than would otherwise be expected.

## 2.5 Reservoir Storage

Loch Lomond Reservoir is the City's only source of stored water and has a total storage capacity of 2.8 billion gallons. In normal and wet years, reservoir storage

**Figure 2-5. Loch Lomond Reservoir**



refills naturally to full capacity with runoff from the Newell Creek watershed, usually by February or March. Storage can also be supplemented in dry years with water pumped up to the reservoir from the San Lorenzo River via the Felton booster station when natural runoff is low.

In a normal year, the reservoir will start the dry season full with 2.8 billion gallons in storage. In the 1987-92 drought, reservoir storage at the beginning of April ranged from 1.5 to 1.7 billion gallons (53 to 61 percent of capacity). In the 1976-77 drought, reservoir storage at the beginning of April 1976 measured 1.6 billion gallons or 57 percent of capacity. In April 1977, beginning season storage was only 1.0 billion gallons or 36 percent of capacity.

## 2.6 Determining If a Water Shortage is Imminent

In normal or wet years when the water supply outlook is favorable, there is generally a surplus of water available from the various sources to meet existing demand. A general rule of thumb is that if Loch Lomond Reservoir is at full capacity by spring, it is not necessary for the City to institute any short-term demand reduction measures the following summer.

After an unusually dry winter or period of consecutive dry years, though, when a lack of supply appears possible, the Water Department undertakes an analysis to forecast whether water supplies will be deficient relative to estimated water needs for the coming dry season. This calculation must be made before the end of rainy season in time to decide on appropriate actions and to provide adequate notice to the public. There is always the chance that late winter rains will change the water supply outlook. Thus, the situation remains dynamic through the end of April.

The peak season from roughly May 1 through October 31 is considered the critical period for the purpose of defining the degree of water supply shortfall, and for selecting the appropriate demand reduction goal. This is the period when water availability in the City's flowing sources is generally lowest and water demand normally would be at its highest, creating a summer water supply "crunch".

Past experience indicates that, even in water short years, there is generally adequate water in the City's flowing sources to meet system demands during the off-peak months between November and April, and that there is little if any need to reduce water demand this time of year when consumption is low.

There is no one single criterion, trigger, or definition that is used to determine if a water shortage exists. The determination of a shortfall involves consideration of all the parameters mentioned previously, as well as expected system demand. To determine the degree of shortfall, the Department follows a three-step process, described below:

1. Develop a monthly forecast of supply available from flowing sources and wells.

2. Compare the supply available from flowing sources and wells to the expected water demand and estimate production needed from Loch Lomond. Calculate the monthly and seasonal drawdown on Loch Lomond Reservoir.

3. Evaluate whether the amount of water in Loch Lomond Reservoir is adequate to meet expected demand for the coming dry season and for the following year in case the dry weather pattern continues through the next winter.

### 2.6.1 Forecasting Water Production from Flowing Sources and Wells

Of primary importance to the system operation is the ability to know at the end of a winter season how the San Lorenzo River, the City's most important source, will flow through the coming summer and into the dry fall season. In wet and normal years, the river flows at the Tait Street diversion are sustained consistently above the 12.2 cfs level that the City is authorized to divert under the City's water rights. The three river pumps normally make a steady 7.5 million

gallons per day from this source, or between 225 and 232 million gallons per month, all season long.

In dry and critically dry years, natural flows can drop below the 12 cfs level at the intake during summer, requiring pumping from the San Lorenzo River to be scaled back. Once the water year type has been established, statistical tables are used to forecast the mean monthly flow in the San Lorenzo River through the remainder of the dry season (Appendix C). This technique helps to identify at what point in the year river production will be reduced and by how much.

Forecasting supplies available from coastal sources involves less certainty due to the lack of historic stream flow information. The technique used to forecast supplies on the north coast is to find historic water years with a similar pattern in rainfall amount and timing. The production records from those years are examined to assess the likely yield of those sources for the coming season, while taking into account any operational rules, capacity constraints, or in-stream flow releases that may have changed from those previous years. Water production from the City's Live Oak well field is projected as a function of the production capacity for any wells in operation and duration that the wells will be operated.

The Department necessarily uses a conservative estimate of yield to ensure the supply forecast for flowing sources and groundwater production is reliable.

### 2.6.2 Calculating Drawdown on Loch Lomond Reservoir

Once the forecast of supply available from surface diversions and wells is made, supplies are compared with expected water demand to determine how much lake water would be needed to meet unrestricted system demand. The amount of water lost from the reservoir to evaporation and released for downstream fisheries preservation is then factored in. From this analysis, a projection can be made about:

- the expected rate of drawdown of the reservoir over the dry season;
- the lake level at the end of October; and
- the expected carryover storage for the following year.

Table 2-2 below presents an example with the City's current sources of supply to illustrate the forecast technique. This situation represents a hypothetical year in

which the lake does not refill over winter and begins the season on April 1 with 2.1 billion gallons in storage, or 73 percent of capacity. Flow in the San Lorenzo River is projected to drop below 12 cfs during the month of July, reducing river production. Without any constraint on water demand, a total of 680 million gallons of water would be needed from the lake to meet normal system demand over the dry season, which, along with other losses and outfows, would result in an end of season reservoir volume of about 1.2 billion gallons, or just under 42 percent of capacity.

**Table 2-2. Example of Water Storage Forecast with Unrestricted Water Demand**

| SCWD Production Forecast (million gallons) | April | May | June | July | Aug | Sep | Oct | Total |
|---|---|---|---|---|---|---|---|---|
| North Coast (gross production) [2] | 82 | 74 | 64 | 50 | 50 | 49 | 35 | 404 |
| North Coast (net production) | 61 | 55 | 48 | 38 | 38 | 37 | 26 | 303 |
| San Lorenzo River | 207 | 232 | 225 | 212 | 200 | 175 | 160 | 1,411 |
| Live Oak Wells | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 168 |
| Total Production without Lake | 293 | 311 | 297 | 274 | 262 | 236 | 210 | 1,882 |
| Projected System Demand | 295 | 344 | 388 | 410 | 415 | 365 | 345 | 2,562 |
| **Lake Production Needed to Meet Demand** | **2** | **33** | **91** | **136** | **153** | **129** | **135** | **680** |
| Evaporation (feet) | 0.2 | 0.3 | 0.3 | 0.4 | 0.4 | 0.3 | 0.2 | 2.1 |
| Evaporation (mil gal) | 11 | 14 | 14 | 18 | 16 | 11 | 6 | 90 |
| Fish Release (mil gal) | 21 | 21 | 21 | 21 | 21 | 21 | 21 | 147 |
| **Beginning Lake Volume** | **2,100** | **2,066** | **1,998** | **1,872** | **1,696** | **1,506** | **1,345** | |
| **End of Month Lake Volume** | **2,066** | **1,998** | **1,872** | **1,696** | **1,506** | **1,345** | **1,183** | |
| **End of Month Lake Elevation (ft above msl)** | **562.8** | **561.2** | **558.5** | **554.3** | **549.3** | **544.6** | **539.6** | |
| Monthly change in elevation | -0.8 | -1.6 | -2.7 | -4.2 | -5.0 | -4.7 | -5.0 | |
| Cumulative change in elevation | -0.8 | -2.4 | -5.1 | -9.3 | -14.3 | -19.0 | -24.0 | |
| Percent of capacity of Loch Lomond (%) | 73.0 | 70.6 | 66.1 | 59.9 | 53.2 | 47.5 | **41.8** | |

### 2.6.3 Evaluating Adequacy of Supply

The determination of whether a shortage exists essentially boils down to a risk assessment regarding the predicted end of season lake level and carryover storage needed in Loch Lomond Reservoir. The Water Department's main considerations in undertaking this assessment include the following:

- Would allowing unrestricted water use in the current year leave insufficient reserves if drought conditions continue into next year?

[2] Gross production refers to the amount of water entering the system at the source, while net production is the amount reaching the City's water treatment plant. The difference is due to coast irrigation sales, leakage, and maintenance.

- Knowing that another dry year could mean the City's flowing sources would drop even lower, how much water should be withheld in the reservoir for the following year to be prudent?

The key decision thus revolves around how much Loch Lomond water to allocate in spring for the current year, whose tradeoffs are summarized in Table 2.3 below.

**Table 2.3 Tradeoffs of Alternative Allocations from Loch Lomond Reservoir**

| Allocation | Frequency | Revenue Impact | Consequence |
|---|---|---|---|
| Large | Shortages occur less frequently | Less impact on water sales and revenue | Would require a smaller cutback in the current year, but would draw down the reservoir faster and potentially would require much more draconian cutbacks if the drought persisted into the following year |
| Small | Shortages occur more frequently | Lower sales and reduced revenue | Would mean customers would be required to cut back more in the current year, but would preserve storage enabling the City to withstand more prolonged drought before running out of stored water |

There is no set formula to determine the optimal allocation. Rule curves were developed for operations modeling purposes as part of the City's Integrated Water Plan to mimic how lake resources theoretically would be allocated under various water conditions. Under these rule curves, no shortage is indicated if lake storage is above 2.4 billion gallons (85 percent of capacity) on April 1 and as long as the lake is forecast to remain above 1.8 billion gallons (64 percent of capacity) though the end of September. Below these levels, a shortage is assumed to occur. The lower the lake level, the greater the shortage. One important rule regarding utilization of lake storage established during the development of the Integrated Water Plan was to always regard the bottom 1.0 billion gallons (35 percent of capacity) in the reservoir as unusable, so there is always some limited amount of supply preserved in storage for the following year.

In the real world, though, with imperfect information about both supply and demand, and no ability to tell when the drought will end, prudent management dictates that the long-term welfare of the City and its residents outweighs the short-term benefit to the community and higher revenues that would be realized by setting a higher allocation. This means generally favoring a smaller allocation and

calling for larger cutbacks than may actually be necessary in retrospect to avoid the possibility of experiencing more critical water shortages if drought conditions continue to worsen. **Ideally, the carryover storage amount will be enough, along with other sources, to meet essential health and safety needs if the subsequent winter is as dry as the driest year on record.** According to the literature, the main lesson from other utilities that have been through droughts is that they would have acted earlier to save more water, in retrospect, in order lessen the impact of implementing more severe cutbacks later on.

Going back to the example in Table 2-2, it is logical to assume that a season-end level of less than 1.2 billion gallons (42 percent of capacity) would be regarded as unsafe and leaving the system vulnerable in case of another dry year. In this example, it is not unreasonable to assume that a decision would be made to curtail water use with the goal of retaining somewhere between 1.5 and 1.6 billion gallons of water in storage (55 percent of capacity) at the end of the season as a hedge against a subsequent dry year. To achieve that target storage, lake withdrawals would need to be reduced from 680 to less than 300 million gallons and customers would be required to cut back by 15 percent or 387 million gallons compared to the normal demand of 2,562 million gallons. Table 2-4 shows the effect a 15 percent cutback would have in terms of increasing carryover storage and lake level at the end of the dry season.

**Table 2-4. Example of Water Storage Forecast with 15 Percent Demand Reduction**

| SCWD Production Forecast (million gallons) | April | May | June | July | Aug | Sep | Oct | Total |
|---|---|---|---|---|---|---|---|---|
| North Coast (gross production) | 82 | 74 | 64 | 50 | 50 | 49 | 35 | 404 |
| North Coast (net production) | 61 | 55 | 48 | 38 | 38 | 37 | 26 | 303 |
| San Lorenzo River | 207 | 232 | 225 | 212 | 200 | 175 | 160 | 1,411 |
| Live Oak Wells | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 168 |
| Total Production without Lake | 293 | 311 | 297 | 274 | 262 | 236 | 210 | 1,882 |
| Reduced System Demand | 295 | 315 | 320 | 330 | 320 | 300 | 295 | 2,175 |
| **Allowable Lake Production** | **2** | **4** | **23** | **56** | **58** | **64** | **85** | **293** |
| Evaporation (feet) | 0.2 | 0.3 | 0.3 | 0.4 | 0.4 | 0.3 | 0.2 | 2.1 |
| Evaporation (mil gal) | 11 | 14 | 14 | 18 | 16 | 11 | 6 | 90 |
| Fish Release (mil gal) | 21 | 21 | 21 | 21 | 21 | 21 | 21 | 147 |
| Beginning Lake Volume | **2,100** | **2,066** | **2,027** | **1,969** | **1,873** | **1,778** | **1,682** | |
| **End of Month Lake Volume Goal** | **2,066** | **2,027** | **1,969** | **1,873** | **1,778** | **1,682** | **1,570** | |
| **End of Month Lake Elevation (ft above msl)** | **562.8** | **561.9** | **560.6** | **558.5** | **556.3** | **553.9** | **551.1** | |
| Monthly change in elevation | -0.8 | -0.9 | -1.3 | -2.1 | -2.2 | -2.4 | -2.8 | |
| Cumulative change in elevation | -0.8 | -1.7 | -3.0 | -5.1 | -7.3 | -9.7 | -12.5 | |
| Percent of capacity of Loch Lomond (%) | 73.0 | 71.6 | 69.6 | 66.2 | 62.8 | 59.4 | **55.5** | |

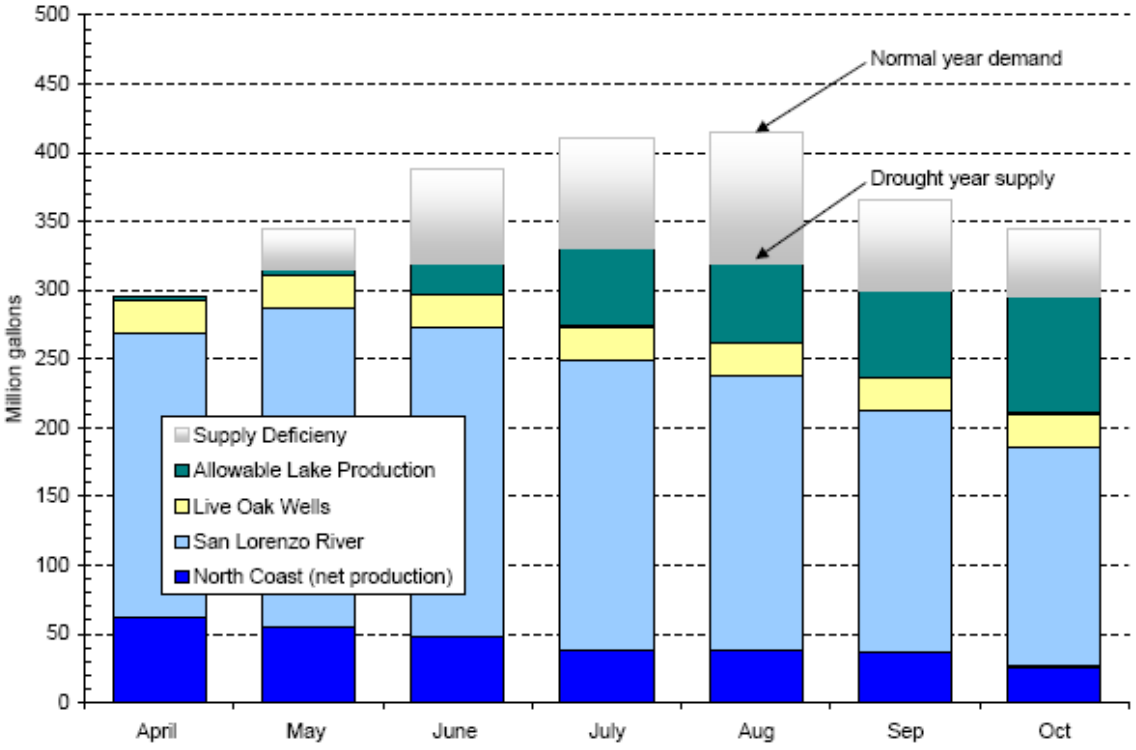
In this case, the reservoir at the end of the dry season stays over half full and 13 feet higher than it would have without any reduction in demand.

The overall water shortage is calculated simply by dividing the supply deficiency for the seven month period from April to October (387 million gallons), by the total unrestricted demand during the same period, expressed as a percentage:

| | |
|---|---|
| Supply deficiency (mg): | 387 |
| Unrestricted demand (mg): | ÷ 2,562 |
| Water shortage: | = 0.15 or **15%** |

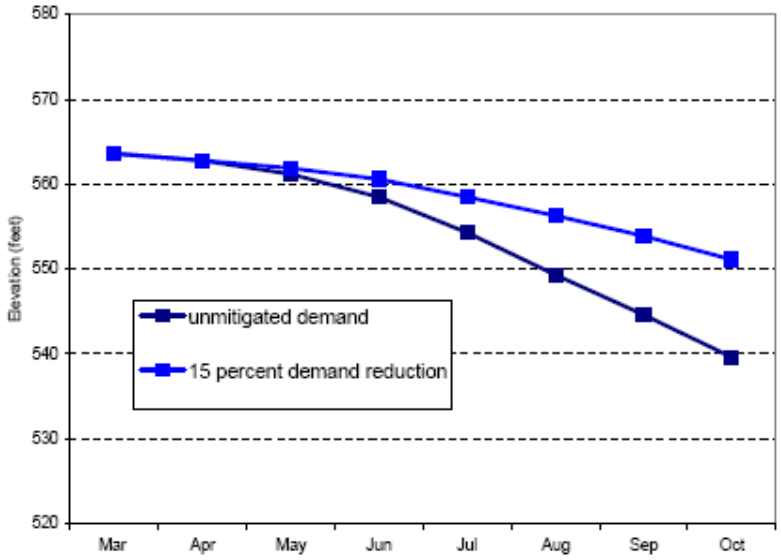
Figure 2-6 below illustrates the 15 percent supply deficiency relative to available supplies on a month to month basis.

**Figure 2-6. Example of a 15 Percent Water Shortage**




The difference in the drawdown rate between the two scenarios is illustrated in Figure 2-7. This chart shows the effect reducing water demand has on slowing the depletion rate of the City's stored water supply.

**Figure 2- 7. Reservoir Drawdown**




The ultimate decision about whether supplies are adequate in Santa Cruz for a given dry year are thus dependent not just how much water is available in that year from the City's sources of supply, but also on the level of demand exerted by customers over the coming season and management's comfort level with predicted carry over storage. In the last few years, systemwide water demands have experienced a noticeable downturn which means the City can better withstand dry conditions like the current 2008 water year and have a lower seasonal impact on lake levels than in the past. The one caveat, though, is that because at present use is so conservative, there is a declining ability for "belt tightening" when the next shortage arises.

## 2.7 New Water Sources and Potential Changes to Existing Supplies

There are several major projects currently under way that are intended to improve the City water system reliability in drought years.

The City and Soquel Creek Water District are jointly pursuing seawater desalination as a supplemental water source, which is expected to become available sometime around 2015. As currently envisioned, this facility would add 2.5 mgd capacity to the City water system, which could provide upwards of 500 million gallons over the dry season as a backup supply in times of drought. The operation of such a facility between the two agencies is yet to be determined, but

the process of evaluating the City's dry year supply and demonstration of need by the City for use of the plant would be similar to the example shown above.

The other major capital improvement project affecting the City's water supply is the renovation of the Live Oak well system, which includes upgrades to wells, treatment plant, and the distribution system to restore production capacity back to its full 2 mgd level that it was in operation during the 1987-92 drought. This assumes the entire groundwater basin is not compromised by continued regional over-pumping of the Purisima aquifer.

Another possible long-term project currently being pursued that may have some minor beneficial effect on City water supplies by reducing summertime peak demand is an exchange of water with the Scotts Valley Water District. The District is exploring ways to provide recycled water from the City of Scotts Valley to the Pasatiempo golf course, which now uses water obtained from the City of from Santa Cruz. The District would receive in exchange surplus water from the City during winter to reduce its groundwater pumping and restore groundwater levels in the Scotts Valley area. While net water production by the City would remain unchanged, the project would shift demands from the peak to off-peak season and shift production away from the lake toward the City's flowing supplies.

In addition to these projects, there are also several uncertainties facing the City's existing sources, particularly along the north coast, that have the very real potential to reduce water supply in dry years.

The City is pursuing an Endangered Species Act Section 10 permit and habitat conservation plan. Long-term requirements for in-stream flow releases affecting the City's surface water diversions have yet to be determined and are pending the outcome of further data collection, analysis, and negotiations with federal and state regulatory authorities. However, preliminary voluntary releases are now being made an all three North Coast sources (Laguna and Majors Creeks, and Liddell Spring) and expectation is that the City will lose more water as a result of regulatory actions at the state or federal level for the protection of listed species. The City is also involved in two water rights matters pending before the State Water Resources Control Board that could affect future operations of the Felton diversion and Loch Lomond Reservoir.

The net effect of all these projects and issues is unclear at this time, but the likelihood is that the City stands to lose some portion of its existing supply before it gains any new source. Those changes will have to be factored into the assessment of supply and demand the next time the City is confronted with a potential water shortage.

# Section 3 DEMAND REDUCTION PROGRAM

This section describes how the City will respond to future water shortages and discusses the various actions it would take to reduce water demand under different shortage scenarios.

## 3.1 Staged Demand Reduction Approach

The recommended 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. Each stage has been ascribed a specific title to describe and convey the severity of the water shortage to the public.

**Table 3-1. Five Stage Structure to Water Shortage Contingency Plan**

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

To put these different levels into context, the City water system normally produces a total of about 2.5 to 2.6 billion gallons of water from April through October. This is the time period when water production is typically the most constrained by shortages and when consumption would need to be reduced. Normal daily usage during this period varies seasonally from 10 to 14 mgd and averages about 12 mgd. Table 3-2 below shows the amount of reduction in demand that would need to be achieved system-wide, on both a seasonal and a daily basis, which corresponds with the upper end of each stage.

The overall concept of this approach is that water shortages of different magnitudes require different measures to overcome the deficiency. As explained in further detail below, each stage includes a set of demand reduction actions and measures which become progressively more stringent as the shortage condition escalates.

**Table 3-2. System-wide Demand Reduction Volumes**

| Stage | Magnitude of Water Shortage | Seasonal Demand Reduction (million gallons) | Average Daily Demand Reduction (mgd) |
|---|---|---|---|
| 1 | 5% | 125 | 0.6 |
| 2 | 15% | 375 | 1.8 |
| 3 | 25% | 625 | 3.0 |
| 4 | 35% | 875 | 4.2 |
| 5 | 50% | 1,250 | 6.0 |

Normally, only one of these five stages would be put into effect early in the year at the recommendation of the Water Director and remain in force for the entire dry season. Which one would depend on the water supply outlook at the beginning of the dry season. However, conditions and circumstances will vary with each shortage event. Although it would not be desirable to do so for sake of consistency, the City might be forced to transition to the next higher stage mid-season if the reduction efforts at the initial stage do not achieve the needed result.

There is an important distinction between the lower two stages (1 and 2), designated above in shades of yellow, and the upper three stages (3, 4, and 5) designated in shades of red, with the break point occurring at the 15 percent shortage level. The lower two stages (1 and 2) represent the **anticipated curtailment** that is envisioned as being necessary to balance water supply and demand from time to time under the City's Integrated Water Plan. Shortages of 15 percent or less, while inconvenient, do not directly threaten public safety or pose undue economic impact.

The upper three stages (3, 4 and 5), conversely, are all characterized as **emergency water shortages** since they result in more widespread hardships being felt throughout the community, may threaten public health and welfare, and cause considerably more economic harm. For these reasons, the City is making considerable effort and investing substantial capital to avoid shortages of this magnitude in the future. Nevertheless, as a public water supplier, the City must still prepare and plan for the possibility of experiencing such large deficits under state law.

## 3.2 Overview of Demand Reduction Strategy

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

- An allocation system to establish reduction goals for different customer groups
- Demand reduction measures
- Publicity and communications
- Operating actions

These four components are summarized below.

### 3.2.1 Allocation System

A fundamental issue any water supplier faces in managing a water shortage involves the allocation of water and how to distribute the available supply among customer categories when supplies fall short. In the process of updating this plan, staff and the City Water Commission examined various options and alternatives and selected a priority-based system. This allocation system produces specific demand reduction goals for each major customer category at various levels of shortfall based on the unique usage characteristics of each customer category. It is one of the key mechanisms to ensure that the overarching goals of: 1) conserving the water supply of the City for the greatest public benefit and 2) mitigating the effects of a water shortage on public health, safety, and economic activity, are achieved. It also provides the means for determining whether demand reduction goals are being met or, if not, making needed adjustments. The allocation system is described in more detail below.

### 3.2.2 Demand Reduction Measures

There are a variety of demand reduction techniques that can be used to curtail customer water use during a supply shortfall. These techniques fall into the following general categories:

Voluntary Water Use Reductions This approach would include issuing guidelines and suggestions to conserve water, encouraging installation or active distribution of conservation devices, stepping up financial incentives for fixtures and

appliances that reduce per capita water use, discouraging installation of new landscape, or encouraging replanting with low water materials. Offering technical assistance in the form of water audits for various types of customers would fall into this category.

Prohibitions on Certain Uses This technique includes banning nonessential uses not required for protection of public health and safety that are not normally prohibited by definition under the city's water waste ordinance. Examples include prohibition on the use of potable water for washing sidewalks and paved surfaces, dust control, or the draining and refilling of private swimming pools. Included in this category would be serving of water in restaurants or other places where food is served unless expressly requested by the customer.

Limits on Certain Uses This approach involves placing mandatory restrictions such as watering only between certain hours or on specific days, watering of landscape only by certain methods (sprinkler ban), or restricting the manner in which vehicles or buildings may be washed.

Mandatory Requirements This technique includes adopting regulations mandating that certain measures be taken by selected customers ranging from the posting of signage in various establishments to save water to requiring the preparation and filing of site-specific conservation plan or requiring an audit of company water use demonstrating conservation efforts.

Rationing This approach involves establishing a fixed volume or allocation for individual customers or for groups of customers that is intended to reduce water use to a certain level commensurate with the seriousness of the situation. Possible methods that can be used to assign customer allotments include setting a uniform or flat amount, applying a percentage reduction from past use (or other benchmark), establishing a ration on a unit basis (per capita, per dwelling unit, per connection) or using a hybrid approach that is based on a combination of factors.

In updating this plan, staff and the City's Water Commission identified and reviewed available options for application to various customer groups and inclusion at different stages, and took into consideration the following factors:

- Water savings
- Seasonality
- Time frame and procedural requirements to implement the measure
- Administrative burden
- Applicable sector (residential, commercial, irrigation)
- Measures used by other water agencies

### 3.2.3 Publicity and Communications

Effective communication is essential to the success of any water shortage contingency plan in achieving the desired water use reductions. All customers need to be adequately informed about water supply conditions, understand the need to conserve, and know what actions they are being requested or required to take to mitigate the shortage. The Water Department naturally assumes a central role in publicizing the extent of the water shortage problem and in advising and assisting customers to conserve. The more severe the shortage, the more vigorous the public information campaign will need to be. No matter what the situation though, any public communications strategy undertaken in connection with water shortage ideally should contain the following fundamental attributes:

Timely – information should be disseminated well in advance of voluntary and mandatory actions that are to take effect, repeated often, and updated at regular intervals.

Credible – public information efforts should strive to be clear, professional, consistent, straightforward, reasoned, and honest to build trust and community support.

Multimodal – information should be made available to the public using a variety of methods, including the internet, newsletters and newspapers, radio, television, special events, visual displays, public meetings, speaking engagements, and other techniques to maximize reach.

Open – the Department will actively listen to, engage, and involve its customers, solicit feedback, address identified concerns, and respond to public input in a manner that is respectful, appreciative, welcome to creative solutions, and acknowledges each individual's sacrifice, inconvenience, and contribution to the situation.

Coordinated – the Department should collaborate with other City departments, affected public agencies and organizations, its own employees, interest groups, and the news media to ensure that everyone is on the same page and working together.

Action Oriented – information should always contain positive action steps people can take to help foster a spirit of cooperation and create an overall atmosphere that encourages the public to save water for the common good.

There are a number of **key groups** to whom water shortage communications will need to be aimed. These include, but are not limited to the following:

City Council and other local elected officials The Council authorizes the use of emergency powers and funds, adopts water shortage regulations, and makes appointments to a special appeals board. As the City's governing body, it will have to deal with frequent inquiries from the media and constituents. It will need to know about possible impacts on citizens and the City's own municipal water use. The City Council will be provided in-depth information for its decision-making. The Water Commission, which advises City Council, is a primary forum where policy issues are discussed and the public is able to make its voice heard. The County Board of Supervisors, Capitola City Council, and governing bodies of adjoining water districts also will need to be kept informed.

City Departments and other governmental bodies All City departments, including Parks, Fire, Public Works, as well as other public institutions will be asked to provide leadership and present a good example to the community by reducing their own water demand. The Water Department will need to work closely to promote and ensure such interdepartmental and government cooperation.

News media The media has a key role to play in helping communicate timely and accurate information to the public, especially when water restrictions or regulations are initially announced. The Water Director or Water Conservation Manager (as alternate) serve as official spokespersons to television and print media, answering questions and explaining reasons for certain actions. Because the news media is such a powerful force, care always must be given to deliver accurate and consistent messages and to maintain good relationships with the media. Feature reporters and editors can also be instrumental in writing about personal interest stories and alternative approaches to help people deal with water shortage in a positive way.

Large water users and groups most affected by water shortage The local landscaping and hospitality industries, along with other high water using businesses, University, and special needs customers (hospitals, nursing care facilities, etc) will need additional information about water shortage restrictions or regulations that affect their business or clients more than average.

City water customers/general public All 90,000 City water users, regardless of whether they are the customer of record, will need to be properly notified so that everyone understands the reasons for voluntary or mandatory cutbacks, what is expected in terms of usage restrictions, and the consequences of failing to abide by any adopted regulations. The Department will need to step up distribution of conservation tips and water saving ideas and respond to an increasing number of individual customer contacts. Special efforts also will need to be made to translate copies of all public notices, regulations, and outreach materials into Spanish and other appropriate languages for non-English speakers.

There are various methods the Department could employ to carry out added communications and public outreach responsibilities that become necessary in a water shortage situation. The menu of possible techniques is listed in Table 3-3.

**Table 3.3 Communications and Public Outreach Methods**

- Press releases
- Press conferences
- Opinion page coverage
- Paid advertising (print, radio, television)
- Community television
- Radio interviews
- Public service announcements
- Internet
- Bill inserts
- Utility bill messages
- Revisions to utility bill layout
- Direct mail
- Printed material (posters, banners, signage)
- E-mail
- Utility newsletter
- Public meetings, forums
- Publish figures and charts of actual water supply and demand on graph, comparing system use against daily, weekly, or monthly water budgets
- Presentations at neighborhood, homeowner's associations, service, and community meetings
- Telephone hotline
- Fliers at schools, churches, libraries, grocery markets, and other social gathering places
- Outdoor signs for visitors
- Conservation events, contests, booths
- Lead or participate in regional drought awareness media campaigns

In reviewing other agency's contingency plans, one feature that was considered valuable to have prepared in advance was a concise public message for each

stage of the Water Shortage Contingency Plan. These statements, set forth below, are intended to help communications stay on message and set the tone for subsequent communications through the duration of the incident.

A working list of contacts for major public agencies, media contacts, business organizations, landscape interests, and large customers is provided in Appendix D for reference.

### 3.2.4 Operating Actions

The Water Department must be flexible in the use of its own workforce and adaptable in realigning its priorities when a water shortage arises. The added responsibilities change what must be done in both field and office operations on a daily basis compared to usual duties under normal water supply conditions. These actions begin early in the water year with monitoring and forecasting water supply conditions and quickly ramp up in spring as the likelihood of a shortage increases. Many will represent increased costs to the Department for additional personnel, services, and supplies.

An important initial step is to designate a working group consisting of the Water Director and senior staff to lead and manage the Department's internal and external water shortage response. The size and composition of the group and frequency of meetings (monthly, weekly, daily) would vary depending on the severity of the shortage.

The Water Department must then mobilize the necessary personnel, resources, and equipment to undertake the various activities that are critical to implementing an effective response. These initial actions may include, among other things:

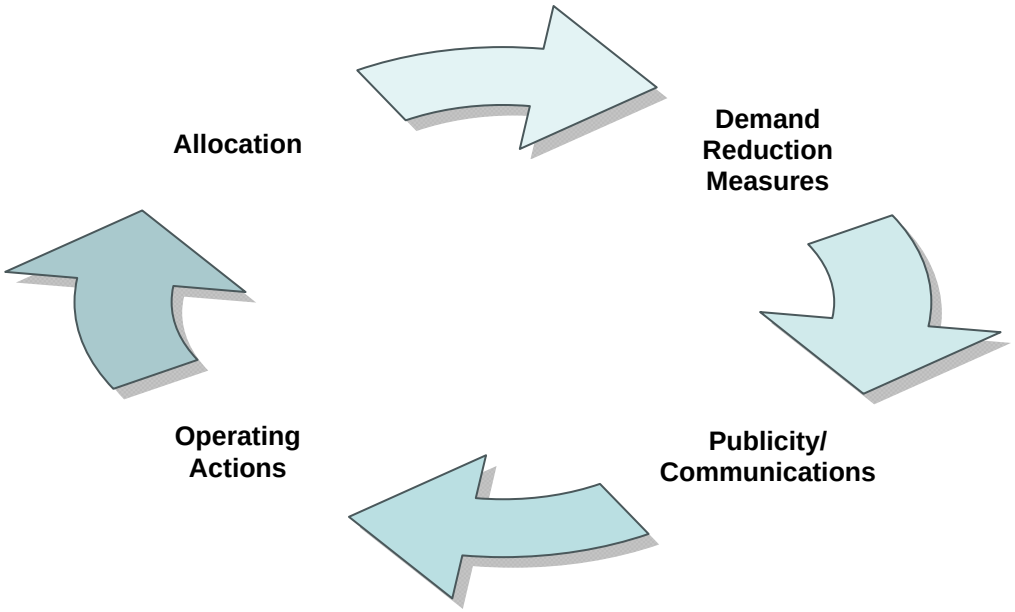
- Establishing water production budgets
- Coordinating with other city departments and affected public agencies
- Establishing a public communications program to publicize use restrictions and to engage and involve the community and key water-using sectors in curtailing their demand
- Ensuring adequate staff and training to effectively respond to customer inquiries and enforce water shortage regulations
- Adapting utility billing format and database capabilities
- Expanding water conservation assistance, outreach, and education

- Instituting a system for processing exception requests and appeals
- Addressing policy issues and updating status with decision makers
- Implementing monitoring mechanisms to track actual usage and measure performance

These and other operating actions are described further below and in Section 4 covering plan implementation.

Together, these four demand reduction strategy components can be thought of as a system whose parts function together to accomplish change; change in customer understanding and awareness, change in their behavior and actions, and fundamentally change in how much water residents, businesses, and visitors use in times of water shortage. As illustrated in Figure 3-1, these interrelated components provide the standards and feedback mechanism to ensure that water consumption is reduced to the level that the system can safely support.

**Figure 3-1. Demand Reduction Strategy**




## 3.3 Priority-Based Water Shortage Allocation

The recommended allocation system is based on the premise that, when water is in short supply, certain end uses should have a higher priority than others. Using a priority-based approach, the normal water demands of each major customer category are first classified into three basic priorities, as follows:

1. **Health and safety.** This is the highest priority use, which includes residential and non-residential interior domestic and sanitary uses.

2. **Business.** This category is the second highest priority and includes all non-sanitary usage related to commercial and industrial activity.

3. **Irrigation.** This is the lowest priority and includes all irrigation and outdoor usage in the single family, multiple residential, UC and irrigation categories.

Table 3-4 shows the normal water use for each of the City's major customer groups during the April to October peak season and the composition of that demand according to usage priority. These figures are based on an analysis of actual consumption records for the three-year period from 2002 through 2004, which was selected as being representative of typical water consumption patterns in a stable period marked by normal weather and water conditions.

**Table 3-4. Composition of Peak Season Water Use, by Usage Priority**
**(Million gallons)**

| Customer Class: | Usage Priority: 1 Health/ Safety | 2 Business | 3 Irrigation | Total | Percent of Total |
|---|---|---|---|---|---|
| Single Family Residential | 660 | | 371 | 1,031 | 42% |
| Multiple Residential | 382 | | 142 | 524 | 21% |
| Business | 165 | 273 | | 438 | 18% |
| University of California | 91 | | 41 | 132 | 5% |
| Other Industrial | | 23 | | 23 | 1% |
| Municipal | 18 | | 30 | 48 | 2% |
| Irrigation | | | 110 | 110 | 4% |
| Golf Course Irrigation | | 32 | 74 | 106 | 4% |
| Coast Agriculture | | 59 | | 59 | 2% |
| Other | | 2 | | 2 | 0% |
| SUBTOTAL | 1,316 | 389 | 768 | 2,473 | 100% |
| **Percent of Total** | **53%** | **16%** | **31%** | **100%** | |
| System uses/losses | | | | 168 | |
| TOTAL SYSTEM PRODUCTION (million gallons) | | | | 2,641 | |

Metered water use by all customers during this 7-month period averages 2,473 million gallons, or roughly 2.5 billion gallons. In terms of the breakdown by usage priority, water used for health and safety purposes amounts to 1.3 billion gallons or just over half (53%) of the total demand during the peak season. Water used for business-related purposes amounts to less than 400 million gallons (16%) and the volume of water used for irrigation and associated outdoor purposes totals 768 million gallons (31%). Expressed on a daily basis, this breakdown equates to an average of 6.3 mgd for to satisfy heath and safety needs, 1.9 mgd for business activities, and 3.7 mgd for irrigation/outdoor purposes.

To arrive at demand reduction goals for each customer group, the normal year demands shown in Table 3-4 are scaled back by usage priority in accordance with the schedule shown in Table 3-5.

**Table 3-5. Reduction in Water Delivery by Usage Priority**
**(percent of normal deliveries)**

| Stage | Overall System Shortfall: | Health/Safety | Business | Irrigation |
|---|---|---|---|---|
| 2 | 15% | 95 | 95 | 64 |
| 3 | 25% | 95 | 90 | 34 |
| 4 | 35% | 90 | 85 | 12 |
| 5 | 50% | 75 | 67 | 0 |

In essence, this allocation system strives to balance available supplies in times of drought as much as possible through cutbacks in outdoor water use. At each level of shortfall, public health and sanitation usage is afforded the highest priority by cutting back on interior usage the least[1]. The importance of water in protecting the City's employment base is also acknowledged through proportionately modest cutbacks to the commercial sector as compared to the overall system shortfall. Irrigation and other outdoor uses in all cases is cutback the most. The larger the water shortage, the greater the cutbacks, but this system of priorities is maintained throughout the range of potential shortages. The heavy reliance on outdoor use reductions makes sense, both from a water system perspective because it reduces peak demands, which is important to preserving storage in Loch Lomond Reservoir, and from a public health and

[1] No separate allocation was developed for Stage 1 shortfall due to the minimal level of demand reduction needed, voluntary nature of conservation measures requested, and regulations that affect all customer groups equally.

welfare perspective, because irrigation and other outdoor use are the most discretionary of all uses when drinking water is in short supply.

Under this system, a systemwide water shortage of 15 percent - the maximum unserved demand envisioned in the Integrated Water Plan - can be addressed through modest cutbacks (5%) in both indoor and business water uses, combined with an approximately one-third reduction in outdoor water use. Emergency water shortages would involve far deeper cutbacks. A 25 percent systemwide shortage requires slightly greater reduction in business water use combined with a harsher two-thirds reduction in outdoor watering. A 35 percent systemwide shortage requires reducing health/safety and business uses somewhat more, combined with drastic reductions, amounting to almost 90 percent, in outdoor water use. To achieve a 50 percent reduction would take nothing less than a significant reduction in both health/safety and business usage, combined with the elimination of all outdoor water use.

The resulting water supply allocation is shown in Table 3-6. The figures are expressed as a percent of normal delivery and by volume in million gallons for each sector. For example, an allocation of 80 percent means a 20 percent cutback from normal use. Single family residential customers are cut back in all stages slightly more than the overall system shortfall and more than the multifamily customers due to their relatively higher proportion of outdoor to indoor use. Business and industrial customers are also cut back, but by less than the system deficit. The University's cutback would be equal or close to system shortfall, while municipal facilities would be cut back substantially greater due to the high percentage of water use that goes to outdoor purposes. Dedicated landscape/irrigation customers suffer the deepest cutbacks of any single group.

The contribution of each customer category to the overall demand reduction goal is shown in Table 3-7. Approximately two-thirds of the total cutback would be realized through reductions at single and multifamily residential accounts, which is roughly proportional to their overall percentage of normal system demand.

This allocation system is the one recommended by the City's Water Commission after considering several options, and is based on current patterns and composition of water consumption. As demand level changes over time, it should be reviewed and possibly revised. In addition, alternative allocations may always be considered at the time a given stage is implemented.

**Table 3-6. Water Supply Allocation and Customer Reduction Goals**

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

**Table 3-7. Contribution of Each Customer Category to Toward Overall Cutback Goal**

| | Stage 2 15% Deficiency | | Stage 3 25% Deficiency | | Stage 4 35% Deficiency | | Stage 5 50% Deficiency | |
|---|---|---|---|---|---|---|---|---|
| Demand Reduction: | Million gallons | Percent of total | Million gallons | Percent of total | Million gallons | Percent of total | Million gallons | Percent of total |
| Single Family Residential | 167 | 46% | 278 | 45% | 392 | 45% | 536 | 44% |
| Multiple Residential | 70 | 19% | 113 | 18% | 163 | 19% | 238 | 19% |
| Business | 22 | 6% | 36 | 6% | 57 | 7% | 131 | 11% |
| UC Santa Cruz | 19 | 5% | 32 | 5% | 45 | 5% | 64 | 5% |
| Other Industrial | 1 | 0% | 2 | 0% | 3 | 0% | 8 | 1% |
| Municipal | 12 | 3% | 21 | 3% | 28 | 3% | 35 | 3% |
| Irrigation | 40 | 11% | 73 | 12% | 97 | 11% | 110 | 9% |
| Golf Course Irrigation | 28 | 8% | 52 | 9% | 70 | 8% | 85 | 7% |
| Coast Irrigation | 3 | 1% | 6 | 1% | 9 | 1% | 19 | 2% |
| Other | 0 | 0% | 0 | 0% | 1 | 0% | 1 | 0% |
| **Total Demand Reduction** | **362** | **100%** | **612** | **100%** | **866** | **100%** | **1,226** | **100%** |

A prime concern of any water shortage contingency plan is maintaining sufficient water for public health and sanitation. Table 3-8 below presents the health and safety allocation for residential customers in terms of gallons per person per day under the four deficit conditions. Current indoor water use averages 58 gallons per person per day for single residential accounts and about 50 gallons per person per day for multifamily accounts. In all but the most extreme case, there is enough water to meet essential health and safety needs, which is considered to be between 45 and 50 gallons per person per day for single family homes, assuming they have been fitted with water conserving fixtures and leakage is minimized. At a 50 percent deficiency, even highly water-efficient households would have to take additional actions to get their usage down to the upper 30 or low 40 gallons per person per day.

**Table 3-8. Health & Safety Indoor Residential Use**

| Deficiency condition | Health / Safety Allocation | Single Residential (gal/person/day) | Multiple Residential (gal/person/day) |
|---|---|---|---|
| No deficiency | 100% | 58 | 50 |
| 15%, 25% | 95% | 55 | 47 |
| 35% | 90% | 52 | 45 |
| 50% | 75% | 43 | 37 |

## 3.4 Water Shortage Response Actions

The allocation system described above serves to establish demand reduction goals for each of the City's major customer groups. The challenge in crafting this contingency plan is to select the most appropriate set of measures that logically correlate with these targets for each sector and stage of shortfall, acknowledging the inherent uncertainties involved and difficulty in predicting their effectiveness in advance.

The recommended menu of actions to cut water use is presented below. It is meant primarily to help inform the public and decision-makers about the types of measures the Water Department would take under various water shortage scenarios and to aid in structuring an updated water shortage ordinance, but should not be construed as limiting other possible options. Specific circumstances will vary with each shortage and decisions about the most appropriate response should be based on the water supply and demand

conditions at the time, and the collective judgment of staff, Water Commission, and City Council, with ample public input. These actions are thus intended as a list of probable measures for advance preparation purposes rather than a set script to be strictly followed, recognizing that as supply and demand change over time, or as a shortage evolves, the ultimate choice of options and actions to best address the shortage also may change.

It is also important to recognize that flexibility in selecting the most appropriate stage may be needed. In the case of a borderline situation, for instance, where there is reasonable likelihood that system demand could be curtailed sufficiently with the lesser restrictions, it may be advantageous to initially choose the lower stage, conditioned with a well publicized caveat that, if water use exceeds targets, the more restrictive regulations would kick in.

Each section that follows includes:

- an overview of the response,
- a discussion of any key issues involved in that stage,
- the prepared public message, and
- a list of the recommended demand reduction measures, communications actions, and operating actions applicable to that stage

### 3.4.1 Stage 1 – Water Shortage Alert

Stage 1 applies to relatively minor water shortages that can be accommodated with a combination of voluntary conservation measures and minimal usage restrictions, combined with enhanced enforcement of the City's ongoing ordinance prohibiting water waste. Except for a few instances, all demand reduction measures apply uniformly to nearly all customers, therefore no specific allocation is proposed during this stage.

A Stage 1 response may also be appropriate in other situations. It may be prudent as a precautionary measure during an unusually dry year in advance of a declared water shortage to help preserve reservoir storage, or during the winter season following an actual shortage event if needed to maintain a continuing level of awareness among customers until normal water conditions are restored.

The Stage 1 public message is as follows:

*"Due to abnormally dry conditions this winter, we're asking all customers to voluntarily cut back water use this summer by 5 percent to stretch the available water supply. City water users should stop using water for non-essential purposes and conserve where possible in case the dry period experienced this past winter continues into next year. If everyone cooperates, we may avoid imposing more stringent watering restrictions. As always, wasting water is prohibited by law"*

### Table 3-9. Stage 1 Water Shortage Alert Response Measures

| **System-wide Reduction Goal: 0-5% 0.6 mgd or less** |
|---|
| **Demand Reduction Measures:**<br>• Request voluntary water conservation by all customers<br>• Step up enforcement of water waste<br>• Restrict the time of landscape irrigation to early morning and evening<br>• Prohibit non-essential water use:<br>  - serving drinking water by restaurant or food service establishments except upon request<br>  - use of potable water for washing driveways, patios, parking lots or other paved surfaces<br>  - require hotel, motel, and other commercial lodging establishments to offer option of not laundering towels and linen daily<br>  - draining and refilling of swimming pools<br>• Require hoses used for any purpose to have shut off nozzles<br>• Encourage use of drip and other low volume irrigation systems<br><br>**Publicity/Communications**<br>• Conduct press conference to announce water conditions, request cooperation<br>• Initiate public information campaign through media, utility newsletter, website<br>• Develop regular advertising campaign to remind consumers of the need to conserve water<br>• Prepare and disseminate suggestions/requirements to reduce water use<br>• Inform large landscape/property managers/green industry of irrigation restrictions<br>• Implement customer meter reading program<br><br>**Operating Actions**<br>• Coordinate water conservation actions with other City Departments and public agencies<br>• Adopt water shortage ordinance prohibiting non-essential water use<br>• Eliminate system water uses deemed non-essential<br>• Delegate water waste patrol duties to all field personnel<br>• Institute regular monitoring and reporting of water production and consumption<br>• Undertake contingency planning for continuing/escalating shortage |

### 3.4.2 Stage 2 – Water Shortage Warning

Stage 2 applies to moderate water shortages. This condition requires more vigorous public information and outreach and an expansion of mandatory water restrictions and prohibitions, particularly on outdoor water uses. The primary methods to meet target consumption levels are to limit irrigation to specified days of the week and to institute water budgets for large landscapes and parks.

The recommended approach to reducing outdoor water use in this stage would be to restrict watering of all lawns and established landscapes to twice weekly during specified hours and to disallow any watering with automatic sprinkler systems on certain days to maximize reduction. Exact schedules would be developed with public input.

Large landscape users, including parks, residential and commercial landscapes, and golf courses with separate irrigation accounts would be required to complete on-site water audits, adhere to monthly water budgets based on their irrigated area and plant materials, and modify their irrigation schedules to achieve the equivalent of a one-third reduction in site water use. The lead time to develop landscape water budgets is long due to the need to collect site specific information, implement billing system changes, and to educate people and transform standard irrigation practices. However, development of water budgets for large users is the next major priority for the City's long-term conservation program, and once they become implemented as an ongoing program, they may be quickly adapted as a shortage management tool. Professional water budgets for dedicated irrigation accounts are typically tied to real-time weather data and tiered pricing systems or surcharges to be effective.

Other measures that would be imposed under Stage 2 would include mandatory leak inspection and repair for large customers and to expand restrictions on exterior washing to dwellings, buildings, and structures.

The Stage 2 public message is as follows:

*"It is necessary to impose mandatory restrictions on water use to ensure that throughout the duration of this water shortage an adequate supply of water is maintained for public health and safety purposes. Our overall goal is to reduce water use by 15 percent, which can be achieved if everyone cuts back their*

*outdoor watering by one-third the normal amount. We are relying on cooperation and support of all water users to abide by all restrictions and to reach this goal. Otherwise, the shortage could deteriorate into a more serious emergency that requires rationing household water use to avoid depleting the available water supply."*

### Table 3-10. Stage 2 Water Shortage Warning Response Measures

| **System-wide Reduction Goal: 5-15% 0.6 to 1.8 mgd** |
|---|
| **Demand Reduction Measures:**<br>• Continue all measures initiated at Stage 1<br>• Restrict landscape irrigation to designated watering days and times<br>• Require large landscapes to adhere to water budgets<br>• Prohibit exterior washing of dwellings, buildings, or structures (with exceptions for window washing or in preparation for painting)<br>• Reduce time allowed to resolve water waste<br>• Require large users audit premises and repair leaks<br>• Continue to promote meter reading and regular leak detection by all customers<br><br>**Publicity/Communications**<br>• Intensify public information campaign with regular media updates, direct notices to all customers, paid advertising, billing inserts.<br>• Generate publicity about individuals and businesses demonstrating leadership to save water<br>• Consult with major customers to develop conservation plans<br>• Publish weekly consumption graph in daily newspaper<br>• Inform large landscape/property managers/green industry of additional irrigation restrictions<br>• Conduct workshops on large landscape requirements for property owners, contractors, maintenance personnel<br><br>**Operating Actions**<br>• Coordinate with all City Departments and public agencies to reduce water use<br>• Optimize existing sources (increase groundwater production, reduce transmission losses)<br>• Suspend main flushing except as required for emergency and essential operations<br>• Intensify distribution system leak detection and repair<br>• Hire, train, dispatch water waste patrol<br>• Establish water conservation "hot line" to respond to questions and reports of waste<br>• Expand home water survey program and offer large landscape water audits<br>• If necessary, use City Water Commission to process requests for exceptions<br>• Continue regular monitoring and reporting of water production and consumption<br>• Undertake contingency planning for continuing/escalating shortage<br>• Develop strategy to mitigate revenue losses |

### 3.4.3 Stage 3 – Water Shortage Emergency

This level of water shortage constitutes an emergency situation requiring significant actions by the public to achieve up to a 25 percent reduction in normal water use to avoid depleting limited water storage. It requires the equivalent of 5 to 10 percent reduction in all indoor use and a drastic two-thirds reduction in outdoor use systemwide. The three primary measures being recommended to meet this emergency reduction goal are:

1. Residential water rationing
2. Required water shortage signage in all nonresidential establishments
3. Reduced landscape water budgets for large landscapes

The basic concept of water rationing is that each utility customer is given a certain allocation of water, expressed in billing units, to use in a billing period[2]. If they use the amount they are allocated or less, charges for water are calculated at the normal rate. If they exceed their allocation, the portion in excess of their allocation is charged a penalty rate. The penalty rate may be broken into multiple tiers so the more the excess usage, the higher the penalty price per CCF used. The purpose is not to generate revenue but rather to use water pricing as a way to motivate the customer to modify their usage to stay within their allocation and avoid being penalized, which most customers do. Those that don't reduce are charged for their overuse at the penalty rates.

The method to allocate water when rationing is instituted varies according to customer type. It may be based on the number of people in a home, the number of dwelling units in a multifamily complex, or set as a percentage of past use during some prior year. Staff and the Water Commission reviewed the water shortage contingency plans of many other water agencies to identify the methods used elsewhere to ration water and considered the advantages and disadvantages of various methods.

For single family residential customers, the **per capita approach** is probably the fairest practical method, easiest to communicate, would be best understood and accepted by the general public, and is effective in achieving cutbacks where they are needed most, in outdoor water use. In addition, past experience

[2] One billing unit equals one hundred cubic feet (CCF) or 748 gallons.

demonstrates that this method was very successful in reducing outdoor water demand for the single residential category when rationing was last instituted in 1990 and in 1977.

One of the key challenges to implementing water rationing using a pure per capita approach is the need to perform a census of household size at over 18,000 single family accounts and to maintain information on household size as number of residents changes over time. In lieu of performing a census, Staff and the Water Commission recommend using a modified per capita rationing system developed by the Goleta Water District. Under this system, all households are given a default allocation sufficient for a family of 4 persons. Households that have more than four persons would be required to contact the Water Department and verify household size in order to be granted an increased allocation, which would depend on the actual number of persons living at the residence.

Recent census data for the City of Santa Cruz indicate that only 17 percent of all occupied households within the City have four or more persons per household. Assuming this figure is similar for the unincorporated part of the City's water service area, establishing a default allocation for a family of four would more than satisfy the 83 percent majority of households that have three or fewer persons per household. This method is similar to that last used by the City to ration water in 1990, which provided a baseline allocation for households of three or less, except that a census was undertaken then to survey the actual number of persons living at each household.

The Goleta rationing model is considered to be preferable because it eliminates the significant work associated with carrying out an occupancy census and alleviates concerns about potential for inaccurate responses. The principle drawback is the problem of equity, since there will be less "cushion" in the allocation for households with four residents than there is for homes with fewer number of residents, and an increased possibility of exceeding their allocation. Whatever method is selected, allocation disagreements are to be expected and procedures need to be put in place to handle valid appeals and exceptions.

Table 3-11 below shows a typical rationing calculation for a single family residence in Stage 3.

**Table 3-11. Water Rationing Schedule: Single Family Residential Account**

| | Ccf/month | Gallons per day: |
|---|---|---|
| Up to four persons: | 11 | 265 |
| Each additional person: | 2 | 50 |
| *Example monthly allocation for a 6-person household:* | | |
| Base allocation: | 11 ccf | |
| 2 additional persons x 2 ccf per person | + 4 ccf | |
| Monthly Allocation | = 15 ccf | = 374 or 62 gpcd [3] |

What makes multifamily customers more challenging for developing a water rationing system are the large differences in housing types, the presence or absence of irrigation meters at a complex, and the fact that many larger accounts are handled by an independent property management firm on behalf of the homeowner's association. These companies typically do not track how many people reside in each unit or in the complex as a whole.

It is recommended that multiple-residential accounts be rationed based on the **number of dwelling units** associated with the water service account. The number of dwelling units is the best starting point since that data is available on the utility billing system and, in the absence of information about the number of people living on the property, it is the next best driver for indoor water demand. It is further recommended that multiple-residential accounts be allowed alternative rationing options that reflect the heterogeneous nature of building types on multifamily properties and the fact that some of these properties have separate irrigation accounts while others don't. These wide differences in user characteristics cause inequities in allocation based solely on the number of dwelling units. Offering alternatives allows the customer choose for themselves the option that works best in their particular case. These options include:

- an allocation based on the number of persons residing at the property
- an allocation based partly on the number of persons residing at the property and partly on landscape water needs at the property that reflect the same cutback to irrigation that other customers would experience (for properties without irrigation accounts)

[3] gpcd = gallons per capita per day

- the same allocation per dwelling unit as single family accounts would receive for certain properties that resemble single family lots in terms of lot coverage

Recommended rationing allotments for single and multiple residential accounts are presented in Appendix E.

If water rationing becomes necessary, it is also recommended that all outside city customers be converted from bimonthly to monthly billing. This change will enhance the customer's ability to monitor their water usage, enable them to detect and repair leaks quicker, and help them stay within their allocation.

The main obstacle in implementing water rationing at this time is the uncertainly about the capability of the new EDEN utility billing system. The system has been in use only since September 2008 and its ability to calculate rationing allocations and excess use charges is unknown. In the event rationing becomes necessary before the billing system can be adequately programmed and tested, other options could be considered to achieve substantial outdoor use reductions in the residential sector in lieu of water rationing. Although not ideal, these include:

- Restricting watering to once weekly, or
- Banning sprinkler irrigation

This problem is discussed further in Section 4.

It should be reiterated that **water rationing is a situation that the City is seeking to avoid** through long-term conservation efforts and the development of an additional water supply. It is, however, necessary to have a contingency plan in place should the need arise.

Commercial customers would be exempted from individual water rationing in Stage 3. Instead they would be expected to meet their collective 8 percent reduction goal by adhering to continuing water restrictions, and by being required to prominently post **"SAVE WATER – REPORT LEAKS AND WATER WASTE"** signs at the entrance and in every bathroom of commercial, industrial and institutional buildings, including:

- Hotels, motels, lodging
- Restaurants, cafeterias, cafes, and all food service establishments

- Offices and government buildings
- Hospitals and health care centers
- Schools

Large landscape customers would be held to water budgets as described in Stage 2, reduced in accordance with the allocation for irrigation customers in Stage 3.

One charged policy issue that often arises in connection with a water shortage emergency is the question of whether or not to continue allowing new connections on the system. In the past, it has been the City's policy to continue allowing new connections mainly because the demand they add in any one year is so negligible. The water that would be made available to existing customers by banning new water connections, therefore, would not make any real difference in terms of increasing the existing customers' allocation. This issue is typically driven by customers who are called on to make sacrifices and feel that water agencies should concentrate on fulfilling present obligations rather than accepting new customers. A number of agencies, however, do have provision for a temporary ban or place a low priority on new connections in later stages of their drought plans.

The Water Commission considered this issue carefully and recommended giving the public a one-year advance notice, beginning in Stage 3, stating that a temporary water service connection ban would be strongly considered if the shortage emergency continues or escalates into the following year. This notice would allow those people with plans and projects already underway time to complete work or make arrangements, and those considering future construction projects to make timely decisions about proceeding with the knowledge that they risk not being able to secure a water service connection until the shortage is over.

The Stage 3 public message is as follows:

*"The City faces a serious water shortage emergency due to prolonged drought. To conserve the available water supply for the greatest public benefit while minimizing impacts on our local economy, it has become necessary to institute a water rationing program for all residential customers. Our goal is to reduce system water demand by ___%. While rationing amounts are adequate for*

*normal domestic needs, significant cuts to outdoor water use may be necessary to remain within set allocations. All customers are urgently asked to make every effort to conserve water and abide by watering restrictions or face further reductions in water allotments."*

### Table 3-12. Stage 3 Water Shortage Emergency Response Measures

| System-wide Reduction Goal: 15-25% 1.8 to 3.0 mgd |
|---|
| **Demand Reduction Measures:**<br>• Institute water rationing for residential customers<br>• Continue landscape irrigation restrictions to designated watering days and times<br>• Require large landscapes to adhere to reduced water budgets<br>• Require all commercial customers to prominently display "save water" signage with specified language at specified locations<br>• Maintain restrictions on exterior washing of surfaces and structures<br>• Continue to promote meter reading and regular leak detection by all customers<br><br>**Publicity/Communications**<br>• Expand, intensify public information campaign focused on 2/3 reduction in outdoor use<br>• Provide regular media briefings, manage media coverage<br>• Provide regular information reports to Water Commission, City Council and other agencies<br>• Consult with major customers to develop conservation plans<br>• Publish weekly consumption graph in daily newspaper<br>• Enlist support of business groups: chamber, CVC, lodging association, etc.<br>• Inform large landscape/property managers/green industry of reduced allocations<br>• Conduct workshops on large landscape requirements for property owners, contractors, maintenance personnel<br>• Prepare public notice regarding possible future service connection moratorium<br><br>**Operating Actions**<br>• Modify utility billing system and bill format to compare actual use with customer allocation<br>• Adopt penalty rates<br>• Increase customer service training to address high bills, irate customers<br>• Convene and staff appeals board to process requests for exceptions and appeals of penalties<br>• Expand size and coverage of water waste patrol<br>• Expand, strengthen water conservation education, activities, and program<br>• Continue all operating actions listed under Stage 2<br>• Increase frequency of monitoring and reporting of water production and consumption<br>• Convert outside City customers from bimonthly to monthly billing<br>• Undertake contingency planning for continuing/escalating shortage<br>• Develop strategy to mitigate revenue losses |

### 3.4.4 Stage 4 – Severe Water Shortage Emergency

The water supply conditions that would trigger Stage 4 parallel the difficult situation the City experienced in the drought of late 1970s. Under this scenario, virtually all available water must be reserved either for health and safety purposes or to sustain local business.

Achieving a 35 percent systemwide reduction would require expanding water rationing to cover all water customers, including business. Residential customers would continue to be rationed as described in Stage 3, but with reduced monthly allotments.

Unfortunately, there is no practical way to assign a commercial water budget based on variables like the number of employees, square footage, etc. given the variety of usage characteristics in this sector. Every business (or group of businesses sharing a single water account, as is often the case in shopping centers) is unique. They include laundries, restaurants, health care facilities, retail outlets, hotels, car washes, and office buildings. We see no choice other than to ration business customers individually based on a **percent of prior use in a normal year** that is consistent with the overall allocation for Stage 4. Where essential water use at a business establishment involves a public health service, including hospitals, doctor's offices, medical laboratories, and skilled nursing facilities, or where a business can demonstrate it has already achieved maximum practical water conservation, provision for additional water could be made on a case by case basis through an exceptions process.

Other actions/restrictions that likely would be necessary in a severe water shortage emergency, in addition to those previously described, include the following:

- Prohibition on lawn/turf irrigation and on installation of new landscaping in new development
- Prohibition on potable water in fountains and ornamental water features
- Prohibition on on-site vehicle washing, including dealer lots, company fleets
- Rescinding hydrant and bulk water permits
- Suspending water main replacement program

Gray water use can be allowed and should be promoted for saving valuable landscape trees and shrubs. It includes drain water from showers, bathtubs,

bathroom sinks, and clothes washers. It does not include water that has come in contact with toilet waste, water from kitchen sinks and dishwashers, or laundry water used for washing diapers. There are no restrictions on the use of gray water if it is carried in a bucket. Plumbed gray water systems can also be built to convey drain water and provide subsurface irrigation to trees and shrubs.

The Stage 4 public message is as follows:

*"Due to continuing deterioration in storage and overall scarcity of available supply, all customers, residential and business alike, are now unavoidably subject to water rationing. The current water shortage is among the most severe ever faced in modern times. We must all continue to conserve water to the maximum extent possible and strive to maintain water use within our established rationing limits as long as the drought endures in order to avert a water crisis."*

**Table 3-13. Stage 4 Severe Water Shortage Emergency Response Measures**

| **System-wide Reduction Goal: 25-35% 3.0 to 4.2 mgd** |
|---|
| **Demand Reduction Measures:**<br>• Reduce residential water allocations<br>• Institute water rationing for commercial customers<br>• Minimize water use by large landscape customers – only for most valuable plant and tree survival<br>• Prohibition on lawn/turf irrigation and on installation of new landscaping in new development<br>• Prohibition on on-site vehicle washing, including dealer lots, company fleets<br>• Rescind hydrant and bulk water permits, prohibit use except by special permission<br><br>**Publicity/Communications**<br>• Contract with outside advertising agency to carry out major publicity campaign<br>• Continue to provide regular media briefings, manage media coverage<br>• Provide regular information reports to Water Commission, City Council and other agencies<br>• Publish daily consumption graph in all local newspapers<br>• Prepare public notice regarding possible service connection moratorium<br>• Publish information on ways to minimize most valuable landscape damage and loss, including promote appropriate use of gray water<br><br>**Operating Actions**<br>• Scale up administrative appeals staff and increase frequency of hearings<br>• Expand water waste enforcement to 24/7 |

- Delegate field staff to assist in enforcement (shut offs, flow restrictors)
- Open separate, centralized drought information center
- Hire temporary staff to conduct conservation training
- Continue all applicable operating actions listed under Stage 3
- Increase frequency of monitoring and reporting of water production and consumption
- Undertake contingency planning for continuing/escalating shortage
- Revise Department operating budget to address revenue shortfall
- Defer portions of capital improvement program
- Consider surcharges, rate changes

### 3.4.5 Stage 5 – Critical Water Shortage Emergency

Stage 5 represents an imminent and extraordinary crisis threatening health, safety, and security of the entire community. Under this dire situation, extreme measures are necessary to cut back water use by up to half the normal amount. Not enough water would exist even to meet the community's full health and safety needs, the top priority. All water should be reserved for human consumption, sanitation, and fire protection purposes and any remaining amount allocated to minimize economic harm. A shortage of this severity could be expected to generate stress, confusion, and chaos much the same as any major emergency and at some point could transform into a full blown natural disaster that can no longer be governed by local ordinance and may need to be managed by the same basic principles and command structure under the state Standardized Emergency Management System that other natural disasters are. The City has experienced water shortages in the past but never one of such large proportion.

This fifth stage would involve nothing less than rationing all customer groups and instituting a prohibition on residential outdoor use for any reason (e.g., garden, car-washing, cleaning, maintenance, etc.) It may also require shutting down or severely restricting use at certain public facilities, like local parks and school play fields. Some businesses may be forced or required to either partially or completely close.

The planned response for a shortage of this magnitude would involve reducing rationing allocations for residential customers to minimal levels and reducing commercial rationing amounts in accordance with their overall allocation. All

outdoor irrigation would be prohibited (other than by hand-held container and what has been captured or collected from another non-prohibited use). No water would be available for public showers or private, community, or public pools and hot tubs. These facilities likely would be forced to close.

A shortage of this magnitude could affect other local water suppliers as people substitute normal activities, such as laundry, showers, etc. from their home to other locations not so affected. The City's response would therefore involve greater coordination at a regional and perhaps even statewide level.

The Stage 5 public message is as follows:

*"The City of Santa Cruz is confronted with a critical water shortage emergency of unprecedented proportions. At this time, there exists barely enough drinking water for the most essential human health, sanitation, and safety needs. As a result, all outdoor watering is now prohibited. We understand the hardship this extraordinary condition poses to every resident and business in the City and appreciate the sacrifices people are making to ensure that water system does not run dry. Everyone is urgently requested to do whatever necessary to maintain water use within or below their allotted amount."*

**Table 3-14. Stage 5 Critical Water Shortage Emergency Response Measures**

| **System-wide Reduction Goal: 35-50% 4.2 to 6.0 mgd** |
|---|
| **Demand Reduction Measures:**<br>• Further reduce residential water allocations<br>• Reduce commercial water allocation<br>• Prohibit all outdoor irrigation<br>• No water for outdoor washing or recreational purposes; close pools, public showers<br>• Continue all measures initiated in prior stages as appropriate<br><br>**Publicity/Communications**<br>• Contract with crisis/emergency communications consultant to develop crisis communications plan and major publicity campaign<br>• Assign Public Information Officer to communicate with media<br>• Set up emergency notification lists for medical/dental facilities, public facilities, large users, food and beverage facilities, and critical businesses<br>• Promote appropriate use of gray water for reuse |

**Operating Actions**

- Consider shifting to EOC model of command management for overall policy guidance and coordination
- Coordinate with CA Dept of Public Health, District Engineer and other emergency response agencies regarding water quality, public health issues
- Coordinate with law enforcement agencies to address enforcement challenges
- Continue water waste enforcement 24/7
- Delegate field staff to assist in enforcement (shut offs, flow restrictors)
- Continue all applicable operating actions listed under Stage 4
- Coordinate with local sanitation agencies regarding sewer line maintenance
- Continue close monitoring and reporting of water production and consumption
- Investigate potential for reduced in-stream release
- Procure resources to utilize dead storage, if needed
- Undertake emergency planning for continuing/escalating shortage

## 3.5 Enforcement, Exceptions, and Appeals

An important part of a water shortage plan is to have the appropriate authority and a combination of methods to enforce mandatory measures such as water restrictions or rationing in order to protect public health and safety. General authority and powers of the City to enforce ordinances is contained in Chapter 4 of the Santa Cruz Municipal Code. In addition, the City's water shortage ordinance contains specific language regarding enforcement of water use rules and regulations and includes provisions for issuing exceptions and hearing appeals. These provisions were reviewed by staff and the Water Commission, which put forth several recommendations to be incorporated into the updated water shortage ordinance.

### 3.5.1 Enforcement Methods

Enforcement is carried out in a number of ways during a water shortage. In cases such as a report of water waste, the first step is to communicate with the customer by telephone, letter, door tag, or by making personal contact in the field to educate them about regulations. Many times this contact is all that is required to get the problem resolved. If not, enforcement progresses to a written notice of violation. Beyond this, there are several methods in the City's existing water conservation and water shortage ordinances that can be used to enforce water restrictions and rationing regulations. These methods are described below.

Penalty fees This method would apply in situations involving violation of water restrictions, if, after multiple warnings had been given, a violation continued to occur at an account. The fee would be added to a customer's utility bill along with a written notice sent to the customer in advance. The penalty fee would increase with subsequent violations, as follows:

1st Violation $100
2nd Violation $250
3rd Violation $500
4th Violation $1,000

The Water Commission recommended that additional, higher penalty fees also be established and applied to large users that willfully violate water restrictions.

Excess use fees Excess use fees are the primary method for enforcing water rationing and are imposed on customers whose water use exceeds their allocation when rationing is in effect. The purpose of the excess use fee is to make the consequences of exceeding one's rationing allocation so severe that the customer is induced to keep their water use within their allocation and avoid being fined. Like water rates, there are two components to setting excess use fees: 1) the way they are structured, and 2) the dollar amount.

Staff and the Water Commission looked at several models from other agencies and recommend maintaining the same excess use fee structure as in the existing water shortage ordinance, for billing reasons and for clarity in communicating penalties to the public. It is, however, recommended that the penalty amount be increased to bring it more in line with current rates, as shown below:

**Table 3-15. Proposed Excess Use Fees**

| Excess Use Range | Percent of water used in Excess of Allotment | Excess Use Charge per 100 Cubic Feet for all Water Used in Excess of Allotment (in addition to ordinary water consumption charges) |
|---|---|---|
| A | 0% to 10% over allotment | $25.00 |
| B | More than 10% over allotment | $50.00 |

For example, in Table 3-11 above, a 4-person household is provided an allocation of 11 CCF per month in Stage 3. At 2008 rates, the normal water charges for an inside city customer using 11 CCF would total $51.37, including the $16.58 readiness-to-serve charge for a 5/8" meter. Under water rationing, if that same customer used 18 CCF, their normal water charges would amount to $92.88, and excess use fees would cost $325 (1 ccf @$25 and 6 ccf @ $50), for a total of $417.88.

The purpose of a two-tier excess use structure is to avoid very large penalties for households that make a good faith effort to stay within their allocation but wind up going over a little. If a customer's water use exceeds one's allocation by a large amount, though, the penalty should be very steep.

Flow restriction Some customers will continue to exceed their allotment regardless of the amount of their water bill. In such instances, the Water Department is authorized to install a flow restricting device to provide minimal water flow, just enough for health and safety purposes. In these cases the customer is charged a fee to cover the staff time needed to install the flow restrictor and another fee for its removal. The Water Department would not use this method where fire suppression sprinklers are on the same supply line as domestic water.

Disconnection/reconnection fees Water suppliers have the legal authority to enforce water shortage regulations by terminating service for egregious violations. In such cases, the customer would be charged for both disconnection and reconnection.

Citation Finally, the City's water shortage ordinance authorizes staff to issue citations that would have to be paid or challenged in court. This method could be used in cases like a multifamily property where terminating service or restricting flow to all households may not be an option.

### 3.5.2 Exceptions

No water shortage plan can account for all situations. The exception procedure allows the Water Department to provide for special or exceptional circumstances that otherwise would create undue hardship for an individual customer or class of customers.

An exception allows a customer to be relieved of a particular regulation or receive an increased allocation for the duration of the shortage. Therefore, it should be granted only when justified on specific grounds that warrant allocating more water than other similarly situated customers and when consistent with the intent of the water shortage regulations, while providing equal treatment of all customers.

The City's existing ordinance includes an exception process. Some of its features are as follows:

- Under water restrictions, an exception application is not accepted unless the customer alleges unfair treatment.
- Under water rationing, an exception application is not accepted unless an excess use fee has been assessed.
- Leaks do not qualify for an exception.
- It allows a resident who is not an account holder to force the customer of record to appeal.
- The process is administered by the Water Director.

This policy is to make the customer first demonstrate the demand reduction efforts taken to meet the restriction or allocation, and places responsibility for managing and monitoring water use on the customer, where it belongs. It also serves to minimize the number of exception applications from those merely seeking more water without having gone to the effort to try to live within their given allocation.

Recommendations Regarding Exceptions

It is recommended that the updated water shortage contingency ordinance be amended to include a process that requires the Director make a formal finding to authorize an exception. This change is proposed to better articulate the standard that must be met in order to receive relief. The suggested language for such findings is as follows:

- Failure to do so would cause a condition affecting the health, sanitation, fire protection, or safety of the applicant or the public;

- Strict application of the allotment provisions imposes a severe or undue hardship on a particular business, or render it infeasible for a business or class of business to remain in operation;

- Alternative restrictions which achieve the same level of demand reduction as the restrictions from which an exception is being sought are available and are binding and enforceable;

- The customer has demonstrated to the Director's satisfaction that circumstances have changed warranting a change in the customer's allocation.

- Hospitals and health care facilities using industry best management practices are eligible for an exception.

- Demonstration by a business of actions already taken to increase environmental sustainability that have reduced water consumption to the maximum extent feasible, as determined by the Water Director.

Additional recommendations regarding the exception process are as follows:

- That the denial of an exception may be appealed to an Appeals Board;

- The Department adopt administrative procedures similar to those used by the City of Tampa Bay for including appropriate information on an exception application, including the requirement that the applicant must demonstrate maximum practical reduction in water consumption;

- That a policy be added allowing the Director to impose conditions requiring long-term water efficiency changes from customers as part of the exception process.

### 3.5.3 Appeals

The City's existing ordinance allows any water service customer who considers an enforcement action to have been erroneously undertaken to appeal their case before a City Council appointed ad hoc Drought Appeals Board. The Appeals

Board considers the evidence presented by the customer and decides whether to uphold the enforcement action or to provide relief.

The difference between an exception and an appeal is that an appeal gives an individual the opportunity to challenge an official decision about an enforcement action. It is not the primary means to secure a larger allocation or get an exception to a water use regulation. However, as mentioned above, customers should be able to appeal a denial by the Water Director of such an exception request to the Appeals Board.

From past experience, the most common reason for filing an appeal was to contest large excess use fees that were levied while under water rationing, often due to a leak in the customers' plumbing fixture or system. This resulted in a large and difficult backlog of cases for the Appeals Board. The Water Department would continue to follow its existing water leak rebate policy that provides administrative relief, including forgiveness of excess use fees, for certain types of leaks that are considered to be beyond the customer's control, such as a leak that develops in an underground pipeline serving a property. Common maintenance items, such as a leaking toilet or failing automatic irrigation valve, that are considered to be customer's responsibility to control, are not eligible for such forgiveness.

One feature of the existing ordinance was to allow a resident who is not a customer of record to force the account customer to appeal the excess water use fee. The ordinance also allowed a customer to request to use a portion of the excess use fee, on a one-time only basis, toward the installation of water conservation equipment in lieu of paying it to the Water Department.

Recommendations Regarding Appeals

It is recommended that the provisions included in the existing ordinance regarding appeals be continued. The Water Commission felt that a formal Appeals Board would not need to be convened until Stage 3, and felt it could serve in that capacity instead during the early stages (1 and 2), if necessary. Furthermore, as an alternative enforcement approach, we recommend adding a new process that would provide one-time forgiveness of excess use charges while under water rationing. To be considered for such forgiveness, the customer would be required to sign up and complete a short weekend or evening course

covering basic meter reading, leak detection, and other topics relevant to the water restrictions in place at the time. This approach (like traffic school) would help reduce the number cases heard by the Appeals Board, provide financial relief to customer receiving the high bill, and most importantly, would give them the opportunity, education, and tools they need to achieve ongoing compliance with water use rules and regulations for the remainder of the shortage.

## 3.6 Water Shortage Recovery and Plan Termination

A water shortage ends when local rainfall, runoff, and reservoir storage levels improve to the point where the water system is once again capable of supporting unrestricted water demand. Any water use rules and regulations in effect at the time are officially rescinded by City Council and public notice is given that the water shortage is over. The Water Director would then oversee any remaining termination and plan review activities. These activities could include:

- Publicize gratitude for the community's cooperation
- Restore water utility operations, organization, and services to pre-event levels
- Document the event and response and compile applicable records for future reference
- Continue to maintain liaison as needed with external agencies
- Collect cost accounting information, assess revenue losses and financial impact, and review deferred projects or programs
- Debrief staff to review effectiveness of actions, to identify the lessons learned, and to enhance response and recovery efforts in the future
- Complete a detailed evaluation of affected facilities and services to prepare an "after action" report
- Update the water shortage contingency plan as needed.

# Section 4 IMPLEMENTATION

This section describes the essential elements of implementing the updated Water Shortage Contingency Plan and discusses the approximate lead time needed to prepare for and activate a demand reduction program. The elements discussed below differ in the amount of staff time, effort, priority, and funding that is required for implementation; some steps can be taken relatively quickly and inexpensively while others will require substantial ongoing work and expense before they are able to be set up and applied as shortage management tools. The primary purpose of this section is to map out the major tasks and timelines required to implement the demand reduction program described in Section 3 and to identify where additional ongoing efforts are necessary to address critical gaps.

## 4.1 Timeline for Declaring Water Shortage

The table below indicates the approximate times of the year when the City evaluates water supply conditions and, if necessary, declares a water shortage. Planning for a water shortage may begin earlier in winter, and should commence early if conditions that winter are unusually dry or are preceded by a dry year, but it is not usually until the end of March that the water supply outlook for the year ahead becomes certain. This leaves very little lead time to prepare for implementing the water shortage contingency plan.

**Table 4-1. Calendar for Declaring Water Shortage**

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

Long-range weather forecasting has not yet advanced to the point where it is possible to know in advance with certainty whether the City will experience a water shortage. Therefore, it is not practical to plan more than one season at a time, other than to prepare possible scenarios using multiple dry years for modeling purposes.

## 4.2 Process for Declaring Water Shortage

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

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

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

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

## 4.3 Public Notification and Coordination

Even before formal declaration of a water shortage, a public information/media program should be activated to provide customers with as much advance notice as possible. Following Council action, all residents and businesses, not just

customers of record, would need to be provided notice of water shortage rules and regulations via a variety of media and communications methods, including print and television media, internet, and other methods. The timeline for getting information out to the public on television, radio, and through newspaper articles is very short. Additional notification would occur though the City's utility newsletter, which requires a longer lead time of six to eight weeks to produce and mail. It is also recommended that a separate website be designed in advance if rationing becomes necessary to provide basic information about the program, conservation information, forms related to the program, contact information, etc., which then can be modified and expanded as necessary. Large water users and those businesses that are most likely to be seriously affected should be contacted directly in writing. Public notification will be provided in Spanish language for non-English speakers.

Coordination with other City departments and other public agencies can begin prior to formal declaration of a water shortage and can be accomplished through regular meetings, e-mail group updates, and presentations.

Getting the public involved and keeping them informed will require a significant expansion of existing water conservation public information and outreach efforts. Contracting with an advertising agency to assist with a communications campaign and mass media advertising is one way to expand outreach efforts quickly. A substantial amount of printed information on how to conserve water during a water shortage has already been developed and tailored to various types of water customers and is available for immediate use.

## 4.4 Personnel, Office Space, and Equipment

The estimated additional staff needed to carry out this contingency plan is shown below in Table 4-2. Program staff may consist of existing staff reassigned from regular duties in the Water or other City departments, new limited-term employees, interns, or some combination of the above.

The role of the administrative and office assistants would be to help with the processing of customer appeal and exception requests, administration of the appeals board meetings, and related correspondence. The field utility representatives would be responsible for patrolling the service area for violations of watering rules and restrictions and public contact, while the office utility

representatives would deal with the greatly increased customer contact (in person and by telephone) and would help with utility billing issues. The meter technician's role would be to support the additional customer service workload related to verifying meter reads, data-logging, and other field activities. The water conservation representative's role would be to assist customers with on-site water audits, provide conservation education, and publicity. Distribution personnel (or possible contractor) would provide leak detection and repair services as well as functions related to meters and flow restriction. The programmer analyst position would provide utility billing system software services when water rationing is in effect.

**Table 4-2. Potential Additional Staff Positions**

| Section/Position | Water Shortage Stage: | | | |
|---|---|---|---|---|
| | 2 | 3 | 4 | 5 |
| Water Administration: | | | | |
| 105 Administrative Assistant I | | 1 | 1 | 2 |
| Customer Services: | | | | |
| 199 Utility Service Representative (field) | 1 | 2 | 4 | 6 |
| 199 Utility Service Representative (office) | 1 | 2 | 3 | 4 |
| 212 Water Meter Technician | | 1 | 1 | 1 |
| 333 Utility Supervisor | | | | 1 |
| Water Conservation: | | | | |
| 208 Water Conservation Representative | 1 | 2 | 2 | 3 |
| Water Distribution: | | | | |
| 209 Water Distribution Worker | 1 | 2 | 2 | 2 |
| Other Temporary: | | | | |
| 229 Programmer Analyst II | | 1 | 1 | 1 |
| 914 Office Assistant | | | 1 | 2 |
| Total Positions | 4 | 11 | 15 | 22 |
| Estimated personnel costs* ($000) | $113 | $324 | $425 | $622 |

**assuming seven months, including overhead*

The timeline associated with recruiting and hiring new or additional staff varies from several weeks to several months depending on the type of employment

opportunity, whether there is an existing recruitment list to draw from, or whether a new job announcement would need to be advertised.

Any newly hired staff would need to be quickly integrated into the organization with basic training in the following areas:

- Water Department functions, organization, facilities, and service area boundary,
- Customer service standards, City policies, and safety responsibilities,
- Computer equipment and the utility billing system,
- Water rates and charges and meter reading,
- Water shortage regulations and enforcement processes.

In addition, all existing Water Department personnel would need to understand water shortage rules and regulations in effect at the time to be able to respond to customer questions wherever they may come into contact with the public on the job.

Additional staff, particularly during stages when rationing is in effect, means expanded office space and additional equipment also would be needed to carry out office and field functions. Even though the Water Department recently moved to a new, larger office, the Customer Service section of the office is currently unable to accommodate any additional office personnel. The Water Department office would need to be reconfigured or new temporary workspace acquired, or vacant storefront property rented. In addition, the Water Department would need to purchase or lease the following equipment:

Office personnel:

- Furniture
- Telephones
- Computers

Field personnel:

- Automobiles
- Cell phones
- Digital cameras

## 4.5 Effect of Water Shortages on Revenue

One of the negative consequences of using demand reduction to deal with water shortages is the corresponding reduction in revenue that occurs to the City's Water Fund as a result of reduced water sales. To better understand the magnitude of revenue losses that the Water Fund might experience, a

spreadsheet model was developed based on 2007 calendar year revenues, the most recent year for which complete revenue data is available. The model assumes the "ready-to-serve" or fixed monthly service charge that is based on meter size would remain unaffected while the volumetric portion of the Department's revenue derived from water sales would vary by customer class in accordance with the allocation presented in Table 3-6 over the seven month period in which water shortage regulations are likely to be in effect. Results are summarized in Table 4-3.

**Table 4-3. Revenue Losses Associated with Various Water Shortages**

| | 2007 Revenue ($000) | | | Revenue Losses due to Reduced Water Sales ($000): | | | | |
|---|---|---|---|---|---|---|---|---|
| Customer Category: | From service charges | From water sales | Total | Stage 1 (5%) | Stage 2 (15%) | Stage 3 (25%) | Stage 4 (35%) | Stage 5 (50%) |
| Single Family Residential | 3,770 | 6,027 | 9,797 | -229 | -687 | -1,236 | -1,740 | -2,381 |
| Multi-Family Residential | 1,069 | 3,742 | 4,810 | -126 | -329 | -556 | -784 | -1,137 |
| Business | 917 | 3,207 | 4,124 | -111 | -111 | -177 | -288 | -665 |
| UC Santa Cruz | 99 | 1,022 | 1,121 | -33 | -99 | -158 | -224 | -317 |
| Other Industry | 44 | 130 | 174 | -4 | -4 | -8 | -13 | -28 |
| Municipal | 149 | 301 | 450 | -13 | -62 | -112 | -153 | -187 |
| Irrigation | 234 | 682 | 916 | -29 | -207 | -379 | -505 | -574 |
| Golf | 32 | 581 | 614 | -27 | -148 | -268 | -361 | -437 |
| Coast | 34 | 36 | 70 | -1 | -1 | -3 | -4 | -9 |
| Other | 19 | 43 | 62 | -1 | -1 | -3 | -13 | -13 |
| **Total 2007 Revenue** | **$6,366** | **$15,770** | **$22,137** | | | | | |
| Total Revenue Losses | | | | -$575 | -$1,649 | -$2,900 | -$4,085 | -$5,749 |
| **Estimated Net Revenue** | | | | **$21,562** | **$20,488** | **$19,236** | **$18,051** | **$16,388** |

Table 4-3 shows revenue losses ranging from just under $0.6 million in a 5 percent water shortage situation to almost $5.8 million in a critical 50 percent water shortage. Compared to 2007 revenues of just over $22 million, the Department's net revenue would be reduced to approximately $21.5 million in Stage 1 to less than $16.4 million in Stage 5. These estimates of losses are ballpark figures only and probably underestimate the problem. Actual losses would be different for the following reasons:

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

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

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

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

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

- Tapping into the Department's Rate Stabilization Fund (currently $2.2 million)
- Deferring planned capital improvements
- Considering possible rate adjustments or surcharges

As a matter of policy, since the City's Integrated Water Plan anticipates occasional water shortages of up to 15 percent, it is recommended that the Rate Stabilization Fund be maintained at least at a level that would fully mitigate expected revenue losses associated with that level of shortfall. The Rate Stabilization Fund would now fully cover the losses of a 15 percent shortfall lasting one year, but may need to be increased in the future, either to keep pace with expected revenue losses, or to mitigate revenue losses from water shortages lasting more than a single year.

Another implementation issue associated with pricing is the Proposition 218 procedure for increasing water rates, fees, and charges. It is assumed that the

proposed changes to both penalty fees and excess use fees discussed in Section 3 would require written notice to all customers, a public hearing, and consideration of written protests and comments before implementing the new fees. Given the minimum 45 day protest period, the entire Prop 218 process can take several months to complete.

## 4.6 Household Survey

To implement water rationing for single residential customers in Stages 3 through 5, it is recommended that the City of Santa Cruz use the system developed by Goleta Water District in lieu of performing a household census or survey. The advantages are that it is simpler, easy to understand, more likely to be feasible with the new utility billing system, avoids having to perform a household survey or census, allows adjustments for larger households, and achieves the fundamental goal of reducing peak season water use, particularly outdoor use . Goleta also required that, for households larger than four, certain efficiency steps be taken before authorizing a larger allocation.

For the majority of households that have fewer than four residents, little opposition to this approach is expected. However, the one downside to this approach is that it does afford somewhat unequal amounts of water on a per person basis to households of different sizes, and so some may object to the City adopting this system. If, based on public input, a true per capita rationing system becomes the preferred approach to ration water instead of the Goleta model, the following describes the work involved to update the number of people residing at each account on the billing system. In the past this survey has been done by mail and is based fundamentally on the honor system. There are currently over 18,700 accounts classified as single residential customers on the water system. This task would involve data processing personnel to prepare data files for mailing, a mailing service vendor to provide printing and mailing services and to provide return envelopes, and two additional temporary staff to handle data input. The task would also involve maintaining census data on a daily basis as household sizes change and new utility accounts are established. The estimated cost for postage and services related to performing such a survey is about $20,000, not counting data entry. The lead time necessary to conduct the survey and enter data is approximately 3 months.

The other major work item involved in a census-based approach to rationing involves configuring the utility billing system to calculate allotments based on household size, discussed below.

## 4.7 Utility Billing/Data Processing Capabilities

Implementing this Water Shortage Contingency Plan will require utility billing system software that provides the necessary capabilities and flexibility to quickly shift from normal billing practices to water rationing mode. To manage a water shortage as outlined in this plan, the billing system must eventually be able, at a minimum, to do the following:

- Integrate penalty fees into the utility bill,
- Change billing frequency, as needed, to monthly from bimonthly for outside City customers,
- Calculate rationing allocations, whether determined by per capita, per dwelling unit, or percentage of past use method,
- Maintain long-term water usage history,
- Calculate excess use fees,
- Address special needs customers (overwrite default allocation to handle rationing exceptions),
- Handle special cases, such as multiple meters serving a single property,
- Calculate seasonally varying landscape water budgets.

In addition, the utility bill format and the data files that are generated to create the utility bills must be modified to incorporate water restrictions, water budgets, and rationing requirements.

The newly installed EDEN utility billing module appears to be able to handle the type of computations needed to implement both the Goleta rationing model for single family residential customers and the per dwelling unit method for multi-family accounts. It currently does not have the capability or flexibility to handle a census-based approach to rationing, large landscape water budgets, or commercial water rationing which is based on some percentage of past use. Acquiring this capability is a top priority but it will have to be custom developed over time. The Customer Service Manager indicates that such programming would likely take in excess of one year to complete. The Department's FY 09 budget includes $25,000 for utility billing software development expenses.

## 4.8 Customer Exceptions and Appeals

One of the actions that is triggered when City Council adopts the water shortage ordinance is the establishment of an Appeals Board. Part of implementing this plan involves providing administrative support to the Appeals Board, including processing requests, preparing recommendations, posting agendas, attending meetings, preparing meeting minutes, and handling correspondence. After the Board's membership has been established and approved by City Council, the Appeals Board function can be implemented quickly, but depending on the stage of water shortage and number of appeals filed, may require substantial staff time over the course of the water shortage to address the resulting caseload.

## 4.9 Large Landscape Water Budgets

The next major work priority scheduled for the City's Water Conservation Office involves implementing a large landscape program. The program will consist of developing water budgets for over 400 large landscape sites served by dedicated irrigation meters, offering water audits, and supporting activities (financial incentives, education, and possible separation of large landscapes currently on mixed use meters). These programs have a long development time (1-2 years) due to the need to measure landscape areas, differentiate among plant materials, and integrate water budget data into the billing system. This latter task requires changing the bill design and layout to show water budget information and tying performance relative to the water budget to water pricing. The project will be designed so that water budgets can be quickly adapted for use as a water shortage management tool in Stages 2-5. If the City were confronted with a water shortage before large landscape water budgets and budget based pricing could be implemented, however, alternative methods to curtail water in the large landscape sector would have to considered.

## 4.10 Monitoring Water Supply and Demand

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

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

An example of a monthly water supply and demand monitoring report is presented in Appendix F.

## 4.11 Ongoing Implementation Steps

The final tasks in updating the City's Water Shortage Contingency Plan include the following steps:

- Involving the community and soliciting public review and input on this document;
- Finalizing and presenting the plan to City Council for adoption;
- Preparing an updated water shortage ordinance;
- Preparing and mailing a Proposition 218 notice about proposed changes to penalty and excess use fees.

As far as critical gaps that require ongoing work, the most important recommendations are to:

1. Continue to work on the new utility billing system so that the database is able to meet the City's requirements for use in water rationing if it becomes necessary, and

2. Focus on developing the large landscape program so that water budgets described above can be used to professionally manage large irrigation accounts the next time a water shortage arises.

3. As much as possible, prepare water shortage notices, announcements, materials, and mailing lists in advance, including bilingual materials for non-English speakers.

Appendices


A California Water Code, Sections 350-359 and 10632 ..... A-1

B Cities and Water Agencies whose Water Shortage Contingency Plans or Ordinances were Reviewed ..... B-1

C Exceedance Probabilities for San Lorenzo River at Felton ..... C-1

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Appendices


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# Appendix A

# California Water Code Sections 350-359 and 10632

## Water Code Section 350-359

350. The governing body of a distributor of a public water supply, whether publicly or privately owned and including a mutual water company, may declare a water shortage emergency condition to prevail within the area served by such distributor whenever it finds and determines that the ordinary demands and requirements of water consumers cannot be satisfied without depleting the water supply of the distributor to the extent that there would be insufficient water for human consumption, sanitation, and fire protection.

351. Excepting in event of a breakage or failure of a dam, pump, pipe line or conduit causing an immediate emergency, the declaration shall be made only after a public hearing at which consumers of such water supply shall have an opportunity to be heard to protest against the declaration and to present their respective needs to said governing board.

352. Notice of the time and place of hearing shall be published pursuant to Section 6061 of the Government Code at least seven days prior to the date of hearing in a newspaper printed, published, and circulated within the area in which the water supply is distributed, or if there is no such newspaper, in any newspaper printed, published, and circulated in the county in which the area is located.

353. When the governing body has so determined and declared the existence of an emergency condition of water shortage within its service area, it shall thereupon adopt such regulations and restrictions on the delivery of water and the consumption within said area of water supplied for public use as will in the sound discretion of such governing body conserve the water supply for the greatest public benefit with particular regard to domestic use, sanitation, and fire protection.

354. After allocating and setting aside the amount of water which in the opinion of the governing body will be necessary to supply water needed for domestic use, sanitation, and fire protection, the regulations may establish priorities in the use of water for other purposes and provide for the allocation, distribution, and delivery of water for such other purposes, without discrimination between consumers using water for the same purpose or purposes.

355. The regulations and restrictions shall thereafter be and remain in full force and effect during the period of the emergency and until the supply of water available for distribution within such area has been replenished or augmented.

356. The regulations and restrictions may include the right to deny applications for new or additional service connections, and provision for their enforcement by discontinuing service to consumers willfully violating the regulations and restrictions.

357. If the regulations and restrictions on delivery and consumption of water adopted pursuant to this chapter conflict with any law establishing the rights of individual consumers to receive either specific or proportionate amounts of the water supply available for distribution within such service area, the regulations and restrictions adopted pursuant to this chapter shall prevail over the provisions of such laws relating to water rights for the duration of the period of emergency; provided, however, that any distributor of water which is subject to regulation by the State Public Utilities Commission shall before making such regulations and restrictions effective secure the approval thereof by the Public Utilities Commission.

358. Nothing in this chapter shall be construed to prohibit or prevent review by any court of competent jurisdiction of any finding or determination by a governing board of the existence of an emergency or of regulations or restrictions adopted by such board, pursuant to this chapter, on the ground that any such action is fraudulent, arbitrary, or capricious.

359. (a) Notwithstanding any other provision of law that requires an election for the purpose of authorizing a contract with the United States, or for incurring the obligation to repay loans from the United States, and except as otherwise limited or prohibited by the California Constitution, a public water agency, as an alternative procedure to submitting the proposal to an election, upon affirmative vote of four-fifths of the members of the governing body thereof, may apply for, accept, provide for the repayment together with interest thereon, and use funds made available by the federal government pursuant to Public Law 95-18, pursuant to any other federal act subsequently enacted during 1977 that specifically provides emergency drought relief financing, or pursuant to existing federal relief programs receiving budget augmentations in 1977 for drought assistance, and may enter into contracts that are required to obtain those federal funds pursuant to the provisions of those federal acts if the following conditions exist:

(1) The project is undertaken by a state, regional, or local governmental agency.
(2) As a result of the severe drought now existing in many parts of the state, the agency has insufficient water supply needed to meet necessary agricultural, domestic, industrial, recreational, and fish and wildlife needs within the service area or area of jurisdiction of the agency.

(3) The project will develop or conserve water before October 31, 1978, and will assist in mitigating the impacts of the drought.
(4) The agency affirms that it will comply, if applicable, with Sections 1602, 1603, and 1605 of the Fish and Game Code
(5) The project will be completed on or before the completion date, if any, required under the federal act providing the funding, but not later than March 1, 1978.

(b) Any obligation to repay loans shall be expressly limited to revenues of the system improved by the proceeds of the contract.

(c) No application for federal funds pursuant to this section shall be made on or after March 1, 1978.

(d) Notwithstanding the provisions of this section, a public agency shall not be exempt from any provision of law that requires the submission of a proposal to an election if a petition requesting such an election signed by 10 percent of the registered voters within the public agency is presented to the governing board within 30 days following the submission of an application for federal funds.

(e) Notwithstanding the provisions of this section, a public water agency that applied for federal funds for a project before January 1, 1978, may make application to the Director of the Drought Emergency Task Force for extension of the required completion date specified in paragraph (5) of subdivision (b). Following receipt of an application for extension, the Director of the Drought Emergency Task Force may extend the required completion date specified in paragraph (5) of subdivision (b) to a date not later than September 30, 1978, if the director finds that the project has been delayed by factors not controllable by the public water agency. If the Drought Emergency Task Force is dissolved, the Director of Water Resources shall exercise the authority vested in the Director of the Drought Emergency Task Force pursuant to this section.

(f) For the purposes of this section, "public water agency" means a city, district, agency, authority, or any other political subdivision of the state, except the state, that distributes water to the inhabitants thereof, is otherwise authorized by law to enter into contracts or agreements with the federal government for a water supply or for financing facilities for a water supply, and is otherwise required by law to submit those agreements or contracts or any other project involving long-term debt to an election within that public water agency.

**Water Code Section 10632**

10632. The plan shall provide an urban water shortage contingency analysis which includes each of the following elements which are within the authority of the urban water supplier:

(a) Stages of action to be undertaken by the urban water supplier in response to water supply shortages, including up to a 50 percent reduction in water supply, and an outline of specific water supply conditions which are applicable to each stage.

(b) An estimate of the minimum water supply available during each of the next three water years based on the driest three-year historic sequence for the agency's water supply.

(c) Actions to be undertaken by the urban water supplier to prepare for, and implement during, a catastrophic interruption of water supplies including, but not limited to, a regional power outage, an earthquake, or other disaster.

(d) Additional, mandatory prohibitions against specific water use practices during water shortages, including, but not limited to, prohibiting the use of potable water for street cleaning.

(e) Consumption reduction methods in the most restrictive stages. Each urban water supplier may use any type of consumption reduction methods in its water shortage contingency analysis that would reduce water use, are appropriate for its area, and have the ability to achieve a water use reduction consistent with up to a 50 percent reduction in water supply.

(f) Penalties or charges for excessive use, where applicable.

(g) An analysis of the impacts of each of the actions and conditions described in subdivisions (a) to (f), inclusive, on the revenues and expenditures of the urban water supplier, and proposed measures to overcome those impacts, such as the development of reserves and rate adjustments.

(h) A draft water shortage contingency resolution or ordinance.

(i) A mechanism for determining actual reductions in water use pursuant to the urban water shortage contingency analysis.

# Appendix B

## Cities and Agencies whose Water Shortage Contingency Plans or Ordinances were Reviewed

Alameda County Water District

Contra Costa Water District

Denver Water, Colorado

East Bay Municipal Utilities District (EBMUD)

El Paso Water Utilities, Texas

Marin Municipal Water District

Monterey Peninsula Water Management District

New York City, New York

Salt Lake City Department of Public Works, Utah

San Diego County Water Authority

San Francisco Public Utilities Commission (SFPUC)

San Luis Obispo, City of

Santa Barbara, City of

Santa Monica, City of

Santa Rosa, City of

Seattle Public Utilities, Washington

Sonoma County Water Agency

Southern Nevada Water Authority, Nevada

St. Helena, City of

Tampa, Florida, City of

Yuba City, City of

# Appendix C

## Exceedance Probabilities for San Lorenzo River at Felton

| Month | Exceedence Probability | Wet | Normal | Dry | Critically Dry |
|---|---|---|---|---|---|
| Jan. | 100 | 120 | 34.2 | 13.8 | 20.5 |
| | 90 | 244 | 56.4 | 28.6 | 22.4 |
| | 75 | 386 | 92.2 | 35.2 | 30.6 |
| | 50 | 656 | 181 | 57.3 | 35.9 |
| | 25 | 831 | 271 | 108 | 43.3 |
| | 10 | 1153 | 600 | 139 | 57.5 |
| Feb. | 100 | 126 | 75.7 | 20.9 | 16.6 |
| | 90 | 218 | 102 | 34.9 | 21.6 |
| | 75 | 337 | 123 | 63.2 | 25.3 |
| | 50 | 637 | 301 | 141 | 47.3 |
| | 25 | 1177 | 466 | 220 | 77.5 |
| | 10 | 1318 | 573 | 256 | 124.0 |
| Mar. | 100 | 113 | 70.1 | 54.9 | 21.4 |
| | 90 | 237 | 87.7 | 58.5 | 22.3 |
| | 75 | 308 | 99.9 | 71.1 | 28.3 |
| | 50 | 462 | 219 | 126 | 37.1 |
| | 25 | 705 | 303 | 197 | 75.9 |
| | 10 | 842 | 494 | 229 | 93.1 |
| April | 100 | 67.9 | 58.0 | 36.7 | 12.3 |
| | 90 | 106 | 63.3 | 42.7 | 20.6 |
| | 75 | 140 | 77.6 | 43.3 | 25.5 |
| | 50 | 246 | 112 | 60.3 | 28.9 |
| | 25 | 459 | 149 | 70.0 | 32.8 |
| | 10 | 849 | 170 | 75.4 | 35.5 |
| May | 100 | 43.9 | 34.5 | 21.9 | 11.6 |
| | 90 | 65.9 | 40.2 | 27.2 | 15.7 |
| | 75 | 82.1 | 45.1 | 27.9 | 19.9 |
| | 50 | 105 | 58.5 | 31.7 | 21.3 |
| | 25 | 154 | 72.0 | 44.3 | 22.7 |
| | 10 | 185 | 87.2 | 77.5 | 29.4 |
| June | 100 | 33.6 | 23.1 | 15.4 | 9.4 |
| | 90 | 42.5 | 26.1 | 17.3 | 11.6 |
| | 75 | 49.0 | 29.7 | 19.4 | 13.3 |
| | 50 | 60.5 | 36.1 | 22.7 | 14.7 |
| | 25 | 77.2 | 44.8 | 28.5 | 17.2 |
| | 10 | 93.0 | 51.6 | 34.8 | 17.8 |
| July | 100 | 24.1 | 16.5 | 10.6 | 6.7 |
| | 90 | 25.9 | 18.2 | 12.9 | 8.7 |
| | 75 | 33.2 | 20.1 | 13.4 | 9.8 |
| | 50 | 40.1 | 24.1 | 15.5 | 10.5 |
| | 25 | 46.6 | 28.8 | 20.6 | 12.1 |
| | 10 | 56.7 | 33.2 | 23.9 | 13.2 |
| Aug. | 100 | 18.5 | 12.7 | 8.4 | 6.5 |
| | 90 | 21.3 | 15.4 | 10.1 | 8.3 |
| | 75 | 23.0 | 16.2 | 11.0 | 9.2 |
| | 50 | 27.4 | 18.7 | 12.0 | 10.1 |
| | 25 | 34.2 | 22.3 | 15.6 | 10.8 |
| | 10 | 40.2 | 25.3 | 18.7 | 11.5 |
| Sept. | 100 | 16.9 | 13.6 | 8.3 | 8.3 |
| | 90 | 19.1 | 14.1 | 8.9 | 8.8 |
| | 75 | 21.1 | 14.6 | 10.8 | 9.3 |
| | 50 | 23.3 | 16.1 | 12.5 | 10.2 |
| | 25 | 26.1 | 20.0 | 14.9 | 10.9 |
| | 10 | 32.9 | 22.7 | 16.8 | 11.5 |
| Oct. | 100 | 8.3 | 9.8 | 10.1 | 9.3 |
| | 90 | 12.0 | 14.4 | 15.3 | 11.3 |
| | 75 | 15.7 | 16.1 | 17.5 | 12.7 |
| | 50 | 21.1 | 21.0 | 25.4 | 15.8 |
| | 25 | 28.0 | 24.6 | 27.3 | 23.2 |
| | 10 | 32.1 | 29.0 | 28.4 | 30.0 |
| Nov. | 100 | 12.8 | 11.8 | 11.4 | 14.5 |
| | 90 | 22.6 | 15.2 | 15.0 | 18.2 |
| | 75 | 27.0 | 24.1 | 20.3 | 20.9 |
| | 50 | 32.9 | 36.4 | 28.1 | 23.7 |
| | 25 | 65.7 | 53.0 | 67.6 | 25.3 |
| | 10 | 173 | 73.5 | 110 | 34.5 |
| Dec. | 100 | 15.3 | 24.4 | 14.7 | 16.4 |
| | 90 | 52.4 | 26.7 | 21.8 | 22.4 |
| | 75 | 77.3 | 31.0 | 28.3 | 25.4 |
| | 50 | 168 | 65.1 | 36.3 | 33.7 |
| | 25 | 272 | 238 | 43.1 | 53.3 |
| | 10 | 501 | 376 | 85.5 | 82.4 |

**Table 1: Exceedence probabilities for San Lorenzo River at Big Trees from 1936-2002 (USGS Gage ID #11160500). Wet, average, dry and drought years are classified by the total flow for the water year (Method A)**

# Appendix D

## Public Agency and Major Customer Contact List

| FACILITY | CONTACT NAME(S) | TELEPHONE | Email |
|---|---|---|---|
| **Water Districts:** | | | |
| CA Dept of Public Health | Jan Sweigert | 831-655-6939 | After hours/emergency 831-236-4311 |
| Soquel Creek Water District | Laura Brown | 831-475-8500 | |
| Scotts Valley Water District | Charlie McNeish | 831-438-2363 | contact@svwd.org |
| San Lorenzo Valley Water District | Jim Mueller | 831-338-2153 | jmueller@slvwd.com |
| **County of Santa Cruz/City of Capitola:** | | | |
| County CAO | Dinah Phillips | 831-454-2100 | dinah.phillips@co.santa-cruz.ca.us |
| County Public Health Officer | Poki Namkung | 831-454-4000 | poki.namkung@co.santa-cruz.ca.us |
| County Director of Environmental Health | Bob Kennedy | 831-454-2022 | bob.kennedy@co.santa-cruz.ca.us |
| County OES | Paul Horvat | 831-458-7109 | oes014@co.santa-cruz.ca.us |
| Santa Cruz County Public Works | John Presleigh | 831-454-2160 | dpwweb@co.santa-cruz.ca.us |
| Emergency/General Services | Nancy Carr-Gordon | 831-454-2714 | nancy.gordon@co.santa-cruz.ca.us |
| NETCOMM | Scotty Douglas | 831-471-1000 | scotty@sccecc.org |
| County Safety Officer | Josh Riley | 831-454-4820 | josh.reilly@co.santa-cruz.ca.us |
| County Parks | Gretchen Iliff Maintenance Supt. | 831-454-7908 Office 831-247-2615 Cell | prc043@scparks.com |
| County Redevelopment Agency | Anita Kane | 831 454-2776 | red017@co.santa-cruz.ca.us |
| City of Capitola | Richard Hill | 831-475-7300 | rhill@ci.capitola.ca.us |
| Capitola Public Works | Steve Jesberg | 831-475-7300 x217 | sjesberg@ci.capitola.ca.us |

# Appendix D

## Public Agency and Major Customer Contact List

| FACILITY | CONTACT NAME(S) | TELEPHONE | Email |
|---|---|---|---|
| **Medical Facilities:** | | | |
| Dominican Hospital<br>Main phone: 462-7700 | Tom Bruce | 831-462-7550 | tbruce@chw.edu |
| Sutter<br>Main phone: 477-2200 | Facilities Office | 831-477-2299 | |
| Santa Cruz Medical Clinic<br>Main phone: 423-4111 | Brian Crispell<br>Facilities Director | 831-227-7110 | |
| **University of California, Santa Cruz:** | | | |
| Campus Dispatch | | 831-459-4856 | |
| Physical Plant (Non-Emergency) | Jim Dunne | 831-459-4444 | jfdunne@ucsc.edu |
| Physical Planning and Construction | Dean Fitch | 831-459-4936 | drfitch@ucsc.edu |
| University Relations | Donna Blitzer | 831-459-3938 | dblitzer@ucsc.edu |
| **School Districts:** | | | |
| City Schools<br>Main phone: 429-3837 | John Bramlett | 831-429-3968 Office<br>831-251-6803 Cell | bram@sccs.santacruz.k12.ca.us |
| Live Oak School Dist.<br>Main phone: 475-6333 | Keith Houchen<br>Director of Maint. | 831-475-6095 Office<br>831-212-4862 Cell | khoutchen@santacruz.k12.ca.us |
| **Other:** | | | |
| PG&E | Phil Furnas | 831-479-5892<br>831-915-8168 | 24 Hour emergency service:<br>1(800) PGE-5000 |
| Pasatiempo Golf Course<br>Corporate Office: 459-9169 | Paul Chojnacky | 831-459-9713 Office<br>415-336-5099 Cell | paul@pasatiempo.com |
| DeLaveaga Golf Course | Miles Hicks<br>Alt. Contact: Steve Pacheco 831-236-0700 | 831-420-6121 Office<br>831-212-8699 Cell | mhicks@cityofsantacruz.com |

# Appendix D

## Public Agency and Major Customer Contact List

| FACILITY | CONTACT NAME(S) | TELEPHONE | Email |
|---|---|---|---|
| Santa Cruz Memorial, Oakwood Cemeteries | Randy Krassow | 831-426-1601 | rkrassow@scmemorial.com |
| Chaminade<br>Main phone: 831-475-5600 | Al Hittle<br>Facilities Director | 831-465-3451 Office<br>831-212-1616 Cell | |
| SC Beach Boardwalk<br>Main phone: 423-5590 | Security<br>Head of Maint. | 831-345-5590 Supv.<br>831-818-3336 Cell | Also: Ted Whiting: 460-1610<br>Carl Henn, Facility Manager 460-3364 |
| City Parks | Steve Hammack | 831-420-5366 Office<br>831-212-5687 Cell | shammack@cityofsantacruz.com |
| Port District | Rick Smith | 831-475-6161 | scpd@santacruzharbor.org |
| IT<br>Main phone: 420-5555<br>Operators for SCADA systems: 420-5457, 24 hrs | Carlos Silva<br>Network Administrator | 831-420-5093 Office<br>831-227-0635 Cell | csilva@cityofsantacruz.com |
| Capitola Mall | Steve Bettencourt | 831-901-8618 | SMS1257@smsclean.com |

# Appendix E

## Residential Water Rationing Allotments

(Monthly allotment, in ccf or billing units)

<table>
<tr><th></th><th colspan="2">Stage 3<br>15–25% Deficiency</th><th>Stage 4<br>25-35% Deficiency</th><th>Stage 5<br>35-50% Deficiency</th></tr>
<tr><td>Single Residential Accounts<br>Up to 4 persons:<br>Each Additional person:</td><td colspan="2">11<br>2</td><td>9<br>2</td><td>7<br>2</td></tr>
<tr><td rowspan="2">Multiple Residential Accounts<br>Allotment is <u>per dwelling unit</u><br>based on number of dwelling units on account:</td><td colspan="2">Separate irrigation meter serving property?<br>No Yes</td><td colspan="2">All multiple residential accounts, regardless of whether there is a separate irrigation meter serving the property or not:</td></tr>
<tr><td>2-4:<br>5-20:<br>Over 20:</td><td>7<br>6<br>5</td><td>6<br>5<br>4</td><td>6<br>5<br>4</td><td>5<br>4<br>3</td></tr>
<tr><td>Multiple Residential Accounts Alternative A<br>Allotment is in gallons per person per day (gpcd) based on the number of permanent residents at the account:</td><td colspan="2">47 gpcd</td><td>45 gpcd</td><td>37 gpcd</td></tr>
<tr><td>Multiple Residential Accounts Alternative B<br>(not applicable to 2-unit accounts)<br><br>Where lot coverage, by dwelling units is <35% of entire property</td><td colspan="4">Same allotment as single residential accounts</td></tr>
</table>

## Appendix F

## Example of Monthly Water Supply and Demand Monitoring Report

| SCWD Production Forecast | April | | | May | | | | Sep | | | Oct | | | Total | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (million gallons) | Projected | Actual | Variance | Projected | Actual | Variance | | Projected | Actual | Variance | Projected | Actual | Variance | | | |
| North Coast (gross production) | | | | | | | | | | | | | | | | |
| North Coast (net production) | | | | | | | | | | | | | | | | |
| San Lorenzo River | | | | | | | | | | | | | | | | |
| Live Oak Wells | | | | | | | | | | | | | | | | |
| Total Production without Lake | | | | | | | | | | | | | | | | |
| Projected System Demand | | | | | | | | | | | | | | | | |
| **Lake Production Needed to Meet Demand** | | | | | | | | | | | | | | | | |
| Evaporation (feet) | | | | | | | | | | | | | | | | |
| Evaporation (mil gal) | | | | | | | | | | | | | | | | |
| Fish Release (mil gal) | | | | | | | | | | | | | | | | |
| Beginning Lake Volume (mil gal) | | | | | | | | | | | | | | | | |
| **End of Month Lake Volume (mil gal)** | | | | | | | | | | | | | | | | |
| **End of Month Lake Elevation (ft above msl)** | | | | | | | | | | | | | | | | |
| Monthly change in elevation (ft) | | | | | | | | | | | | | | | | |
| Cumulative change in elevation (ft) | | | | | | | | | | | | | | | | |
| Percent of capacity (%) | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |

| | |
|---|---|
| Previous Year Water Consumption | |
| Current Year Water Consumption | |
| Difference | |

Notes:

North Coast gross production based on …

North Coast net production assumed to be …

San Lorenzo River forecast assumes ___ year type, ___ percent exceedance probability

Projected system demand based on …

Assumptions for Loch Lomond Reservoir include: starting elev: ____ no additional pumping from Felton Diversion, & no natural inflow.

# Appendix G

RESOLUTION NO. NS-28,024

RESOLUTION OF THE CITY COUNCIL OF THE CITY OF SANTA CRUZ
ADOPTING THE 2009 WATER SHORTAGE CONTINGENCY PLAN

WHEREAS, the City Council of the City of Santa Cruz in 2003 adopted a long range planning document known as the Integrated Water Plan, which was intended to provide a flexible, phased approach for reducing near-term drought year shortages and to provide a reliable supply that meets long-term needs while ensuring protection of public health and safety; and

WHEREAS, in addition to implementing water conservation programs to reduce average daily water use and pursuing a cooperative desalination project to increase the supply of water, the Integrated Water Plan includes a curtailment component calling for temporary cutbacks of water use by up to 15 percent to help balance available water supply against demand in drought years; and

WHEREAS, the need to better prepare for the possibility of future water shortages in advance of the next major drought was identified as a top priority in the city's 2005 Urban Water Management Plan; and

WHEREAS, California Water Code section 10632 requires water agencies to plan for water shortages of up to 50 percent as part of their Urban Water Management Plan; and,

WHEREAS, development of the Water Shortage Contingency Plan was a collaborative, open, and public process among the City Water Department staff, the City's Water Commission, City Council and the public; and

WHEREAS, the Water Commission has reviewed the Water Shortage Contingency Plan and unanimously recommended that City Council adopt it to provide a framework for guiding the City's response to future droughts; and

WHEREAS, the State of California is now in its third consecutive year of drought and despite the recent rain, water conditions in Santa Cruz remain below normal; and

WHEREAS, because stream flows that constitute the City's primary drinking water source of supply are projected to run lower than usual this year, voluntary and mandatory actions to temporarily reduce water demand will likely be needed this summer to help preserve valuable reservoir storage in case dry conditions continue beyond 2009.

NOW, THEREFORE, BE IT RESOLVED by the City Council of the City of Santa Cruz that it hereby adopts the 2009 Water Shortage Contingency Plan, authorizes the Water Director to file a copy with the California Department of Water Resources as an amendment to the City's 2005 Urban Water Management Plan, and directs staff to develop a water shortage ordinance that is consistent with the recommendations outlined in the plan.

RESOLUTION NO. NS-28,024

PASSED AND ADOPTED this 10th day of March, 2009, by the following vote:

| | |
|---|---|
| AYES: | Councilmembers Coonerty, Robinson, Lane, Madrigal, Beiers, Vice Mayor Rotkin; Mayor Mathews. |
| NOES: | None. |
| ABSENT: | None. |
| DISQUALIFIED: | None. |

APPROVED: _____
Mayor

ATTEST: _____
City Clerk

# Appendix H

ORDINANCE NO. 2010-12

AN ORDINANCE OF THE CITY OF SANTA CRUZ REPEALING ORDINANCE 2009-14 AND ADDING A NEW CHAPTER 16.01 OF THE MUNICIPAL CODE PROHIBITING AND REGULATING CERTAIN USES OF WATER FROM THE CITY WATER SUPPLY SYSTEM NOT ESSENTIAL TO THE PUBLIC HEALTH AND SAFETY FOR WATER CONSERVATION PURPOSES, PRESCRIBING PENALTIES FOR VIOLATIONS, AND ESTABLISHING A WATER SHORTAGE APPEAL BOARD

BE IT ORDAINED by the City Council of the City of Santa Cruz as follows:

SECTION 1: Ordinance 2009-14 is hereby repealed.

SECTION 2: Chapter 16.01 of the Santa Cruz Municipal Code is hereby enacted to read as follows:

"Chapter 16.01

Water Shortage Regulations and Restrictions

Sections:

16.01.010 Findings.
16.01.020 Declaration of Water Shortage.
16.01.030 Application of Regulations.
16.01.040 Precedence of Regulations.
16.01.050 Definitions.
16.01.060 Water Waste Prohibitions.
16.01.070 Stage 1: Water Shortage Alert.
16.01.080 Stage 2: Water Shortage Warning.
16.01.090 Stage 3: Water Shortage Emergency.
16.01.100 Stage 4: Severe Water Shortage Emergency.
16.01.110 Stage 5: Critical Water Shortage Emergency.
16.01.120 Exceptions.
16.01.130 Water Shortage Appeal Board.
16.01.140 Administrative Enforcement.
16.01.150 Additional Enforcement Authority.
16.01.160 Severability.

16.01.010 FINDINGS.

WHEREAS, the City of Santa Cruz water system draws almost exclusively on local surface water sources, whose yield varies from year to year depending on the amount of rainfall received and runoff generated during the winter season; and

WHEREAS, the City water system is susceptible to water shortages in dry and critically dry years or in periods of prolonged regional drought when water conditions characterized by low surface flows in the north coast streams and San Lorenzo River sources, depleted storage in Newell Creek Reservoir, or both, reduce the available supply to a level that cannot support seasonal water demand; and

WHEREAS, on March 10, 2009, the City Council of the City of Santa Cruz adopted an updated Water Shortage Contingency Plan that describes how the City will respond to future water shortages and lists the various actions the City would take to reduce water demand under different water shortage scenarios ranging from 5 percent or less up to and including a 50 percent seasonal water supply deficiency; and

WHEREAS California Water Code sections 350 et seq. authorize water suppliers, after holding a properly noticed public hearing and after making certain findings, to declare a water shortage (emergency) and to adopt such regulations and restrictions to conserve the water supply for the greatest public benefit with particular regard for domestic use, sanitation, and fire protection; and

WHEREAS, the voluntary and mandatory water conservation measures and progressive restrictions on water use and method of use set forth herein provide an effective and immediately available means of conserving water which is essential during periods of water shortage to ensure a reliable and sustainable minimum supply of water for the public health, safety, and welfare and to preserve valuable limited reservoir storage, avoid depleting water storage to an unacceptably low level, and thereby lessen the possibility of experiencing more critical shortages if dry conditions continue or worsen; and

WHEREAS, the usage allotments hereinafter established will equitably spread the burden of restricted and prohibited usage in a manner prescribed by the City's Water Shortage Contingency Plan over all City Water Department customers and other consumers of City water; and

WHEREAS, the purposes of this chapter are to conserve the water supply of the City of Santa Cruz for the greatest public benefit, to mitigate the effects of a water supply shortage on public health and safety and economic activity, and to budget water use so that a reliable and sustainable minimum supply of water will be available for the most essential purposes for the entire duration of the water shortage.

16.01.020 DECLARATION OF WATER SHORTAGE.

The provisions of this chapter shall take effect whenever the Director, upon engineering analysis of City water supplies, finds and determines that a water shortage exists or is imminent within the City of Santa Cruz water service area and a declaration of a water shortage is made by a resolution of the City Council, and they shall remain in effect for the duration of the water shortage set forth in the resolution.

16.01.030 APPLICATION OF REGULATIONS.

The provisions of this chapter shall apply to all persons using or consuming water both inside and outside the City and within the City water service area, and regardless of whether any person using water shall have a contract for water service with the City.

16.01.040 PRECEDENCE OF REGULATIONS.

Where other provisions of the Municipal Code, whether enacted prior or subsequent to this chapter, are inconsistent with this the provisions of this chapter, the provisions of this chapter shall supersede and control for the duration of the water shortage set forth in the resolution of the City Council.

16.01.050 DEFINITIONS.

(a) "Director" refers to the Director of the City of Santa Cruz Water Department.

(b) "Water" refers to water produced and served by the City of Santa Cruz Water Department.

(c) "City" refers to the City of Santa Cruz.

(d) "Water Department" refers to the City of Santa Cruz Water Department.

(e) "Seasonal water demand" refers to the demand, measured in gallons, placed by customers on the City water supply between April 1 and October 31 each calendar year.

(f) "Issue"/"Declare". Whenever this chapter references the Director's issuance or declaration of an alert, warning, emergency, or regulation, said alert, warning, emergency or regulation shall be put into effect by the placement of a legal advertisement in a newspaper of general circulation, by a posting on the City's internet website and by a posting in the following public places: Santa Cruz City Hall, 809 Center Street, Santa Cruz; Santa Cruz Water Department Office, 212 Locust Street, Santa Cruz; Capitola City Hall, 420 Capitola Avenue, Capitola, and the Santa Cruz County Governmental Center, 701 Ocean Street, Santa Cruz. Any such alert, warning, emergency or regulation shall take effect upon the date of its publication in the Santa Cruz Sentinel.

(g) "Customer" shall refer to any account customer of the City of Santa Cruz Water Department as well as to any consumer of City water who may not be City of Santa Cruz Water Department account customer.

(h) "Dry Year" refers to the type of water year under the City's water year classification system, which begins October 1 and ends September 30, in which the total annual discharge of the San Lorenzo River at Felton measures between 29,000 and 49,000 acre-feet.

(i) "Critically Dry Year" refers to the type of water year under the City's water year classification system, which begins October 1 and ends September 30, in which the total annual discharge of the San Lorenzo River at Felton measures less than 29,000 acre-feet.

16.01.060 WATER WASTE PROHIBITIONS.

It shall be unlawful during any water shortage stage for any person, firm, partnership, association, corporation, political entity (including the City) or any other Water Department customer to use water for any of the following:

(a) Fire Hydrants. Use of water from any fire hydrant unless specifically authorized by permit from the City, except by regularly constituted fire protection agencies for fire suppression purposes, or for other authorized uses, including distribution system flushing, fire flow testing, and filling of approved vehicles for sewer system flushing, storm drain maintenance, and street sweeping purposes.

(b) Watering/Irrigation. The watering of grass, lawn, groundcover, shrubbery, open ground, crops and trees, including agricultural irrigation, in a manner or to an extent that causes

or allows excessive water flow or runoff onto an adjoining sidewalk, driveway, street, gutter or ditch.

(c) Plumbing Leaks. The escape of water through leaks, breaks, or other malfunctions within the water user's plumbing or distribution system for any period of time after such break or leak should have reasonably been discovered and corrected. It shall be presumed that a period of twenty-four hours after the water user discovers such break, leak or malfunction, or receives notice from the City of such condition, whichever occurs first, is a reasonable time within which to correct such condition or to make arrangements for correction.

(d) Washing of Exterior Surfaces. The washing of sidewalks, walkways, driveways, parking lots, patios, or other exterior surfaces unless the hose is equipped with an automatic shutoff nozzle.

(e) Cleaning of Structures and Vehicles. The cleaning of building exteriors, mobile homes, cars, boats, and recreational vehicles unless the hose is equipped with an automatic shutoff nozzle.

(f) Fountains and Decorative Water Features. The operation of a water fountain or other decorative water feature that does not use re-circulated water.

(g) Commercial Car Washes. The washing of vehicles at a commercial car wash unless the facility utilizes water recycling equipment, or operates on a timer for a limited time period and shuts off automatically at the expiration of the time period.

(h) Construction. The use of potable water for dust control or soil compaction purposes in construction activities where there is a reasonably available source of reclaimed water appropriate for such use.

(i) The indiscriminate running of water or washing with water not otherwise prohibited in this section, which is wasteful, and without reasonable purpose.

16.01.070 STAGE 1: WATER SHORTAGE ALERT.

(a) The Director is empowered to issue a Water Shortage Alert and to enforce the water shortage restrictions in this Section upon finding that the magnitude of an anticipated water shortage, per the criteria delineated in the City's adopted Water Shortage Contingency Plan, will be five percent (5%) and a minimal consumer demand reduction is necessary to make more efficient use of water and appropriately respond to existing water supply conditions. In a Stage 1 water shortage, the City will enforce the following water shortage restrictions with the objective of realizing a seasonal water demand reduction of 125 million gallons or an average daily water demand reduction of 600,000 gallons.

(b) During Stage 1, it shall be unlawful for any person, firm, partnership, association, corporation, political entity (including the City) or any other Water Department customer:

1. to water or irrigate lawn, landscape, or other vegetated area between the hours of 10:00 a.m. and 5:00 p.m., except when performed with a bucket or watering can, or by use of a drip irrigation system or similar low-volume, non-spray irrigation equipment, or for very short periods of time for the express purpose of allowing landscape contractors to adjust or repair an irrigation system;

2. to use a hose that is not equipped with a shut off nozzle;

3. to use potable water to wash down hard or paved surfaces, including but not limited to sidewalks, walkways, driveways, parking lots, tennis courts, patios, or other paved surfaces, except when it is necessary to alleviate safety or sanitation hazards or to prepare paved surfaces for sealing;

4. to initially fill or to drain and refill residential swimming pools;

5. to serve water in a restaurant or other commercial food service establishment except upon the request of a patron; and/or

6. to operate a hotel, motel or other commercial lodging establishment without offering patrons the option to forego the daily laundering of towels, sheets and linens.

16.01.080 STAGE 2: WATER SHORTAGE WARNING.

(a) The Director is empowered to issue a Water Shortage Warning and to enforce the water shortage restrictions in this Section upon finding that the magnitude of an anticipated water shortage, per the criteria delineated in the City's adopted Water Shortage Contingency Plan, will be between five percent (5%) and fifteen percent (15%) and a moderate consumer demand reduction is necessary to make more efficient use of water and appropriately respond to existing water supply conditions. In a Stage 2 water shortage, the City will enforce the following water shortage restrictions with the objective of realizing a seasonal water demand reduction of up to 375 million gallons and an average daily water demand reduction of up to 1.8 million gallons.

(b) During Stage 2, it shall be unlawful for any person, firm, partnership, association, corporation, political body (including the City) or other Water Department customer:

1. to water or irrigate lawn, landscape, or other vegetated area between the hours of 10:00 a.m. and 5:00 p.m., except when performed with a bucket or watering can, or by use of a drip irrigation system or similar low-volume, non-spray irrigation equipment, or for very short periods of time for the express purpose of allowing landscape contractors to adjust or repair an irrigation system;

2. to use a hose that is not equipped with a shut off nozzle;

3. to use potable water to wash down hard or paved surfaces, including but not limited to sidewalks, walkways, driveways, parking lots, tennis courts, patios, or other paved surfaces, except when it is necessary to alleviate safety or sanitation hazards or to prepare paved surfaces for sealing;

4. to initially fill or to drain and refill residential swimming pools;

5. to serve water in a restaurant or other commercial food service establishment except upon the request of a patron;

6. to operate a hotel, motel or other commercial lodging establishment without offering patrons the option to forego the daily laundering of towels, sheets and linens;

7. to water or irrigate lawn, landscape, or other vegetated area on days of the week other than the two days of the week authorized and publicized by the Director, except when performed with a bucket or watering can, or by use of a drip irrigation system or similar low-volume, non-spray irrigation equipment, or for very short periods of time for the express purpose of allowing landscape contractors to adjust or repair an irrigation system. Hourly restrictions set forth in subsection (1) above continue to apply on authorized watering days. This provision shall not apply to commercial growers/nurseries or to residential vegetable gardens/edible plantings watered with a hose equipped with a shut off nozzle;

8. to water or irrigate lawn, landscape, or other vegetated area using an automatic irrigation system for more than fifteen minutes per watering station per assigned day. This provision shall not apply to automatic irrigation systems exclusively using low output sprinkler equipment, including rotors, stream rotors, or micro-spray systems;

9. to wash the exterior of dwellings, buildings or structures (with the exception of window washing and preparation of property for painting or for sale);

10. to irrigate or water landscapes in a manner that conflicts with a customer's landscape irrigation water budget when such a budget is required by the Director per the criteria delineated in the City's adopted Water Shortage Contingency Plan; and/or

11. to disobey Water Department direction to large commercial, industrial or irrigation customers using 1,337 or more billing units (one million gallons) per year to conduct water use audits, to prepare water conservation plans and to submit progress reports, or to immediately repair water system leaks, including leaks attributable to faulty pipes or fixtures.

16.01.090 STAGE 3: WATER SHORTAGE EMERGENCY.

(a) The Director is empowered to declare a Water Shortage Emergency and to enforce the water shortage restrictions in this Section upon finding that the magnitude of an anticipated water shortage, per the criteria delineated in the City's adopted Water Shortage Contingency Plan, will be between fifteen percent (15%) and twenty five percent (25%) and a significant consumer demand reduction is necessary to make more efficient use of water and appropriately respond to existing water supply conditions. In a Stage 3 water shortage, the City will enforce the following water shortage restrictions with the objective of realizing a seasonal water demand reduction of up to 625 million gallons and an average daily water demand reduction of up to 3.0 million gallons.

(b) During Stage 3, it shall be unlawful for any person, firm, partnership, association, corporation, political body (including the City) or other Water Department customer:

1. to water or irrigate lawn, landscape, or other vegetated area between the hours of 10:00 a.m. and 5:00 p.m., except when performed with a bucket or watering can, or by use of a drip irrigation system or similar low-volume, non-spray irrigation equipment, or for very short periods of time for the express purpose of allowing landscape contractors to adjust or repair an irrigation system;

2. to use a hose that is not equipped with a shut off nozzle;

3. to use potable water to wash down hard or paved surfaces, including but not limited to sidewalks, walkways, driveways, parking lots, tennis courts, patios, or other paved surfaces, except when it is necessary to alleviate safety or sanitation hazards or to prepare paved surfaces for sealing;

4. to initially fill or to drain and refill any swimming pools, outdoor spas, wading pools, and ornamental water features;

5. to serve water in a restaurant or other commercial food service establishment except upon the request of a patron;

6. to operate a hotel, motel or other commercial lodging establishment without offering patrons the option to forego the daily laundering of towels, sheets and linens;

7. to water or irrigate lawn, landscape, or other vegetated area on days of the week other than the specified day(s) of the week authorized and publicized by the Director, except when performed with a bucket or watering can, or by use of a drip irrigation system or similar low-volume, non-spray irrigation equipment, or for very short periods of time for the express purpose of allowing landscape contractors to adjust or repair an irrigation system. Hourly restrictions set forth in subsection (1) above continue to apply on authorized watering days. This provision shall not apply to commercial growers/nurseries or to residential vegetable gardens/edible plantings watered with a hose equipped with a shut off nozzle;

8. to water or irrigate lawn, landscape, or other vegetated area using an automatic irrigation system for more than ten minutes per watering station per assigned day. This

provision shall not apply to automatic irrigation systems exclusively using low output sprinkler equipment, including rotors, stream rotors, or micro-spray systems;

9. to wash the exterior of dwellings, buildings or structures (with the exception of window washing and preparation of property for painting or for sale);

10. to irrigate or water landscapes in a manner that conflicts with a customer's landscape irrigation water budget when such a budget is required by the Director per the criteria delineated in the City's adopted Water Shortage Contingency Plan; and/or

11. to disobey Water Department direction to large commercial, industrial or irrigation customers using 1,337 or more billing units (one million gallons) per year to conduct water use audits, to prepare water conservation plans and to submit progress reports, or to immediately repair water system leaks, including leaks attributable to faulty pipes or fixtures;

12. to violate residential customer water rationing regulations, including regulations intended to preclude excessive water usage and specifying maximum water usage limitations, issued by the Director in accordance with guidelines set forth in the City's' adopted Water Shortage Contingency Plan; and/or

13. to disobey Water Department directives issued to commercial customers requiring the prominent placement of "Save Water" signage at specified locations at the customer's premises.

16.01.100 STAGE 4: SEVERE WATER SHORTAGE EMERGENCY.

(a) The Director is empowered to declare a Severe Water Shortage Emergency and to enforce the water shortage restrictions in this Section upon finding that the magnitude of an anticipated water shortage, per the criteria delineated in the City's adopted Water Shortage Contingency Plan, will be between twenty five percent (25%) and thirty five percent (35%) and an extraordinary consumer demand reduction is necessary to make more efficient use of water and appropriately respond to existing water supply conditions. In a Stage 4 water shortage, the City will enforce the following water shortage restrictions with the objective of realizing a seasonal water demand reduction of up to 875 million gallons and an average daily water demand reduction of up to 4.2 million gallons.

(b) During Stage 4, it shall be unlawful for any person, firm, partnership, association, corporation, political body (including the City) or other Water Department customer:

1. to water or irrigate landscape or other vegetated area between the hours of 10:00 a.m. and 5:00 p.m., except when performed with a bucket or watering can, or by use of a drip irrigation system or similar low-volume, non-spray irrigation equipment, or for very short periods of time for the express purpose of allowing landscape contractors to adjust or repair an irrigation system;

2. to use a hose that is not equipped with a shut off nozzle;

3. to use potable water to wash down hard or paved surfaces, including but not limited to sidewalks, walkways, driveways, parking lots, tennis courts, patios, or other paved surfaces, except when it is necessary to alleviate safety or sanitation hazards or to prepare paved surfaces for sealing;

4. to fill or to top off any swimming pools, outdoor spas, wading pools, and ornamental water features;

5. to serve water in a restaurant or other commercial food service establishment except upon the request of a patron;

6. to operate a hotel, motel or other commercial lodging establishment without offering patrons the option to forego the daily laundering of towels, sheets and linens;

7. to water or irrigate landscape or other vegetated area on days of the week other than the specified day(s) of the week authorized and publicized by the Director, except when performed with a bucket or watering can, or by use of a drip irrigation system or similar low-volume, non-spray irrigation equipment, or for very short periods of time for the express purpose of allowing landscape contractors to adjust or repair an irrigation system. Hourly restrictions set forth in subsection (1) above continue to apply on authorized watering days. This provision shall not apply to commercial growers/nurseries or to residential vegetable gardens/edible plantings watered with a hose equipped with a shut off nozzle;

8. to water landscapes using automatic irrigation systems for more than ten minutes per watering station per assigned day. This provision does not apply to automatic irrigation systems using water efficient devices, including but not limited to weather-based controllers, drip/micro-irrigation systems and stream rotor sprinklers.

9. to wash the exterior of dwellings, buildings or structures (with the exception of window washing and preparation of property for painting or for sale);

10. to irrigate or water landscapes in a manner that conflicts with a customer's landscape irrigation water budget when such a budget is required by the Director per the criteria delineated in the City's adopted Water Shortage Contingency Plan; and/or

11. to disobey Water Department direction to large commercial, industrial or irrigation customers using 1,337 or more billing units (one million gallons) per year to conduct water use audits, to prepare water conservation plans and to submit progress reports, or to immediately repair water system leaks, including leaks attributable to faulty pipes or fixtures;

12. to violate residential customer water rationing regulations, including regulations intended to preclude excessive water usage and specifying maximum water usage limitations, issued by the Director in accordance with guidelines set forth in the City's' adopted Water Shortage Contingency Plan;

13. to disobey Water Department directives issued to commercial customers requiring the prominent placement of "Save Water" signage at specified locations at the customer's premises;

14. to violate commercial customer water rationing regulations, including regulations intended to preclude excessive water usage and specifying maximum water usage limitations, issued by the Director in accordance with guidelines set forth in the City's adopted Water Shortage Contingency Plan;

15. to disobey a Water Department order to customers identified as "dedicated irrigation accounts" directing those customers to further limit their landscape irrigation and watering activity so as to preserve only the customers' most valuable trees and plants;

16. to water lawns or turf, unless such watering is authorized by the Director in accordance with a landscape irrigation water budget and is consistent with the guidelines set forth in the City's adopted Water Shortage Contingency Plan;

17. to install new landscaping which requires any irrigation or watering;

18. to wash or clean vehicles, including but not limited to automobile, truck, van, bus, motorcycle, boat, or trailer including the washing of fleet vehicles and the washing of vehicles on dealer lots. This restriction will not apply to commercial car wash businesses which use recycled water; and/or

19. to exercise any rights conferred by hydrant and bulk water permits that were issued prior to the Severe Water Shortage Emergency declaration absent special permission

granted by the Director. Said special permission may be granted only for projects necessary to protect the public health, safety and welfare where no alternative to potable water exists and for emergency response purposes.

16.01.110 STAGE 5: CRITICAL WATER SHORTAGE EMERGENCY.

(a) The Director is empowered to declare a Critical Water Shortage Emergency and to enforce the water shortage restrictions in this Section upon finding that the magnitude of an anticipated water shortage, per the criteria delineated in the City's adopted Water Shortage Contingency Plan, shall be between thirty five percent (35%) and fifty percent (50%) and an extreme consumer demand reduction is necessary to make more efficient use of water and appropriately respond to existing water supply conditions. In a Stage 5 water shortage, the City will enforce the following water shortage restrictions with the objective of realizing a seasonal water demand reduction of up to 1,250 million gallons and an average daily water demand reduction of up to 6.0 million gallons.

(b) During Stage 5, it is unlawful for any person, firm, partnership, association, corporation, political body (including the City) or other Water Department customer:

1. to water or irrigate any outdoor landscaping, unless such watering is authorized by the Director and is consistent with the guidelines set forth in the City's adopted Water Shortage Contingency Plan;
2. to use a hose that is not equipped with a shut off nozzle;
3. to use water for any outdoor washing purpose including commercial car washing, window washing, and paint preparation;
4. to fill or to top off any swimming pools, outdoor spas, wading pools, and ornamental water features;
5. to serve water in a restaurant or other commercial food service establishment except upon the request of a patron;
6. to operate a hotel, motel or other commercial lodging establishment without offering patrons the option to forego the daily laundering of towels, sheets and linens;
7. to use water for recreational purposes;
8. to operate public swimming pools;
9. to operate public showers;
10. to disobey Water Department direction to large commercial, industrial or irrigation customers using 1,337 or more billing units (one million gallons) per year to conduct water use audits, to prepare water conservation plans and to submit progress reports, or to immediately repair water system leaks, including leaks attributable to faulty pipes or fixtures;
11. to violate residential customer water rationing regulations, including regulations intended to preclude excessive water usage and specifying maximum water usage limitations, issued by the Director in accordance with guidelines set forth in the City's adopted Water Shortage Contingency Plan;
12. to violate commercial customer water rationing regulations, including regulations intended to preclude excessive water usage and specifying maximum water usage limitations, issued by the Director in accordance with guidelines set forth in the City's December 2008 Water Shortage Contingency Plan;
13. to disobey Water Department directives issued to commercial customers requiring the prominent placement of "Save Water" signage at specified locations at the customer's premises;

14. to install new landscaping which requires any irrigation or watering; and/or

15. to exercise any rights conferred by hydrant and bulk water permits that were issued prior to the Critical Water Shortage Emergency declaration absent special permission granted by the Director. Said special permission may be granted only for projects necessary to protect the public health, safety and welfare where no alternative to potable water exists and for emergency response purposes.

16.01.120 EXCEPTIONS.

(a) The Director, upon application made in writing by a customer on a form promulgated by the Water Department and accompanied by supporting documentation, shall be authorized to issue an exception from the strict application of any restriction, regulation or prohibition enforced pursuant to this chapter, upon the customer's production of substantial evidence demonstrating the existence of one or more of the following circumstances that are particular to that customer and which are not generally shared by other Water Department customers:

1. Failure to approve the requested exception would cause a condition having an adverse effect on the health, sanitation, fire protection, or safety of the customer or members of the public served by the customer;

2. Strict application of the subject restriction, regulation or prohibition would impose a severe or undue hardship on a particular business customer or render it infeasible for a particular business customer or class of business customers to remain in operation;

3. Alternative restrictions to which the customer is willing to adhere are available that would achieve the same level of demand reduction as the restriction for which an exception is being sought and such alternative restrictions are enforceable by the Water Department;

4. Circumstances concerning the customer's property or business have changed since the implementation of the subject restriction warranting a change in the customer's water usage allocation; or

5. A hospital or health care facility customer using industry best management practices is eligible for an exception upon demonstrating that the subject restriction, regulation or prohibition is interfering with or preventing it from providing health care service to its customers in accordance with industry hygiene, sanitation and health care standards.

6. A business customer has already implemented environmental sustainability measures that have reduced water consumption to the maximum extent feasible. As used in this subsection the term "environmental sustainability measures" refers to installation of high efficiency plumbing fixtures, devices, equipment, and appliances, recycled water systems, and landscaping consisting exclusively of low water using plant materials using drip or similar high efficiency, non-spray irrigation systems, or to buildings that are designed, built, and continuously operated according to Leadership in Energy and Environmental Design (LEED) certification standards.

(b) In order to qualify for an exception, a customer must first complete a self water audit pursuant to standards and procedures promulgated by the Water Department. This audit shall be made part of the customer's exception application and water conservation measures indicated by the audit may be incorporated as conditions of approval to an exception in addition

to any other conditions of approval imposed by the Director in connection with the Director's approval of the customer's exception application.

16.01.130 WATER SHORTAGE APPEAL BOARD.

(a) A Water Shortage Appeal Board is hereby established and shall be eligible to convene upon the Director's issuance of any water shortage declaration and the implementation of water shortage restrictions pursuant to Sections 16.010.070 though 16.01.110. Thereafter the Water Shortage Appeal Board will remain available to convene for as long as the water shortage remains in effect.

(b) Under water shortage Stages 1 and 2, the Water Shortage Appeal Board will be comprised of members of the City Water Commission. Under water shortage Stages 3, 4, and 5, the Water Shortage Appeal Board will be appointed by City Council and will be comprised of one member of the Water Commission, one business customer, one landscape industry customer, one residential customer, and two at-large members who reside within the City's water service area.

(c) Any customer who considers an action taken by the Director or an enforcement official under the provisions of this chapter, including actions on exception applications and the assessment of administrative penalties, to have been erroneously taken or issued, may appeal that action or penalty to the Water Shortage Appeal Board in the following manner:

1. The appeal shall be made in writing, shall state the nature of the appeal specifying the action or penalty that is being appealed and the basis upon which the action or penalty is alleged to be in error. Penalty appeals shall include a copy of the Notice of Violation;

2. An appeal, to be effective, must be received by the Director not later than ten (10) business days following the date of the Notice of Violation or the date that the Director took the action which is the subject to the appeal;

(A) A water service resident who is not an account customer may notify the Water Department of his or her intention to file a petition to force the resident's account customer to appeal an excess water use penalty within ten (10) business days following the penalty;

(B) If the Water Department has been given a notice of intention to file a petition per subsection 2(A) by a water service area resident who is not an account customer, the appeal from the account customer must be received within fifteen (15) business days after the account customer has been petitioned by the resident.

3. The Director shall schedule the appeal for consideration by the Water Shortage Appeal Board at a Water Shortage Appeal Board meeting. The Water Shortage Appeal Board shall hear the appeal within 90 days of the date of the appeal and issue its decision within 30 days of the date of the hearing.

4. The decision of the Water Shortage Appeal Board shall be final. In ruling on appeals, the Water Shortage Appeal Board shall strictly apply the provisions of this chapter, and shall not impose or grant terms and conditions not authorized by this chapter.

(d) The Chair of the Water Shortage Appeal Board shall have the discretion to divide the Board into two-three member hearing panels. Each hearing panel shall have the same authority to hear and rule upon appeals as the entire Water Shortage Appeal Board. A hearing panel shall have no more than one at-large appointee as a member. The decision of any hearing panel shall be final.

16.01.140 ADMINISTRATIVE ENFORCEMENT.

(a) Any person firm, partnership, association, corporation, political entity or other Water Department customer violating any provision of this chapter may be assessed an administrative penalty.

(b) Each and every day a violation of this chapter exists constitutes a separate and distinct offense for which an administrative penalty may be assessed.

(c) Penalties. The purpose of the administrative penalties assessed pursuant to this Section is to assure future chapter compliance by the cited customer through the imposition of increasingly significant penalties so as to create a meaningful disincentive to commit future chapter violations. In acknowledgment of the fact that the City's water is a scarce and irreplaceable commodity and that this chapter is intended to equitably distribute that commodity among Water Department customers and to assure that, to the extent feasible, City water is conserved and used only for purposes deemed necessary for public health and safety, the penalty schedule herein prescribed is not to be construed as creating a "water pricing" structure pursuant to which customers may elect to pay for additional water at significantly higher rates. To this end, a customer's repeated violation of the chapter shall result in either the installation of a flow restriction device or disconnection of the customer's property from the City's water service system at the customer's cost.

(d) Administrative penalties for failure to comply with water waste prohibitions requirements in Section 16.01.060 or mandatory water use restrictions and regulations commencing with Stage 1 in Section 6 are as follows:

1. First Offense: Written notice of violation and opportunity to correct violation.

2. Second Offense: A second violation within the preceding twelve (12) calendar months is punishable by a fine not to exceed one hundred dollars ($100).

3. Third Offense: A third violation within the preceding twelve (12) calendar months is punishable by a fine not to exceed two hundred fifty dollars ($250).

4. Fourth Offense: A fourth violation within the preceding twelve (12) calendar months is punishable by a fine not to exceed five hundred dollars ($500). In addition to any fines, the Director may order a water flow restrictor device be installed.

5. Large customers. Administrative penalties for customers that use an average of 1,337 billing units (one million gallons) or more per calendar year shall be triple the amounts listed above.

6. Discontinuing Service. In addition to any fines and the installation of a water flow restrictor, the Director may disconnect a customer's water service for willful violations of mandatory restrictions and regulations in this chapter. Upon disconnection of water service, a written notice shall be served upon the customer which shall state the time, place, and general description of the prohibited or restricted activity and the method by which reconnection can be made.

(e) Excessive Water Use Penalties. An excessive use penalty shall be assessed where the customer, during any given billing cycle, uses more than the customer's water allotment per the Director's water rationing regulations issued pursuant to this chapter commencing with Stage 3 in Section 16.01.090. Excess use penalties shall be in addition to ordinary water consumption charges, as follows:

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

3. In addition to any excess use penalties, the Director may order a water flow restrictor device be installed and/or may disconnect a customer's water service for willful violations of the water rationing regulations in this chapter. Upon disconnection of water service, a written notice shall be served upon the customer which shall state the time, place, and general description the prohibited or restricted activity and the method by which reconnection can be made.

(f) Cost of Flow Restrictor and Disconnecting Service: A person or entity that violates this chapter is responsible for payment of charges for installing and/or removing any flow restricting device and for disconnecting and/or reconnecting service in accordance with the City's Miscellaneous Water Service Fee Resolution then in effect. The charge for installing and/or removing any flow restricting device must be paid before the device is removed. Nonpayment will be subject to the same remedies as nonpayment of basic water rates.

(g) Notice and Hearing. The Director will issue a Notice of Violation by mail or personal delivery at least ten (10) business days before taking any enforcement action described in subsection 13D. Such notice must describe the violation and the date by which corrective action must be taken. A customer may appeal the Notice of Violation by filing a written notice of appeal with the City no later than the close of business day before the date scheduled for enforcement action accompanied by a $25 appeal fee. Any Notice of Violation not timely appealed will be final. Upon receipt of a timely appeal, a hearing on the appeal will be scheduled, and the City will mail written notice of the hearing date to the customer at least ten (10) days before the date of the hearing. Pending receipt of a written appeal or pending a hearing pursuant to an appeal, the Director may take appropriate steps to prevent the unauthorized use of water as appropriate to the nature and extent of the violation and the current declared water shortage condition.

16.01.150 ADDITIONAL ENFORCEMENT AUTHORITY.

In addition to the remedies referenced above, the Director is empowered to pursue any additional remedies necessary, including criminal, civil and administrative remedies listed in Title 4 of the Santa Cruz Municipal Code, to correct a violation of this chapter.

16.01.160 SEVERABILITY.

If any portion of this chapter is held to be unconstitutional, it is the intent of the City Council that such portion of the chapter be severable from the remainder and that the remainder be given full force and effect."

SECTION 3: This ordinance shall take effect 30 days after final adoption.

ORDINANCE NO. 2010-12

PASSED FOR PUBLICATION this 25th day of May, 2010, by the following vote:

AYES: Councilmembers Lane, Beiers, Madrigal, Robinson; Mayor Rotkin.

NOES: None.

ABSENT: Councilmember Mathews, Vice Mayor Coonerty.

DISQUALIFIED: None.

APPROVED: _____
Mayor

ATTEST: _____
City Clerk

PASSED FOR FINAL ADOPTION on this 8th day of June, 2010, by the following vote:

AYES: Councilmembers Lane, Beiers, Robinson; Vice Mayor Coonerty; Mayor Rotkin.

NOES: None.

ABSENT: Councilmembers Mathews, Madrigal.

DISQUALIFIED: None.

APPROVED: _____
Mayor

ATTEST: _____
City Clerk

This is to certify that the above and foregoing document is the original of Ordinance No. 2010-12 and that it has been published or posted in accordance with the Charter of the City of Santa Cruz.

_____
City Clerk

# Chapter 16.01
# WATER SHORTAGE REGULATIONS AND RESTRICTIONS

Sections:

16.01.010 Findings.
16.01.020 Declaration of water shortage.
16.01.030 Application of regulations.
16.01.040 Precedence of regulations.
16.01.050 Definitions.
16.01.055 Water department customer classifications/allocations.
16.01.060 Water waste prohibitions.
16.01.070 Stage 1: Water shortage alert.
16.01.080 Stage 2: Water shortage warning.
16.01.090 Stage 3: Water shortage emergency.
16.01.100 Stage 4: Severe water shortage emergency.
16.01.110 Stage 5: Critical water shortage emergency.
16.01.120 Exceptions.
16.01.130 Water shortage appeals.
16.01.140 Administrative enforcement.
16.01.150 Additional enforcement authority.
16.01.160 Severability.

## 16.01.010 FINDINGS.

Whereas, the city of Santa Cruz water system draws almost exclusively on local surface water sources, whose yield varies from year to year depending on the amount of rainfall received and runoff generated during the winter season; and

Whereas, the city water system is susceptible to water shortages in dry and critically dry years or in periods of prolonged regional drought when water conditions characterized by low surface flows in the north coast streams and San Lorenzo River sources, depleted storage in Newell Creek Reservoir, or both, reduce the available supply to a level that cannot support seasonal water demand; and

Whereas, on March 10, 2009, the city council of the city of Santa Cruz adopted an updated water shortage contingency plan that describes how the city will respond to future water shortages and lists the various actions the city would take to reduce water demand under different water shortage scenarios ranging from five percent or less up to and including a fifty percent seasonal water supply deficiency; and

Whereas California Water Code Sections 350 et seq. authorize water suppliers, after holding a properly noticed public hearing and after making certain findings, to declare a water shortage (emergency) and to adopt such regulations and restrictions to conserve the water supply for the greatest public benefit with particular regard for domestic use, sanitation, and fire protection; and

Whereas, the voluntary and mandatory water conservation measures and progressive restrictions on water use and method of use set forth herein provide an effective and immediately available means of

conserving water which is essential during periods of water shortage to ensure a reliable and sustainable minimum supply of water for the public health, safety, and welfare and to preserve valuable limited reservoir storage, avoid depleting water storage to an unacceptably low level, and thereby lessen the possibility of experiencing more critical shortages if dry conditions continue or worsen; and

Whereas, the usage allotments hereinafter established will equitably spread the burden of restricted and prohibited usage in a manner prescribed by the city's water shortage contingency plan over all city water department customers and other consumers of city water; and

Whereas, the purposes of this chapter are to conserve the water supply of the city of Santa Cruz for the greatest public benefit, to mitigate the effects of a water supply shortage on public health and safety and economic activity, and to budget water use so that a reliable and sustainable minimum supply of water will be available for the most essential purposes for the entire duration of the water shortage.

(Ord. 2010-12 § 2 (part), 2010).

### 16.01.020 DECLARATION OF WATER SHORTAGE.

The provisions of this chapter shall take effect whenever the director, upon engineering analysis of city water supplies, finds and determines that a water shortage exists or is imminent within the city of Santa Cruz water service area and a declaration of a water shortage is made by a resolution of the city council, and they shall remain in effect for the duration of the water shortage set forth in the resolution.

(Ord. 2010-12 § 2 (part), 2010).

### 16.01.030 APPLICATION OF REGULATIONS.

The provisions of this chapter shall apply to all persons using or consuming water both inside and outside the city and within the city water service area, and regardless of whether any person using water shall have a contract for water service with the city.

(Ord. 2010-12 § 2 (part), 2010).

### 16.01.040 PRECEDENCE OF REGULATIONS.

Where other provisions of the municipal code, whether enacted prior or subsequent to this chapter, are inconsistent with the provisions of this chapter, the provisions of this chapter shall supersede and control for the duration of the water shortage set forth in the resolution of the city council.

(Ord. 2010-12 § 2 (part), 2010).

### 16.01.050 DEFINITIONS.

(a) "Director" refers to the director of the city of Santa Cruz water department.

(b) "Water" refers to water produced and served by the city of Santa Cruz water department.

(c) "City" refers to the city of Santa Cruz.

(d) "Water department" refers to the city of Santa Cruz water department.

(e) "Seasonal water demand" refers to the demand, measured in gallons, placed by customers on the city water supply between April 1st and October 31st each calendar year.

(f) Issue/Declare. Whenever this chapter references the director's issuance or declaration of an alert, warning, emergency, or regulation, said alert, warning, emergency or regulation shall be put into effect by the placement of a legal advertisement in a newspaper of general circulation, by a posting on the city's Internet website and by a posting in the following public places: Santa Cruz City Hall, 809 Center Street, Santa Cruz; Santa Cruz Water Department Office, 212 Locust Street, Santa Cruz; Capitola City Hall, 420 Capitola Avenue, Capitola; and the Santa Cruz County Governmental Center, 701 Ocean Street, Santa Cruz. Any such alert, warning, emergency or regulation shall take effect upon the date of its publication in the Santa Cruz Sentinel.

(g) "Customer" shall refer to any account customer of the city of Santa Cruz water department as well as to any consumer of city water who may not be a city of Santa Cruz water department account customer.

(h) "Dry year" refers to the type of water year under the city's water year classification system, which begins October 1st and ends September 30th, in which the total annual discharge of the San Lorenzo River at Felton measures between twenty-nine thousand and forty-nine thousand acre-feet.

(i) "Critically dry year" refers to the type of water year under the city's water year classification system, which begins October 1st and ends September 30th, in which the total annual discharge of the San Lorenzo River at Felton measures less than twenty-nine thousand acre-feet.

(j) "Independent hearing officer" refers to a person appointed by the city to preside at administrative hearings pursuant to Title 4 of this code.

(Ord. 2015-07 § 1, 2015: Ord. 2010-12 § 2 (part), 2010).

## 16.01.055 WATER DEPARTMENT CUSTOMER CLASSIFICATIONS/ALLOCATIONS.

For determining a water department customer's water allocation during a declared water shortage under this chapter and for all other purposes under this title, the following customer classification definitions shall apply based on the customer's ownership or occupation of the following types of property served by the water department:

(a) 1. Single-Family Residential. Individually metered residential dwelling units (regardless of housing type). This classification shall apply whether or not the residential dwelling unit is being put to a use other than, or in addition to, residential use, and whether or not the residential use is permanent or transient in nature including use as a vacation rental unit. A residential dwelling unit is considered an occupant's permanent residence when, on average, the occupant resides in the unit for at least twenty-one days within each monthly water service period.

2. Multiple-Family Residential. Any residential account with more than one residential dwelling unit served by one water meter. This classification shall apply whether or not the residential dwelling units are being put to a use other than, or in addition to, residential use and whether or

not the residential use is permanent or transient in nature including use as a vacation rental unit. A residential dwelling unit is considered an occupant's permanent residence when, on average, the occupant resides in the unit for at least twenty-one days within each monthly water service period.

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

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

5. Municipal. This category is comprised of city-owned and operated facilities such as city offices, parks, police and fire stations, water and wastewater treatment plants, street medians, and parking lots.

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

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

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

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

(b) Residency. For the purpose of determining residential water rationing allotments under water shortage Stages 3, 4 or 5 of this chapter, the number of persons in each household shall be determined by calculating the number of that household's permanent residents. A permanent resident is an occupant who resides in the subject residential dwelling unit, on average, for at least twenty-one days within each monthly water service period.

(Ord. 2015-07 § 2, 2015).

### 16.01.060 WATER WASTE PROHIBITIONS.

It shall be unlawful during any water shortage stage for any person, firm, partnership, association, corporation, political entity (including the city) or any other water department customer to use water for any of the following:

(a) Fire Hydrants. Use of water from any fire hydrant unless specifically authorized by permit from the city, except by regularly constituted fire protection agencies for fire suppression purposes, or for other authorized uses, including distribution system flushing, fire flow testing, and filling of approved vehicles for sewer system flushing, storm drain maintenance, and street sweeping purposes.

(b) Watering/Irrigation. The watering of grass, lawn, groundcover, shrubbery, open ground, crops and trees, including agricultural irrigation, in a manner or to an extent that causes or allows excessive water flow or runoff onto an adjoining sidewalk, driveway, street, gutter or ditch.

(c) Plumbing Leaks. The escape of water through leaks, breaks, or other malfunctions within the water user's plumbing or distribution system for any period of time after such break or leak should have reasonably been discovered and corrected. It shall be presumed that a period of twenty-four hours after the water user discovers such break, leak or malfunction, or receives notice from the city of such condition, whichever occurs first, is a reasonable time within which to correct such condition or to make arrangements for correction.

(d) Washing of Exterior Surfaces. The washing of sidewalks, walkways, driveways, parking lots, patios, or other exterior surfaces unless the hose is equipped with an automatic shutoff nozzle.

(e) Cleaning of Structures and Vehicles. The cleaning of building exteriors, mobile homes, cars, boats, and recreational vehicles unless the hose is equipped with an automatic shutoff nozzle.

(f) Fountains and Decorative Water Features. The operation of a water fountain or other decorative water feature that does not use re-circulated water.

(g) Commercial Car Washes. The washing of vehicles at a commercial car wash unless the facility utilizes water recycling equipment, or operates on a timer for a limited time period and shuts off automatically at the expiration of the time period.

(h) Construction. The use of potable water for dust control or soil compaction purposes in construction activities where there is a reasonably available source of reclaimed water appropriate for such use.

(i) The indiscriminate running of water or washing with water, not otherwise prohibited in this section which is wasteful and without reasonable purpose.

(Ord. 2010-12 § 2 (part), 2010).

### 16.01.070 STAGE 1: WATER SHORTAGE ALERT.

(a) The director is empowered to issue a water shortage alert and to enforce the water shortage restrictions in this section upon finding that the magnitude of an anticipated water shortage, per the criteria delineated in the city's adopted water shortage contingency plan, will be five percent and a minimal consumer demand reduction is necessary to make more efficient use of water and appropriately respond to existing water supply conditions. In a Stage 1 water shortage, the city will enforce the following water shortage restrictions with the objective of realizing a seasonal water demand reduction of one hundred twenty-five million gallons or an average daily water demand reduction of six hundred thousand gallons.

(b) During Stage 1, it shall be unlawful for any person, firm, partnership, association, corporation, political entity (including the city) or any other water department customer:

1. To water or irrigate lawn, landscape, or other vegetated area between the hours of 10:00 a.m. and 5:00 p.m., except when performed with a bucket or watering can, or by use of a drip irrigation system or similar low volume, nonspray irrigation equipment, or for very short periods of time for the express purpose of allowing landscape contractors to adjust or repair an irrigation system;

2. To use a hose that is not equipped with a shutoff nozzle;

3. To use potable water to wash down hard or paved surfaces, including but not limited to sidewalks, walkways, driveways, parking lots, tennis courts, patios, or other paved surfaces, except when it is necessary to alleviate safety or sanitation hazards or to prepare paved surfaces for sealing;

4. To initially fill or to drain and refill residential swimming pools;

5. To serve water in a restaurant or other commercial food service establishment except upon the request of a patron; and/or

6. To operate a hotel, motel or other commercial lodging establishment without offering patrons the option to forego the daily laundering of towels, sheets and linens.

(Ord. 2010-12 § 2 (part), 2010).

### 16.01.080 STAGE 2: WATER SHORTAGE WARNING.

(a) The director is empowered to issue a water shortage warning and to enforce the water shortage restrictions in this section upon finding that the magnitude of an anticipated water shortage, per the criteria delineated in the city's adopted water shortage contingency plan, will be between five percent and fifteen percent and a moderate consumer demand reduction is necessary to make more efficient use of water and appropriately respond to existing water supply conditions. In a Stage 2 water shortage, the city will enforce the following water shortage restrictions with the objective of realizing a seasonal water demand reduction of up to three hundred seventy-five million gallons and an average daily water demand reduction of up to one million eight hundred thousand gallons.

(b) During Stage 2, it shall be unlawful for any person, firm, partnership, association, corporation, political body (including the city) or other water department customer:

1. To water or irrigate lawn, landscape, or other vegetated area between the hours of 10:00 a.m. and 5:00 p.m., except when performed with a bucket or watering can, or by use of a drip irrigation system or similar low volume, nonspray irrigation equipment, or for very short periods of time for the express purpose of allowing landscape contractors to adjust or repair an irrigation system;

2. To use a hose that is not equipped with a shutoff nozzle;

3. To use potable water to wash down hard or paved surfaces, including but not limited to sidewalks, walkways, driveways, parking lots, tennis courts, patios, or other paved surfaces, except when it is necessary to alleviate safety or sanitation hazards or to prepare paved surfaces for sealing;

4. To initially fill or to drain and refill residential swimming pools;

5. To serve water in a restaurant or other commercial food service establishment except upon the request of a patron;

6. To operate a hotel, motel or other commercial lodging establishment without offering patrons the option to forego the daily laundering of towels, sheets and linens;

7. To water or irrigate lawn, landscape, or other vegetated area on days of the week other than the two days of the week authorized and publicized by the director, except when performed with a bucket or watering can, or by use of a drip irrigation system or similar low volume, nonspray irrigation equipment, or for very short periods of time for the express purpose of allowing landscape contractors to adjust or repair an irrigation system. Hourly restrictions set forth in subsection (b)(1) continue to apply on authorized watering days. This provision shall not apply to commercial growers/nurseries or to residential vegetable gardens/edible plantings watered with a hose equipped with a shutoff nozzle;

8. To water or irrigate lawn, landscape, or other vegetated area using an automatic irrigation system for more than fifteen minutes per watering station per assigned day. This provision shall not apply to automatic irrigation systems exclusively using low output sprinkler equipment, including rotors, stream rotors, or micro-spray systems;

9. To wash the exterior of dwellings, buildings or structures (with the exception of window washing and preparation of property for painting or for sale);

10. To irrigate or water landscapes in a manner that conflicts with a customer's landscape irrigation water budget when such a budget is required by the director per the criteria delineated in the city's adopted water shortage contingency plan; and/or

11. To disobey water department direction to large commercial, industrial or irrigation customers using one thousand three hundred thirty-seven or more billing units (one million gallons) per year to conduct water use audits, to prepare water conservation plans and to submit progress reports, or to immediately repair water system leaks, including leaks attributable to faulty pipes or fixtures.

(Ord. 2010-12 § 2 (part), 2010).

## 16.01.090 STAGE 3: WATER SHORTAGE EMERGENCY.

(a) The director is empowered to declare a water shortage emergency and to enforce the water shortage restrictions in this section upon finding that the magnitude of an anticipated water shortage, per the criteria delineated in the city's adopted water shortage contingency plan, will be between fifteen percent and twenty-five percent and a significant consumer demand reduction is necessary to make more efficient use of water and appropriately respond to existing water supply conditions. In a Stage 3 water shortage, the city will enforce the following water shortage restrictions with the objective of realizing a seasonal water demand reduction of up to six hundred twenty-five million gallons and an average daily water demand reduction of up to three million gallons.

(b) During Stage 3, it shall be unlawful for any person, firm, partnership, association, corporation, political body (including the city) or other water department customer:

1. To water or irrigate lawn, landscape, or other vegetated area between the hours of 10:00 a.m. and 5:00 p.m., except when performed with a bucket or watering can, or by use of a drip

irrigation system or similar low volume, nonspray irrigation equipment, or for very short periods of time for the express purpose of allowing landscape contractors to adjust or repair an irrigation system;

2. To use a hose that is not equipped with a shutoff nozzle;

3. To use potable water to wash down hard or paved surfaces, including but not limited to sidewalks, walkways, driveways, parking lots, tennis courts, patios, or other paved surfaces, except when it is necessary to alleviate safety or sanitation hazards or to prepare paved surfaces for sealing;

4. To initially fill or to drain and refill swimming pools;

5. To serve water in a restaurant or other commercial food service establishment except upon the request of a patron;

6. To operate a hotel, motel or other commercial lodging establishment without offering patrons the option to forego the daily laundering of towels, sheets and linens;

7. To water or irrigate lawn, landscape, or other vegetated area on days of the week other than the specified day(s) of the week authorized and publicized by the director, except when performed with a bucket or watering can, or by use of a drip irrigation system or similar low volume, nonspray irrigation equipment, or for very short periods of time for the express purpose of allowing landscape contractors to adjust or repair an irrigation system. Hourly restrictions set forth in subsection (b)(1) continue to apply on authorized watering days. This provision shall not apply to commercial growers/nurseries or to residential vegetable gardens/edible plantings watered with a hose equipped with a shutoff nozzle;

8. To water or irrigate lawn, landscape, or other vegetated area using an automatic irrigation system for more than ten minutes per watering station per assigned day. This provision shall not apply to automatic irrigation systems exclusively using low output sprinkler equipment, including rotors, stream rotors, or micro-spray systems;

9. To apply potable water to outdoor landscapes during and within forty-eight hours after measurable rainfall;

10. To wash the exterior of dwellings, buildings or structures (with the exception of window washing and preparation of property for painting or for sale);

11. To irrigate or water landscapes in a manner that conflicts with a customer's landscape irrigation water budget when such a budget is required by the director per the criteria delineated in the city's adopted water shortage contingency plan;

12. To disobey water department direction to large commercial, industrial or irrigation customers using one thousand three hundred thirty-seven or more billing units (one million gallons) per year to conduct water use audits, to prepare water conservation plans and to submit progress reports, or to immediately repair water system leaks, including leaks attributable to faulty pipes or fixtures;

13. To violate residential customer water rationing regulations, including regulations intended to preclude excessive water usage and specifying maximum water usage limitations, issued by the director in accordance with guidelines set forth in the city's adopted water shortage contingency plan; and/or

14. To disobey water department directives issued to commercial customers requiring the prominent placement of "Save Water" signage at specified locations at the customer's premises.

(Ord. 2015-07 § 3, 2015: Ord. 2010-12 § 2 (part), 2010).

## 16.01.100 STAGE 4: SEVERE WATER SHORTAGE EMERGENCY.

(a) The director is empowered to declare a severe water shortage emergency and to enforce the water shortage restrictions in this section upon finding that the magnitude of an anticipated water shortage, per the criteria delineated in the city's adopted water shortage contingency plan, will be between twenty-five percent and thirty-five percent and an extraordinary consumer demand reduction is necessary to make more efficient use of water and appropriately respond to existing water supply conditions. In a Stage 4 water shortage, the city will enforce the following water shortage restrictions with the objective of realizing a seasonal water demand reduction of up to eight hundred seventy-five million gallons and an average daily water demand reduction of up to four million two hundred thousand gallons.

(b) During Stage 4, it shall be unlawful for any person, firm, partnership, association, corporation, political body (including the city) or other water department customer:

1. To water or irrigate landscape or other vegetated area between the hours of 10:00 a.m. and 5:00 p.m., except when performed with a bucket or watering can, or by use of a drip irrigation system or similar low volume, nonspray irrigation equipment, or for very short periods of time for the express purpose of allowing landscape contractors to adjust or repair an irrigation system;

2. To use a hose that is not equipped with a shutoff nozzle;

3. To use potable water to wash down hard or paved surfaces, including but not limited to sidewalks, walkways, driveways, parking lots, tennis courts, patios, or other paved surfaces, except when it is necessary to alleviate safety or sanitation hazards or to prepare paved surfaces for sealing;

4. To fill or to top off any swimming pools, outdoor spas, wading pools, and ornamental water features;

5. To serve water in a restaurant or other commercial food service establishment except upon the request of a patron;

6. To operate a hotel, motel or other commercial lodging establishment without offering patrons the option to forego the daily laundering of towels, sheets and linens;

7. To water or irrigate landscape or other vegetated area on days of the week other than the specified day(s) of the week authorized and publicized by the director, except when performed with a bucket or watering can, or by use of a drip irrigation system or similar low volume,

nonspray irrigation equipment, or for very short periods of time for the express purpose of allowing landscape contractors to adjust or repair an irrigation system. Hourly restrictions set forth in subsection (b)(1) continue to apply on authorized watering days. This provision shall not apply to commercial growers/nurseries or to residential vegetable gardens/edible plantings watered with a hose equipped with a shutoff nozzle;

8. To water landscapes using automatic irrigation systems for more than ten minutes per watering station per assigned day. This provision does not apply to automatic irrigation systems using water-efficient devices, including but not limited to weather-based controllers, drip/micro-irrigation systems and stream rotor sprinklers;

9. To wash the exterior of dwellings, buildings or structures (with the exception of window washing and preparation of property for painting or for sale);

10. To irrigate or water landscapes in a manner that conflicts with a customer's landscape irrigation water budget when such a budget is required by the director per the criteria delineated in the city's adopted water shortage contingency plan;

11. To disobey water department direction to large commercial, industrial or irrigation customers using one thousand three hundred thirty-seven or more billing units (one million gallons) per year to conduct water use audits, to prepare water conservation plans and to submit progress reports, or to immediately repair water system leaks, including leaks attributable to faulty pipes or fixtures;

12. To violate residential customer water rationing regulations, including regulations intended to preclude excessive water usage and specifying maximum water usage limitations, issued by the director in accordance with guidelines set forth in the city's adopted water shortage contingency plan;

13. To disobey water department directives issued to commercial customers requiring the prominent placement of "Save Water" signage at specified locations at the customer's premises;

14. To violate commercial customer water rationing regulations, including regulations intended to preclude excessive water usage and specifying maximum water usage limitations, issued by the director in accordance with guidelines set forth in the city's adopted water shortage contingency plan;

15. To disobey a water department order to customers identified as "dedicated irrigation accounts" directing those customers to further limit their landscape irrigation and watering activity so as to preserve only the customers' most valuable trees and plants;

16. To water lawns or turf, unless such watering is authorized by the director in accordance with a landscape irrigation water budget and is consistent with the guidelines set forth in the city's adopted water shortage contingency plan;

17. To install new landscaping which requires any irrigation or watering;

18. To wash or clean vehicles, including but not limited to automobiles, trucks, vans, buses, motorcycles, boats, or trailers, including the washing of fleet vehicles and the washing of vehicles on dealer lots. This restriction will not apply to commercial car wash businesses which use recycled water; and/or

19. To exercise any rights conferred by hydrant and bulk water permits that were issued prior to the severe water shortage emergency declaration absent special permission granted by the director. Said special permission may be granted only for projects necessary to protect the public health, safety and welfare where no alternative to potable water exists and for emergency response purposes.

(Ord. 2010-12 § 2 (part), 2010).

### 16.01.110 STAGE 5: CRITICAL WATER SHORTAGE EMERGENCY.

(a) The director is empowered to declare a critical water shortage emergency and to enforce the water shortage restrictions in this section upon finding that the magnitude of an anticipated water shortage, per the criteria delineated in the city's adopted water shortage contingency plan, shall be between thirty-five percent and fifty percent and an extreme consumer demand reduction is necessary to make more efficient use of water and appropriately respond to existing water supply conditions. In a Stage 5 water shortage, the city will enforce the following water shortage restrictions with the objective of realizing a seasonal water demand reduction of up to one billion two hundred fifty million gallons and an average daily water demand reduction of up to six million gallons.

(b) During Stage 5, it is unlawful for any person, firm, partnership, association, corporation, political body (including the city) or other water department customer:

1. To water or irrigate any outdoor landscaping, unless such watering is authorized by the director and is consistent with the guidelines set forth in the city's adopted water shortage contingency plan;

2. To use a hose that is not equipped with a shutoff nozzle;

3. To use water for any outdoor washing purpose including commercial car washing, window washing, and paint preparation;

4. To fill or to top off any swimming pools, outdoor spas, wading pools, and ornamental water features;

5. To serve water in a restaurant or other commercial food service establishment except upon the request of a patron;

6. To operate a hotel, motel or other commercial lodging establishment without offering patrons the option to forego the daily laundering of towels, sheets and linens;

7. To use water for recreational purposes;

8. To operate public swimming pools;

9. To operate public showers;

10. To disobey water department direction to large commercial, industrial or irrigation customers using one thousand three hundred thirty-seven or more billing units (one million gallons) per year to conduct water use audits, to prepare water conservation plans and to submit progress reports, or to immediately repair water system leaks, including leaks attributable to faulty pipes or fixtures;

11. To violate residential customer water rationing regulations, including regulations intended to preclude excessive water usage and specifying maximum water usage limitations, issued by the director in accordance with guidelines set forth in the city's adopted water shortage contingency plan;

12. To violate commercial customer water rationing regulations, including regulations intended to preclude excessive water usage and specifying maximum water usage limitations, issued by the director in accordance with guidelines set forth in the city's December 2008 water shortage contingency plan;

13. To disobey water department directives issued to commercial customers requiring the prominent placement of "Save Water" signage at specified locations at the customer's premises;

14. To install new landscaping which requires any irrigation or watering; and/or

15. To exercise any rights conferred by hydrant and bulk water permits that were issued prior to the critical water shortage emergency declaration absent special permission granted by the director. Said special permission may be granted only for projects necessary to protect the public health, safety and welfare where no alternative to potable water exists and for emergency response purposes.

(Ord. 2010-12 § 2 (part), 2010).

## 16.01.120 EXCEPTIONS.

(a) The director, upon application made in writing by a customer on a form promulgated by the water department and accompanied by supporting documentation, shall be authorized to issue an exception from the strict application of any restriction, regulation or prohibition enforced pursuant to this chapter, upon the customer's production of substantial evidence demonstrating the existence of one or more of the following circumstances that are particular to that customer and which are not generally shared by other water department customers:

1. Exceptions Applicable to All Water Department Customers:

A. Failure to approve the requested exception would cause a condition having an adverse effect on the health, sanitation, fire protection, or safety of the customer or members of the public served by the customer;

B. Alternative restrictions to which the customer is willing to adhere are available that would achieve the same level of demand reduction as the restriction for which an exception is being sought and such alternative restrictions are enforceable by the water department;

C. Circumstances concerning the customer's property or business have changed since the implementation of the subject restriction warranting a change in the customer's water usage allocation.

2. Exceptions Applicable Only to Water Department Nonresidential Customers. For purposes of this subsection a residential dwelling unit which is used as a vacation rental shall not be classified as a business.

A. Strict application of the subject restriction, regulation or prohibition would impose a severe or undue hardship on a particular business customer or render it infeasible for a particular business customer or class of business customers to remain in operation;

B. A hospital or health care facility customer using industry best management practices is eligible for an exception upon demonstrating that the subject restriction, regulation or prohibition is interfering with or preventing it from providing health care service to its customers in accordance with industry hygiene, sanitation and health care standards; or

C. A business customer has already implemented environmental sustainability measures that have reduced water consumption to the maximum extent feasible. As used in this subsection the term "environmental sustainability measures" refers to installation of high efficiency plumbing fixtures, devices, equipment, and appliances, recycled water systems, and landscaping consisting exclusively of low-water-using plant materials using drip or similar high efficiency, nonspray irrigation systems, or to buildings that are designed, built, and continuously operated according to Leadership in Energy and Environmental Design (LEED) certification standards.

(b) In order to qualify for an exception, a customer must first complete a self water audit pursuant to standards and procedures promulgated by the water department. This audit shall be made part of the customer's exception application and water conservation measures indicated by the audit may be incorporated as conditions of approval to an exception in addition to any other conditions of approval imposed by the director in connection with the director's approval of the customer's exception application.

(Ord. 2015-07 § 4, 2015: Ord. 2010-12 § 2 (part), 2010).

## 16.01.130 WATER SHORTAGE APPEALS.

(a) A water shortage appeal procedure is hereby established which shall apply upon the director's issuance of any water shortage declaration and the implementation of water shortage restrictions pursuant to Sections 16.01.070 through 16.01.110. Thereafter during the declared water shortage, independent hearing officers shall be appointed to hear and rule upon water shortage appeals filed in accordance with this section.

(b) Any customer who considers an action taken by the director or an enforcement official under the provisions of this chapter, including actions on exception applications and the assessment of administrative penalties, to have been erroneously taken or issued may appeal that action or penalty in the following manner:

1. The appeal shall be made in writing, shall state the nature of the appeal specifying the action or penalty that is being appealed and the basis upon which the action or penalty is alleged to be in error. Penalty appeals shall include a copy of the notice of violation;

2. An appeal, to be effective, must be received by the director not later than ten business days following the date of the notice of violation or the date that the director took the action which is the subject of the appeal;

(A) A water service resident who is not an account customer may notify the water department of his or her intention to file a petition to force the resident's account customer to appeal an excess water use penalty within ten business days following the penalty;

(B) If the water department has been given a notice of intention to file a petition per subsection (b)(2)(A) by a water service area resident who is not an account customer, the appeal from the account customer must be received within fifteen business days after the account customer has been petitioned by the resident;

3. The director shall schedule the appeal for consideration by an independent hearing officer. The independent hearing officer shall hear the appeal within ninety days of the date of the appeal and issue its decision within thirty days of the date of the hearing;

4. The decision of the independent hearing officer shall be final. In ruling on appeals, the independent hearing officer shall strictly apply the provisions of this chapter, and shall not impose or grant terms and conditions not authorized by this chapter.

(Ord. 2015-07 § 5, 2015: Ord. 2010-12 § 2 (part), 2010).

### 16.01.140 ADMINISTRATIVE ENFORCEMENT.

(a) Any person, firm, partnership, association, corporation, political entity or other water department customer violating any provision of this chapter may be assessed an administrative penalty.

(b) Each and every day a violation of this chapter exists constitutes a separate and distinct offense for which an administrative penalty may be assessed.

(c) Penalties. The purpose of the administrative penalties assessed pursuant to this section is to assure future chapter compliance by the cited customer through the imposition of increasingly significant penalties so as to create a meaningful disincentive to commit future chapter violations. In acknowledgment of the fact that the city's water is a scarce and irreplaceable commodity and that this chapter is intended to equitably distribute that commodity among water department customers and to assure that, to the extent feasible, city water is conserved and used only for purposes deemed necessary for public health and safety, the penalty schedule herein prescribed is not to be construed as creating a "water pricing" structure pursuant to which customers may elect to pay for additional water at significantly higher rates. To this end, a customer's repeated violation of this chapter shall result in either the installation of a flow restriction device or disconnection of the customer's property from the city's water service system at the customer's cost.

(d) Administrative penalties for failure to comply with water waste prohibition requirements in Section 16.01.060 or mandatory water use restrictions and regulations commencing with Stage 1 in Section 16.01.070 are as follows:

1. First Offense. Written notice of violation and opportunity to correct violation.

2. Second Offense. A second violation within the preceding twelve calendar months is punishable by a fine not to exceed one hundred dollars.

3. Third Offense. A third violation within the preceding twelve calendar months is punishable by a fine not to exceed two hundred fifty dollars.

4. Fourth Offense. A fourth violation within the preceding twelve calendar months is punishable by a fine not to exceed five hundred dollars. In addition to any fines, the director may order a water flow restrictor device be installed.

5. Large Customers. Administrative penalties for customers that use an average of one thousand three hundred thirty-seven billing units (one million gallons) or more per calendar year shall be triple the amounts listed above.

6. Discontinuing Service. In addition to any fines and the installation of a water flow restrictor, the director may disconnect a customer's water service for willful violations of mandatory restrictions and regulations in this chapter. Upon disconnection of water service, a written notice shall be served upon the customer which shall state the time, place, and general description of the prohibited or restricted activity and the method by which reconnection can be made.

(e) Excessive Water Use Penalties. An excessive use penalty shall be assessed where the customer, during any given billing cycle, uses more than the customer's water allotment per the director's water rationing regulations issued pursuant to this chapter commencing with Stage 3 in Section 16.01.090. Excess use penalties shall be in addition to ordinary water consumption charges, as follows:

1. One percent to ten percent over customer rationing allotment: not to exceed twenty-five dollars/CCF.

2. More than ten percent over customer rationing allotment: not to exceed fifty dollars/CCF.

3. In addition to any excess use penalties, the director may order a water flow restrictor device be installed and/or may disconnect a customer's water service for willful violations of the water rationing regulations in this chapter. Upon disconnection of water service, a written notice shall be served upon the customer which shall state the time, place, and general description of the prohibited or restricted activity and the method by which reconnection can be made.

4. The director is authorized to develop administrative policies and procedures for the waiver of excessive water use penalties.

(f) Cost of Flow Restrictor and Disconnecting Service. A person or entity that violates this chapter is responsible for payment of charges for installing and/or removing any flow-restricting device and for disconnecting and/or reconnecting service in accordance with the city's miscellaneous water service

fee resolution then in effect. The charge for installing and/or removing any flow restricting device must be paid before the device is removed. Nonpayment will be subject to the same remedies as nonpayment of basic water rates.

(g) Notice and Hearing. The director will issue a notice of violation by mail or personal delivery at least ten business days before taking any enforcement action described in subsection (d). Such notice must describe the violation and the date by which corrective action must be taken. A customer may appeal the notice of violation by filing a written notice of appeal with the city no later than the close of the business day before the date scheduled for enforcement action, accompanied by a twenty-five-dollar appeal fee. Any notice of violation not timely appealed will be final. Upon receipt of a timely appeal, a hearing on the appeal will be scheduled, and the city will mail written notice of the hearing date to the customer at least ten days before the date of the hearing. Pending receipt of a written appeal or pending a hearing pursuant to an appeal, the director may take appropriate steps to prevent the unauthorized use of water as appropriate to the nature and extent of the violation and the current declared water shortage condition.

(Ord. 2015-07 § 6, 2015: Ord. 2010-12 § 2 (part), 2010).

### 16.01.150 ADDITIONAL ENFORCEMENT AUTHORITY.

In addition to the remedies referenced above, the director is empowered to pursue any additional remedies necessary, including criminal, civil and administrative remedies listed in Title 4 of the Santa Cruz Municipal Code, to correct a violation of this chapter.

(Ord. 2010-12 § 2 (part), 2010).

### 16.01.160 SEVERABILITY.

If any portion of this chapter is held to be unconstitutional, it is the intent of the city council that such portion of the chapter be severable from the remainder and that the remainder be given full force and effect.

(Ord. 2010-12 § 2 (part), 2010).

**The Santa Cruz Municipal Code is current through Ordinance 2016-07, passed May 24, 2016.**
Disclaimer: The City Clerk's Office has the official version of the Santa Cruz Municipal Code. Users should contact the City Clerk's Office for ordinances passed subsequent to the ordinance cited above.

RESOLUTION NO. NS-29,012

RESOLUTION OF THE CITY COUNCIL OF THE CITY OF SANTA CRUZ AMENDING RESOLUTION NO. NS-28,836 CONCERNING DROUGHT COST RECOVERY FEE

WHEREAS, Title 16 of the Santa Cruz Municipal Code Provides rules governing the administration and operation of the City's Water System, including identification of the various sources of authority to establish and amend rates, fees, and system development charges by Resolution; and

WHEREAS, on September 23, 2014, the City Council adopted Resolution No. NS-28,836 establishing new water rates and ready-to-serve charges; and

WHEREAS, this resolution pertains to Section 1, number 4, Drought Cost Recovery Fee rates only; and

WHEREAS, the City Council recognized the need to replenish water sales revenues lost due a water shortage declaration and instituted a Drought Cost Recovery Fee on September 23, 2014; and

WHEREAS, the maximum amount of revenue which can be collected through the Drought Cost Recovery Fee is tied to estimated annual revenue shortfalls effected by a water shortage stage declared by the City Council; and

WHEREAS, the language contained in the resolution regarding the Drought Cost Recovery Fee needs further clarification to be consistent with prior noticing and intent; and

WHEREAS, the City Council further finds that the rates established by Resolution No. NS-26,836 and as hereinafter set forth do not exceed the amount of the estimated costs required to provide the services for which the rates are levied; and

WHEREAS, the City Council further finds that the rates previously established to cover the estimated annual shortfall caused by a drought declaration are reasonable and required for the proper operation of the water system, and are exempt from the California Environmental Quality Act, pursuant to Section 21080(b)(8) of the Public Resources Code, because they are for the purposes of (1) meeting operating expenses, (2) purchasing or leasing supplies, equipment and materials, (3) meeting financial reserve requirements, and (4) obtaining funds for capital projects necessary to maintain service within existing service areas.

NOW, THEREFORE, BE IT RESOLVED by the City Council of the City of Santa Cruz as follows:

Section 1: WATER RATES AND CHARGES

The water rates for customers inside and outside of the City Limits are hereby amended to read as follows:

4. The Drought Cost Recovery Fee maximum amounts set forth below are a fixed fee and are hereby established and shall be applicable for the full fiscal year (twelve months) following the water shortage declaration made by City Council. The maximum targeted cost recovery amount is indicated below and is linked to the water shortage stage declared by the City Council.

| Service Size | Stage 1 – 5% Shortage | Stage 2 – 15% Shortage | Stage 3 – 25% Shortage | Stage 4 – 35% Shortage | Stage 5 – 50% Shortage |
|---|---|---|---|---|---|
| Maximum Targeted Cost Recovery | $ 1,000,000 | $ 2,500,000 | $ 4,000,000 | $ 5,500,000 | $ 7,500,000 |
| 5/8-in | $ 2.45 | $ 6.12 | $ 9.79 | $ 13.46 | $ 18.35 |
| 3/4-in | $ 2.45 | $ 6.12 | $ 9.79 | $ 13.46 | $ 18.35 |
| 1-in | $ 6.13 | $ 15.30 | $ 24.48 | $ 33.65 | $ 45.88 |
| 1 1/2-in | $ 12.25 | $ 30.60 | $ 48.95 | $ 67.30 | $ 91.75 |
| 2-in | $ 19.60 | $ 48.96 | $ 78.32 | $ 107.68 | $ 146.80 |
| 3-in | $ 36.75 | $ 91.80 | $ 146.85 | $ 201.90 | $ 275.25 |
| 4-in | $ 61.25 | $ 153.00 | $ 244.75 | $ 336.50 | $ 458.75 |
| 6-in | $ 122.50 | $ 306.00 | $ 489.50 | $ 673.00 | $ 917.50 |
| 8-in | $ 281.75 | $ 703.80 | $ 1,125.85 | $ 1,547.90 | $ 2,110.25 |
| 10-in | $ 347.90 | $ 869.04 | $ 1,390.18 | $ 1,911.32 | $ 2,605.70 |

BE IT FURTHER RESOLVED that, except as amended by this resolution, all water-related fees and charges established by Resolution No. NS-28,836 and not amended herein shall not be affected by this Resolution.

Section 2. EFFECTIVE DATE.

This Resolution shall be in force and effect so as to appear in all billings from and after October 27, 2015.

PASSED AND ADOPTED this 27th day of October, 2015, by the following vote:

| | |
|---|---|
| AYES: | Councilmembers Chase, Terrazas, Comstock, Posner, Noroyan; Vice Mayor Mathews; Mayor Lane. |
| NOES: | None. |
| ABSENT: | None. |
| DISQUALIFIED: | None. |

APPROVED: _____
Mayor

ATTEST: _____
City Clerk Administrator

# Chapter 16.02
# WATER CONSERVATION

Sections:

16.02.010 Purpose.
16.02.020 Application of regulations.
16.02.030 Definitions.
16.02.040 Regulations.
16.02.050 Disconnection.
16.02.060 Reconnection.
16.02.070 Appeal.
16.02.080 Violation.
16.02.090 Enforcement.

## 16.02.010 PURPOSE.

The purpose of this chapter is to ensure that the water supply of the city of Santa Cruz is put to maximum beneficial use and that waste or unreasonable use or unreasonable method of use of water be prevented.

(Ord. 2003-13 § 2 (part), 2003).

## 16.02.020 APPLICATION OF REGULATIONS.

The provisions of this chapter shall apply to all persons using water, both in and outside the city and within city water service areas, and regardless of whether any person using water shall have a contract for water service with the city. Notwithstanding other code provisions inconsistent with this chapter, the provisions of this chapter shall supersede and prevail until termination of this chapter.

(Ord. 2003-13 § 2 (part), 2003).

## 16.02.030 DEFINITIONS.

For the purpose of this chapter, the following words shall have the meanings set forth below:

(a) “Director” is the director of the water department of the city of Santa Cruz, or his or her designated representative.

(b) “Drip irrigation” shall mean low-flow point specific irrigation systems that apply water directly to plant root zones through emitters, low volume micro-spray devices that are components of a drip irrigation system, and soaker hoses.

(c) “Person” shall mean any individual, firm, partnership, association, corporation, or political entity.

(d) “Water” shall mean any water obtained from the water department of the city of Santa Cruz.

(Ord. 2003-13 § 2 (part), 2003).

## 16.02.040 REGULATIONS.

It is unlawful for any person to use water for any of the following:

(a) Fire Hydrants. Use of water from any fire hydrant unless specifically authorized by permit from the city, except by regularly constituted fire protection agencies for fire suppression purposes, or for other authorized uses, including distribution system flushing, fire flow testing, and filling of approved vehicles for sewer system flushing, storm drain maintenance, and street sweeping purposes.

(b) Watering/Irrigation. The watering of grass, lawn, groundcover, shrubbery, open ground, crops and trees, including agricultural irrigation, in a manner or to an extent which allows excess water to run to waste.

(c) Plumbing Leaks. The escape of water through leaks, breaks, or malfunction within the water user's plumbing or distribution system for any period of time within which such break or leak should reasonably have been discovered and corrected. It shall be presumed that a period of twenty-four hours after the water user discovers such break, leak or malfunction, or receives notice from the city of such condition, whichever occurs first, is a reasonable time within which to correct such condition or to make arrangements for correction.

(d) Washing of Exterior Surfaces. The washing of sidewalks, walkways, driveways, parking lots, patios, or other exterior surfaces unless the hose is equipped with an automatic shutoff nozzle.

(e) Cleaning of Structures and Vehicles. The cleaning of building exteriors, mobile homes, cars, boats, and recreational vehicles unless the hose is equipped with an automatic shutoff nozzle.

(f) Fountains. The operation of an ornamental fountain, unless such water is recycled in the fountain.

(g) Cooling. The use of water in new ice-making machines and any other new mechanical equipment that utilizes a single pass cooling system to remove and discharge heat to the sanitary sewer. Water used for all cooling purposes shall be recycled.

(h) Commercial Car Washes. The washing of vehicles at a commercial car wash unless the facility utilizes water recycling equipment, or operates on a timer for a limited time period and shuts off automatically at the expiration of the time period.

(i) Construction. The use of potable water for dust control or soil compaction purposes in construction activities where there is a reasonably available source of reclaimed water appropriate for such use.

(j) Clothes Washing. Water for new non-recirculating industrial clothes wash systems.

(k) The indiscriminate running of water or washing with water not otherwise prohibited in this section, which is wasteful, and without reasonable purpose.

(l) Any other nonessential uses of water, as determined and publicly announced by the director, in response to below average water supply conditions that could result in carryover storage in Loch Lomond Reservoir being drawn down to levels that would trigger the declaration of a water supply emergency in the event of a subsequent dry year, including, but not limited to:

1. Use of potable water to irrigate turf, lawns, gardens, or ornamental landscaping between 10:00 a.m. and 5:00 p.m. unless by drip irrigation, or by hand watering with a quick acting positive shut off nozzle. (Exceptions may be made by the director for professional gardeners where there is no ability to not water between 10:00 a.m. and 5:00 p.m.).

2. Serving drinking water to any customer, unless expressly requested, by a restaurant, hotel, cafe, cafeteria, or other public place where food is sold, served, or offered for sale.

The water director shall provide notification to city council and the public before any such restrictions are put into effect.

(Ord. 2003-13 § 2 (part), 2003).

### 16.02.050 DISCONNECTION.

Any person in violation of the provisions of this chapter who failed to take corrective action within fifteen days of receiving the first notification of the violation shall be subject to disconnection of water service. Upon disconnection of water service a written notice shall be served upon the violator, or conspicuously posted at the entrance of the violator's premises, and shall state the time, place and general description of the violation and the method by which reconnection can be accomplished.

(Ord. 2003-13 § 2 (part), 2003).

### 16.02.060 RECONNECTION.

Where water service is disconnected, as authorized above, it shall be immediately reconnected upon correction of the condition or activity and the payment of the reconnection charge in an amount specified by resolution of the city council.

(Ord. 2003-13 § 2 (part), 2003).

### 16.02.070 APPEAL.

Any person who feels that the activity or condition, which resulted in the disconnection of water service pursuant to this chapter, did not constitute a violation of this chapter may appeal the disconnection to the city council in the manner specified in Chapter 1.16 of the Santa Cruz Municipal Code. If the city council finds that the activity or conduct did not constitute a violation of this chapter, the reconnection charge will be refunded.

(Ord. 2003-13 § 2 (part), 2003).

### 16.02.080 VIOLATION.

Any person violating this chapter shall be deemed guilty of an infraction. Any person violating this chapter shall be subject to criminal, civil, and/or administrative enforcement action as provided in Title 4 of the Santa Cruz Municipal Code. Each and every day a violation of this chapter exists constitutes a separate and distinct offense for which enforcement action may be taken.

(Ord. 2003-13 § 2 (part), 2003).

### 16.02.090 ENFORCEMENT.

All peace officers and persons authorized by law to issue citations within the water service area shall, in conjunction with duties imposed by the law, diligently enforce the provisions of this chapter. Pursuant to the provisions of Section 836.5 of the State Penal Code, the following officers and employees of the city of Santa Cruz are hereby designated and authorized to issue citations for enforcement of this chapter:

Director of the water department;

Deputy director/Operations manager;

Water quality manager;

Customer service manager;

Utility supervisor;

Production superintendent;

Water conservation coordinator;

Utility service representative;

Water department employees designated by the director.

(Ord. 2003-13 § 2 (part), 2003).

**The Santa Cruz Municipal Code is current through Ordinance 2016-07, passed May 24, 2016.**
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CITY OF SANTA CRUZ

# Information About Proposed Water Rate Increases

To Fund Water System Upgrades
August 2014

## Learning From the Past; Preparing for the Future

The mission of the City of Santa Cruz Water Department is to provide a safe, clean and continuous supply of water that meets or exceeds local, State and Federal standards for public health and environmental quality, and to provide courteous, responsive and efficient service in the most cost-effective manner to our customers. The Department provides water to 93,000 customers, 24 hours a day, 365 days per year and there hasn't been a lapse in our service delivery in over 100 years.

There have been a lot of changes to the process of producing and delivering water. A century ago, Santa Cruz's water pipes were hollowed out redwood logs. Raw water from local rivers and creeks was piped directly to homes, without any treatment. Water was taken from rivers and creeks without concern that there wouldn't be enough left for fish.

A lot has been learned from the past to help us now prepare for the future. Our past tells us that our water sources aren't always plentiful, so we need to conserve what we have. With dramatically increased regulations to treat and store water, we've learned how critical it is for us to maintain and improve the facilities we have. We've learned that our consumption of water has had negative impacts on critical habitat for endangered species. And we've learned that our local rainfall, which provides 100% of our water supply, isn't as predictable as it was in years past.

Our community's health, safety, economy and quality of life rely on our water supply. Local water infrastructure needs to be updated so we don't waste precious drops of water and to ensure continued service efficiency. The water treatment plant needs to be retrofitted so we are prepared to comply with changing processes and regulations to effectively treat water. And pipes and delivery systems that have far outlived their lifespans need to be replaced.

**www.cityofsantacruz.com/waterrates**



# Proposed Rate Increases

Collecting, treating and delivering water is a capital-intensive service. We're proposing a rate increase over the next five years.

## What will the proposed rate increases look like?

Customers currently pay a monthly "Ready to Serve" charge, which is a service charge to cover part of the fixed costs of delivering water. This service charge is currently approximately $17 to $22 per month for residential customers and we are proposing to increase it by 10% each year for the next five years. Customers also pay for the volume of water consumed, which is currently in the range of $1.50 to $9.00 per unit (a unit is 748 gallons of water) for residential customers. The rate for the volume of water is proposed to increase 10% each year for the next five years. (See enclosed proposed rate and fee schedules.)

The City is also proposing a Drought Cost Recovery fee for the next two years. Under curtailment and rationing, customers use less water and the Water Department earns less revenue. However, it still costs the Department just as much to operate the water delivery system – those costs don't decrease because most of the expense for delivering water is in system infrastructure.

For each stage of water shortage during drought conditions, Water Department revenue declines over $1 million dollars, combined with increased costs for implementing curtailment and rationing, while most Water Department costs for continued operations, maintenance and capital replacement of the water system remain fairly constant. The current Stage 3 water shortage, for example, has resulted in approximately $3 million dollars in lost revenue, combined with additional costs related to implementing Stage 3 rationing. In order to cover the cost of Department operations, maintenance and capital depreciation during periods of reduced consumption, the proposed rate increase includes Drought Cost Recovery fee that is progressively higher for each stage of water shortage, as shown on the proposed fee schedule below.

The proposed Drought Cost Recovery Fee will be assessed on a monthly basis and would be implemented for the full fiscal year.

## What will you get for your money?

In addition to funding ongoing Water Department operations, administration and future planning, during the next five years, the Water Department proposes to make significant investments in upgrading and rehabilitating your water delivery system. While still functional, most of the system is many decades old and things are wearing out. In addition, there are many new regulations for treating water that didn't exist when our system was built. You can think of our system like a classic car; still a solidly built machine, but continually requiring replacements and upgrades to keep it running smoothly.

**The projects that the water department will be undertaking to upgrade, improve and maintain the water system are as follows. These projects are proposed to be funded through a rate increase.**

| PROJECT | FY 2015 | FY 2016 | FY 2017 | PROJECT TOTALS 2008-2017 |
|---|---|---|---|---|
| North Coast System Rehabilitation | $8.9 million | | $1 million | **$14.1 million** |
| Graham Hill Water Treatment Plant Upgrades | $14.4 million | | | **$15.8 million** |
| Bay Street Reservoir Tank Construction | $6.1 million | | | **$26.3 million** |
| Water Main Replacement Projects | $2.6 million | $2.6 million | $2.6 million | **$12.1 million** |
| Other: Storage Tank Rehab, Well and Pump Station Rehab, Facility Improvements | $7.7 million | | | **$47.9 million** |

# Water System Upgrade Projects

## North Coast System Rehabilitation

The Santa Cruz Water Department has operated and maintained the 18-mile-long North Coast system since the 1880s. Diversion structures ranging in age from approximately 80 years to over 120 years direct flows from North Coast sources (including Liddell Springs and Reggiardo, Laguna and Majors creeks,) into a pipe system, which conveys water by gravity to the Coast Pump Station adjacent to the City's San Lorenzo River intake. The Coast Pump Station lifts water to the Graham Hill Water Treatment Plant where it is treated and delivered to customers. The North Coast sources rely on rainfall and groundwater to furnish up to 30% of the City's overall water production and this water is the City's highest quality water. A significant portion of the 18-miles of pipeline is approaching, or has exceeded, its lifespan. This aging infrastructure is prone to higher levels of maintenance and an increased potential for failure. This $45 million project is segmented into 6 phases to be completed over approximately 15 years. Phases 1 and 2 were completed between 2006 and 2012; the City is currently working on Phase 3.

## Graham Hill Water Treatment Plant Upgrades

The Graham Hill Water Treatment Plant (GHWTP) was commissioned in 1960 and has undergone expansion and improvements over the last five decades. A series of recent studies have identified a number of projects that are necessary to meet complex water quality regulations and plant reliability goals. The priority project includes rehabilitation of the existing filters and filter bays. Valued at $4.5 million, this project consists of structural improvements to the filter and drain system infrastructure and associated piping, valve, and electrical and instrumentation improvements. Construction of the project is scheduled to begin in fall 2014. The project is tentatively scheduled to be completed by October 2015. Future proposed projects include rehabilitation of various other tanks and basins as well as their mechanical, electrical and communications components.

## Bay Street Reservoir

The Bay Street Reservoir was originally constructed in 1924 to hold untreated water from North Coast water sources. The reservoir originally held approximately 35 million gallons of water. The reservoir was converted to store treated water and a roof was added in 1976 to protect finished drinking water from airborne contaminants. Due to growing risks of the aging infrastructure and the management practice of reducing the overall volume of stored treated water to reduce stagnation and byproduct build-up the Water Department demolished the original Bay Street Reservoir in fall 2007. A $26 million project to construct two replacement 6-million gallon tanks at the facility is currently underway, with the first tank placed into service in October 2013. The second tank is under construction and expected to be complete in spring of 2015.

## Water Main Replacement

The Santa Cruz water delivery system is made up of over 300 miles of water mains. This includes over 30 miles of large diameter mains from the City's water sources, such as Loch Lomond Reservoir, and more than 250 miles of water mains within City and County streets, which deliver treated drinking water to customers. Guided by water industry standards, the Water Department reserves funds to replace 2-4 miles of aging water mains each year. Many factors guide replacement priority including the need to maintain water system reliability and water quality, deliver adequate fire flows, improve circulation, and reduce maintenance costs by coordinating street paving with other planned projects.

## Storage Tank Rehabilitation, Facilities Improvements, Well and Pump Station Rehabilitation

These projects will include the rehabilitation of a storage tank for treated water located on Empire Grade, an evaluation of the intake system on the San Lorenzo River, replacement of several pumps and motors throughout the system and completion of the Beltz 12 well project.

CITY OF SANTA CRUZ

# Rates Inside the City of Santa Cruz

## Inside City Ready-to-Serve Rates (fixed)

| Meter Size | Current Rates | FY 2015 Effective October 2014 | FY 2016 Effective July 2015 | FY 2017 Effective July 2016 | FY 2018 Effective July 2017 | FY 2019 Effective July 2018 |
|---|---|---|---|---|---|---|
| 5/8-in | $17.41 | $19.16 | $21.08 | $23.19 | $25.51 | $28.07 |
| 3/4-in | $17.41 | $19.16 | $21.08 | $23.19 | $25.51 | $28.07 |
| 1-in | $43.52 | $47.88 | $52.67 | $57.94 | $63.74 | $70.12 |
| 1 1/2-in | $87.05 | $95.76 | $105.34 | $115.88 | $127.47 | $140.22 |
| 2-in | $139.27 | $153.20 | $168.52 | $185.38 | $203.92 | $224.32 |
| 3-in | $261.14 | $287.26 | $315.99 | $347.59 | $382.35 | $420.59 |
| 4-in | $435.24 | $478.77 | $526.65 | $579.32 | $637.26 | $700.99 |
| 6-in | $870.46 | $957.51 | $1,053.27 | $1,158.60 | $1,274.46 | $1,401.91 |
| 8-in | $2,002.05 | $2,202.26 | $2,422.49 | $2,664.74 | $2,931.22 | $3,224.35 |
| 10-in | $2,472.09 | $2,719.30 | $2,991.23 | $3,290.36 | $3,619.40 | $3,981.34 |

## Inside City Commodity Rates (volumetric)

| | Current Rates | FY 2015 Effective October 2014 | FY 2016 Effective July 2015 | FY 2017 Effective July 2016 | FY 2018 Effective July 2017 | FY 2019 Effective July 2018 |
|---|---|---|---|---|---|---|
| SFR | $ / ccf | $ / ccf | $ / ccf | $ / ccf | $ / ccf | $ / ccf |
| Tier 1 | $1.57 | $1.73 | $1.91 | $2.11 | $2.33 | $2.57 |
| Tier 2 | $4.00 | $4.40 | $4.84 | $5.33 | $5.87 | $6.46 |
| Tier 3 | $5.14 | $5.66 | $6.23 | $6.86 | $7.55 | $8.31 |
| Tier 4 | $7.05 | $7.76 | $8.54 | $9.40 | $10.34 | $11.38 |
| Tier 5 | $8.79 | $9.67 | $10.64 | $11.71 | $12.89 | $14.18 |
| Uniform (Non-SFR) | $4.00 | $4.40 | $4.84 | $5.33 | $5.87 | $6.46 |
| North Coast | $1.27 | $1.40 | $1.54 | $1.70 | $1.87 | $2.06 |

# Rates Outside the City of Santa Cruz

## Outside City Ready-to-Serve Rates (fixed)

| Meter Size | Current Rates | FY 2015 Effective October 2014 | FY 2016 Effective July 2015 | FY 2017 Effective July 2016 | FY 2018 Effective July 2017 | FY 2019 Effective July 2018 |
|---|---|---|---|---|---|---|
| 5/8-in | $22.20 | $24.42 | $26.87 | $29.56 | $32.52 | $35.78 |
| 3/4-in | $22.20 | $24.42 | $26.87 | $29.56 | $32.52 | $35.78 |
| 1-in | $55.50 | $61.05 | $67.16 | $73.88 | $81.27 | $89.40 |
| 1 1/2-in | $110.98 | $122.08 | $134.29 | $147.72 | $162.50 | $178.75 |
| 2-in | $177.56 | $195.32 | $214.86 | $236.35 | $259.99 | $285.99 |
| 3-in | $332.95 | $366.25 | $402.88 | $443.17 | $487.49 | $536.24 |
| 4-in | $554.92 | $610.42 | $671.47 | $738.62 | $812.49 | $893.74 |
| 6-in | $1,109.83 | $1,220.82 | $1,342.91 | $1,477.21 | $1,624.94 | $1,787.44 |
| 8-in | $2,553.34 | $2,808.68 | $3,089.55 | $3,398.51 | $3,738.37 | $4,112.21 |
| 10-in | $3,151.92 | $3,467.12 | $3,813.84 | $4,195.23 | $4,614.76 | $5,076.24 |

## Outside City Commodity Rates (volumetric)

| | Current Rates | FY 2015 Effective October 2014 | FY 2016 Effective July 2015 | FY 2017 Effective July 2016 | FY 2018 Effective July 2017 | FY 2019 Effective July 2018 |
|---|---|---|---|---|---|---|
| SFR | $ / ccf | $ / ccf | $ / ccf | $ / ccf | $ / ccf | $ / ccf |
| Tier 1 | $2.00 | $2.20 | $2.42 | $2.67 | $2.94 | $3.24 |
| Tier 2 | $5.10 | $5.61 | $6.18 | $6.80 | $7.48 | $8.23 |
| Tier 3 | $6.55 | $7.21 | $7.94 | $8.74 | $9.62 | $10.59 |
| Tier 4 | $8.98 | $9.88 | $10.87 | $11.96 | $13.16 | $14.48 |
| Tier 5 | $11.21 | $12.34 | $13.58 | $14.94 | $16.44 | $18.09 |
| Uniform (Non-SFR) | $5.10 | $5.61 | $6.18 | $6.80 | $7.48 | $8.23 |

# Drought Cost Recovery Fees & Water Rate Comparison

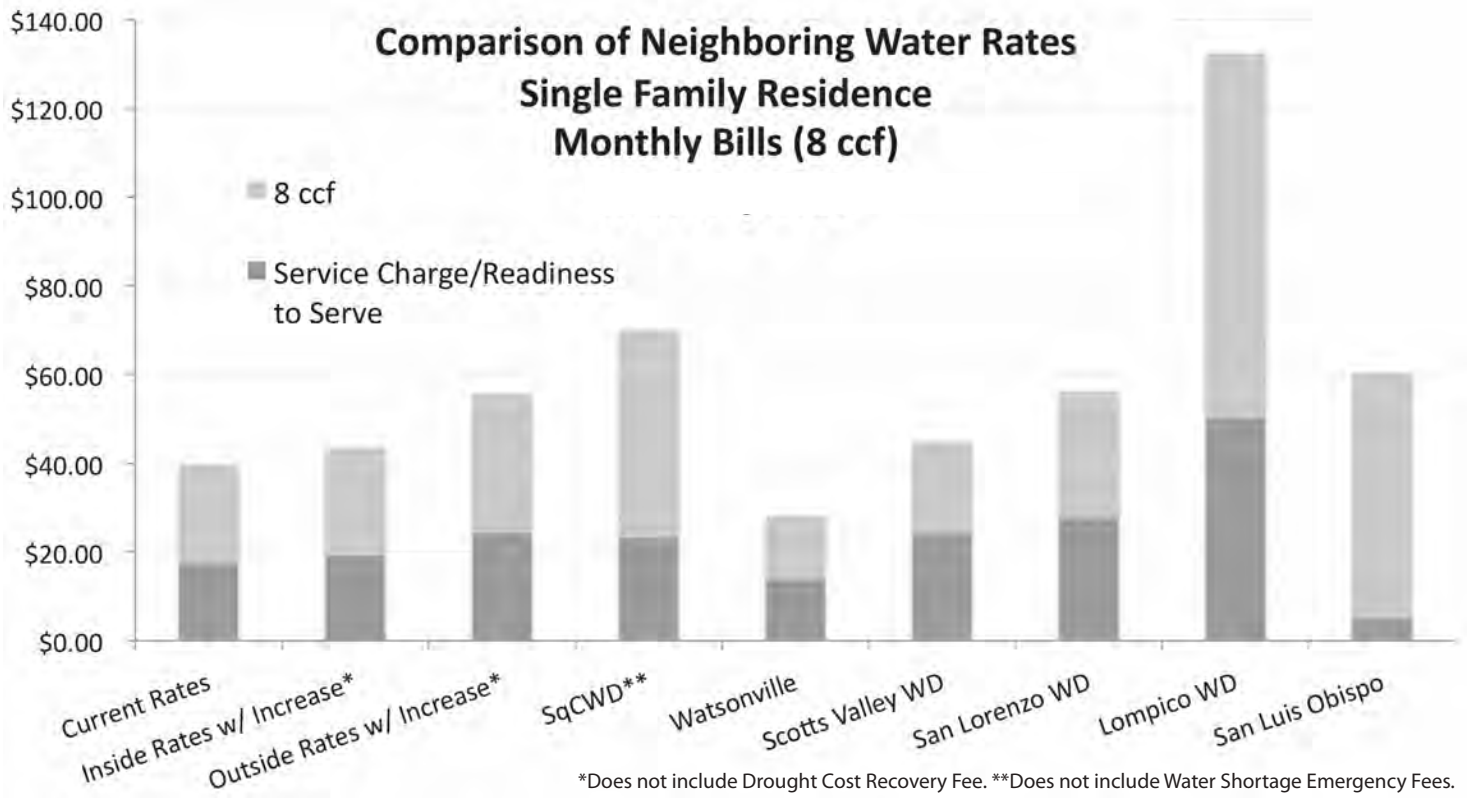
## Proposed Drought Cost Recovery Fees

| DROUGHT STAGE | CUTBACK REQUIRED | MAXIMUM TARGETED COST RECOVERY | 3/4-INCHOR 5/8-INCH DROUGHT RECOVERY FEE |
|---|---|---|---|
| Stage 1 | 5% | $1,000,000 | $2.45 |
| Stage 2 | 15% | $2,500,000 | $6.12 |
| Stage 3 | 25% | $4,000,000 | $9.79 |
| Stage 4 | 35% | $5,500,000 | $13.46 |
| Stage 5 | 50% | $7,500,000 | $18.35 |

The proposed Drought Cost Recovery Fee will be assessed on a monthly basis and would be implemented for the full fiscal year

## Inside and Outside City Drought Cost Recovery Fee Ready-to-Serve Rates (fixed)

| DROUGHT FEES | FY 2015 – EFFECTIVE OCTOBER 2014 | FY 2016 – EFFECTIVE JULY 2015 |
|---|---|---|
| ON RTS | | |
| 5/8-IN | $7.37 | $2.45 |
| 3/4-IN | $7.37 | $2.45 |
| 1-IN | $18.43 | $6.13 |
| 1 1/2-IN | $36.85 | $12.25 |
| 2-IN | $58.96 | $19.60 |
| 3-IN | $110.55 | $36.75 |
| 4-IN | $184.25 | $61.25 |
| 6-IN | $368.50 | $122.50 |
| 8-IN | $847.55 | $281.75 |
| 10-IN | $1,046.54 | $347.90 |
| | | |
| COMMODITY | $0 / CCF | $0 / CCF |




*Does not include Drought Cost Recovery Fee. **Does not include Water Shortage Emergency Fees.

# Notice of Public Hearing

## The City Council for the City of Santa Cruz will hold a Public Hearing Tuesday, September 23, 2014, during the regular meeting of the City Council at 7:00 pm.

The City Council will consider adoption of a proposed water rate increase affecting all water customers. Interested persons are encouraged to attend and comment on the issues being discussed. The meeting will be held in City Council Chambers at 809 Center Street.

Written protests: **Any property owner or a tenant who is a customer of the Water Department may protest the proposed water rates.** Only one written protest per parcel, filed by an owner or a tenant who is a customer, will be counted. Only written and signed protests that include the writer's address and/or assessor parcel number will be counted to determine whether a majority protest to the proposed water rate increase exists. Written protests may be mailed or hand delivered to the Mayor and Council of Santa Cruz at 809 Center Street, Room 10, Santa Cruz, CA 95060.

If you oppose the proposed rate increases, your protest must be submitted in writing to be counted, even if you plan to attend the Public Hearing. To be counted, the protest must: 1) be in writing; 2) state opposition to the proposed rate increase; 3) identify the parcel by assessor's parcel number or street address; 4) include the original signature of the owner of record or a tenant who is a customer of the Water Department submitting the protest; 5) be received before the conclusion of the Public Hearing on September 23, 2014. The meeting will be held in City Council Chambers at 809 Center Street.

**For more information, visit www.cityofsantacruz.com/waterrates.**

CITY OF SANTA CRUZ

Santa Cruz Water District
212 Locust Street
Santa Cruz, CA 95060

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Notice of Public Hearing
**Proposed Water Rates**
**Affecting Your Area**

# CITY OF SANTA CRUZ WATER DEPARTMENT

# LONG RANGE FINANCIAL PLAN




## JUNE 2016

# LONG RANGE FINANCIAL PLAN

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# Executive Summary

The Long Range Financial Plan (LRFP or Financial Plan) was developed to ensure the financial sustainability of the City of Santa Cruz's Water Enterprise Fund during the ten year period 2016 – 2026. This Financial Plan is specifically designed to support the continued operations and maintenance of the water system and its ability to serve the community with a high quality and reliable water supply, and to lay out the funding strategy that will be needed to finance major capital investments in water system infrastructure and the construction of a water supply augmentation project.

To prepare this Financial Plan, the Water Department and its consultants Raftelis Financial Consultants and Public Financial Management developed a series of financial planning inputs and outputs including:

- Prepared annual Operations and Maintenance Budgets for the Water Department;
- Developed a 10 Year Capital Improvement Plan;
- Integrated the Department's financial planning with existing Financial Policies and Goals, including developing a new financial policy on debt service coverage ratios and providing a strategy for fully funding all reserves;
- Projected revenue requirements for the 10 year period July 1, 2016 through June 30 2026;
- Completed a comprehensive Cost of Service Analysis;
- Identified a financing strategy that combines debt financing and pay-as-you-go investments to support the implementation of the 10 Year Capital Improvement Program;
- Updated Water Rate Structures, including considering the impacts to customers or a range of rate structure options; and
- Developed recommended Water Rates to implement the recommended water rate structure and meet the identified revenue requirements.

Capital investments of $127.9 million are planned for the next five years from Fiscal Year (FY) 2017 through FY 2021, with 33% of those costs ($42 Million) required to comply with state regulatory requirements. The CIP for FY 2022 through FY 2026 requires an additional investment of $169 million for a ten year CIP total of $296.9 million.

Using the revenue requirements data developed as part of the financial planning work, a five-year schedule of water rates is proposed for implementation. The proposed water rate structure includes the following assumptions and provisions:

- For the purposes of rate development, assume that the amount of water to be sold during the five-years covered by the proposed rates is 2.5 billion gallons per year.
- Adopt a rate structure that collects enough fixed fee revenue to recover the revenue necessary to cover the cost of meter reading, meter maintenance, billing preparation and distribution, and customer service. For FY 2017 this amounts to about 10% of total operating costs. Adopt volume-based user rates to collect the remaining revenues.
- Create a new fee called the Infrastructure Reinvestment Fee (IRF). The purpose of this fee is to help communicate to customers what their rate dollars are paying for which, in this case, involves major reinvestments in existing water system infrastructure. This fee would generate the revenues needed to pay for "pay-as-you-go" capital investments and debt service for capital projects. The cost to customers of this fee would be based on customer water use which, again, supports achievement of high priority pricing objectives.
- Acknowledge and mitigate for the risks to revenue stability associated with moving to a more volume based rate using two strategies**:**
    1. Maintaining the conservative assumption at 2.5 billion gallons per year;
    2. Beginning with the planned July 1, 2018 rate increase, apply a $1.00 surcharge per unit of water consumption (a hundred cubic feet or CCF) to increase the amount of the Rate Stabilization Reserve from the current minimum level of $2.3 million to a total of $10 million. In any normal water year where 2.5 billion gallons of water is not sold, the revenue shortfall associated with this situation would be covered by resources from this fund.

This Financial Plan lays out a road map for the Department and informs policy makers and the community about what it will take for the Department to develop and operate the water system needed to deliver service to 95,000 customers in northern Santa Cruz county.

In addition to three appendices that provide some additional details, a Glossary of terms can be found at the end of the Plan.

# 1. INTRODUCTION

This Long Range Financial Plan includes a ten year financing strategy with a specific financial plan for the first five year period. Overall, the Financial Plan is intended to support the City of Santa Cruz Water Department in achieving the following goals:

- **Address the repair and rehabilitation of critical infrastructure and the needed augmentation of the City's available water supply;**
- **Establish and maintain financial policies, reserve levels, and stable revenues needed to ensure financial sustainability and provide flexibility to adapt to unforeseen circumstances or challenges;**
- **Maintain the credit rating needed to support the Department's ability to debt finance the major capital investments and reinvestments needed to ensure supply and system reliability;**
- **Maintain reasonable rates in the near and medium term;**
- **Achieve an equitable allocation of capital costs/charges between current and future system users; and**
- **Manage rates in a predictable and reasonably stable manner.**

Working together with its consultants, Public Financial Management (PFM) and Raftelis Financial Consultants (Raftelis), a financial planning model was created to allow the Department to project operating and capital budgets and forecast annual revenue requirements. These projections include:

- **Revenues needed to cover debt service payments for the financing expected to be used to fund capital investments;**
- **Assumptions about how much of the capital program will be cash (pay-as-you-go funding) financed versus debt financed; and**
- **Funds required to meet financial reserve targets.**

Raftelis developed proposed water rates using these revenue projections, the Cost of Service Analysis, and Rate Structure Redesign work they completed during the fall and winter of 2015. Based on input received from the Water Commission and City Council in March 2015, priority objectives for pricing water were established to include:

- Revenue sufficiency,
- Promotes efficiency;
- Perceived to be fair by the public;

- Affordable for essential uses,
- Revenue stability,
- Understandable by customers,
- Promotes conservation, and
- Rate stability.

# 2. BACKGROUND

The Santa Cruz Water Department is an entirely self-funded operation. User rates, fees, and charges are the source of all revenues used to support the ongoing operation, maintenance, planning, management, and capital investments needed to deliver water to some 95,000 water users every day.

The unrestricted fund balance of the Water Operating fund (Fund 711) has historically been strong, but has been declining during the past four fiscal years. A major cause of this decline is cash funding of large Capital Improvement Program (CIP) projects such as the $26 million reconstruction of the Bay Street Reservoir.

The customer base is stable, primarily residential and reasonably diverse with the top 10 customers accounting for only 11% of total operating revenues. The service area economy is also stable and anchored by the University of California at Santa Cruz.

The three primary cost drivers of the LRFP include the following;

- **Capital projects to comply with State regulatory requirements;**
- **Capital projects to address infrastructure reinvestment and rehabilitation of major elements of the water system; and**
- **One or more capital projects to augment water supply that will result from implementing the recommendations of the Water Supply Advisory Committee.**

## 1.1 PLANNED CAPITAL INVESTMENTS

Capital investments of $127.9 million are planned for the next five years from Fiscal Year (FY) 2017 through FY 2021, with 33% of those costs ($42 Million) required to comply with state

regulatory requirements. The CIP for FY 2022 through FY 2026 requires an additional investment of $169 million[1] for a ten year CIP total of $296.9 million.

Capital projects planned for over the ten year period include:

- **PROJECTS FOCUSED ON EITHER REHABILITATING OR REPLACING EXISTING FACILITIES:**
  - Felton Diversion Dam and Pump Station
  - Laguna Dam
  - Majors Creek Diversion
  - San Lorenzo River Diversion and Tait Wells
  - Newell Creek Pipeline (between Newell Creek Dam and the Graham Hill Water Treatment Plant via Felton )
  - Newell Creek Dam Inlet/Outlet Pipeline – a project required to meet state regulatory requirements
  - Additional Phases of the North Coast Pipeline Replacement Project
  - Graham Hill Water Treatment Plant Concrete Tanks
  - Graham Hill Water Treatment Plant Solids Handling
  - Distribution System Water Main Replacements
  - Recoating of University Reservoir Tanks No. 4 and 5
  - Pressure Regulating Stations
  - Beltz 11 Well Replacement
  - Water Treatment Upgrades
- **PROJECTS FOCUSED ON UPGRADING OR IMPROVING EXISTING FACILITIES:**
  - Advanced Metering Infrastructure
  - Loch Lomond Recreation ADA Improvements
  - Photovoltaic/Solar Projects
  - Building for Water Resources Staff
  - Security Camera and Building Access Upgrades
- **PROJECTS FOCUSED ON IMPLEMENTING THE RECOMMENDATIONS OF THE WATER SUPPLY ADVISORY COMMITTEE TO IMPROVE WATER SUPPLY RELIABILITY:**
  - Winter water harvest strategies including in lieu recharge and studies to evaluate and pilot test aquifer storage and recovery

[1] These figures are in inflation adjusted 2015 dollars

- Study of options for the development and use of recycled water
- Source water quality evaluation related to future potential water treatment requirements, especially as changing source water characteristics might affect water treatment requirements
- Construction of one or some combination of water supply augmentation projects as needed to either increase available stored water by 2.4 billion gallons or provide an additional 3 to 4 million gallons per day source of supply to meet community needs during drought conditions.

The Department proposes to fund these projects with a combination of annual pay-as-you-go revenues and long-term debt.

The total capital investment for the 10 year planning horizon equals $296.9 million.

## 1.2 CURRENT FINANCIAL PROFILE

In the spring of 2014, the Water Department worked with the City's Finance Department staff to refinance its one existing debt issue from 2006. This step was undertaken to deal with a declining fund balance and the looming impacts of drought-required reductions in water use. The goal of the refinancing was to lower the interest rate and establish a less constraining debt service coverage requirement.

Standard and Poor's Rating Service and Fitch Ratings were asked to provide credit ratings for the Water Department as part of the 2014 refinancing of its debt. A credit rating is useful when an agency needs to access capital markets and issue debt at lower interest rates than would be available without a credit rating. Higher credit ratings can reduce borrowing costs and generate more competition from investors.

The Department's historical credit rating has been AA (high quality). Following the credit rating agency review, Standard and Poor's Rating Service downgraded the utility's credit rating to AA- with a Negative Rating Outlook. Fitch Ratings went farther, providing a rating of A+ (upper medium grade), two steps down from the Department's former AA rating. Both Rating Agencies cited the lack of a recent rate increase, the Department's declining fund balance, in insufficient debt service coverage, and the pending drought as reasons for their views of the Department's creditworthiness.

In the summer of 2015, Standard & Poor's revisited the Water Department's rating. This review took into account the City's action on a five-year program of rate increases in September 2014,

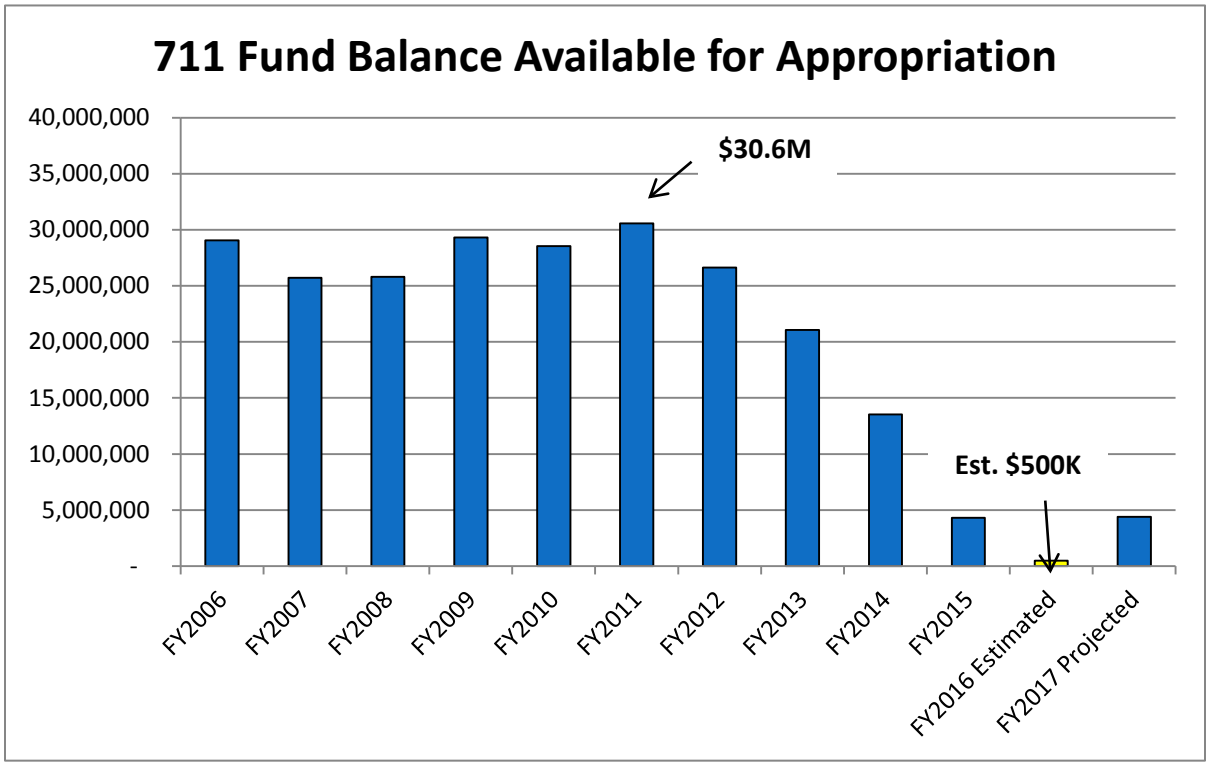
the utility's and the community's positive response to required water rationing, and the progress being made on the community-based water supply planning process. Standard and Poor's chose to retain the previous AA- rating but revised its rating outlook from Negative to Stable. Fitch Ratings is scheduled to revisit its rating for the Water Department in June of this year.

Annual rate increases of 10% have been approved through 2018. Water rate structure redesign and rate-setting work are currently underway and revised rates will be proposed for action by the Water Commission and the City Council during the winter and spring of 2016. The redesigned rates will replace and extend the original five-year rate increase program adopted in 2014.

For planning purposes, it has been assumed that the first year of any revised rate structure and increase will be applied on October 1, 2016. However, to address the immediate issue of declining cash and fund balance it is recommended that the originally planned 10% increase be implemented on July 1, 2016 and be replaced when the new structure is implemented in October. Remaining rate increases for years two through five of the new five-year rate program would be applied on July 1, in each year 2017, 2018, 2019, and 2020.

Figure 1 shows the Department's fund balance in Water Enterprise Operating Fund (Fund 711) demonstrating a high of $30.6 Million in 2011 that has steadily declined in the last five years and is estimated to approach $500,000 by end of FY 2016. The cause of the steady decline in this fund balance is cash financing the Department's Capital Improvement Program, reduced revenues resulting from restricting water use in the summers of 2014 and 2015, and rates not being set high enough to recover ongoing operating costs, even when water use is not restricted.

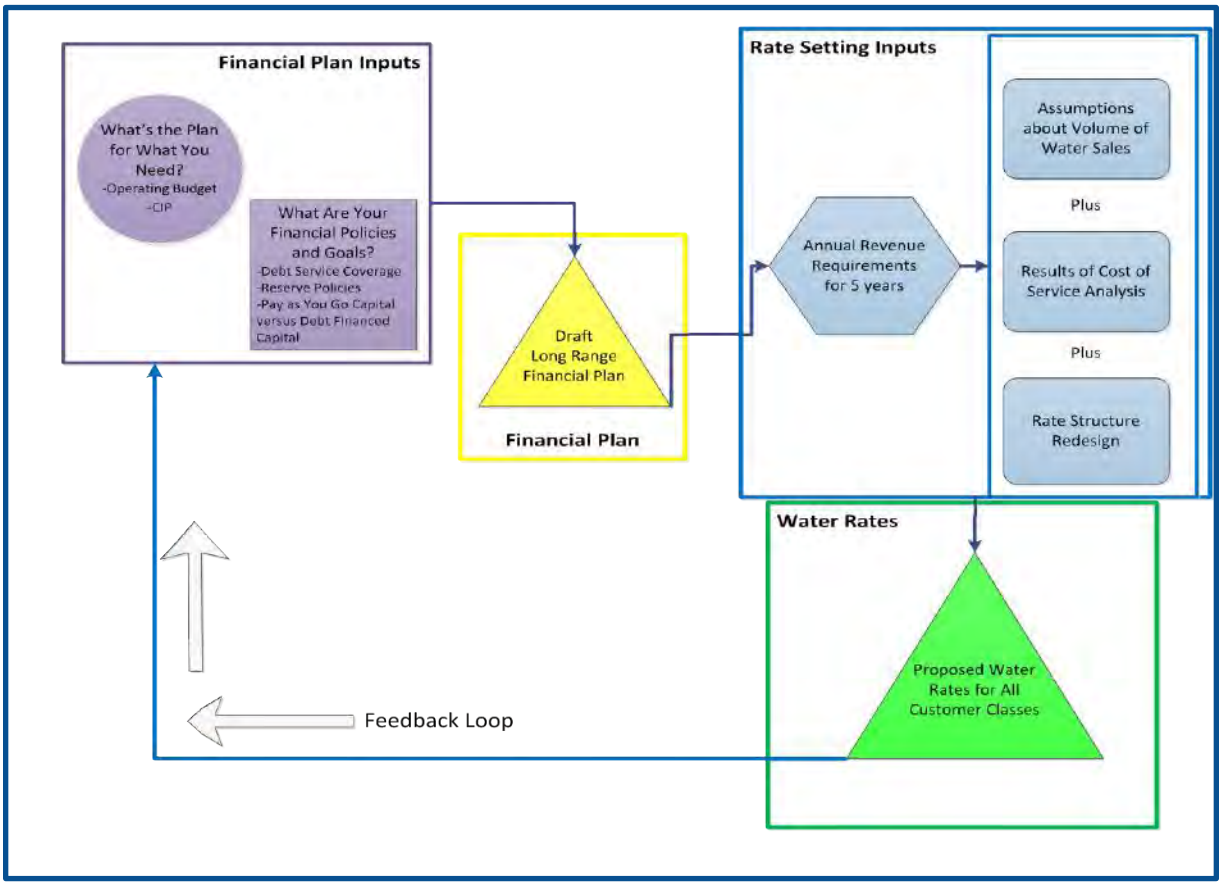
**Figure 1**
**Operating Fund Balance**




## 3. CONCEPTUAL MODEL FOR UTILITY FINANCIAL PLANNING

Financial planning and rate making for today's water utility involves a multi-stepped process depicted in Figure 2 below. The figure shows the inputs and outputs of the utility financial planning and rate making processes. It also shows the feedback loop between proposed rates, the end product of the process, and the organization's budget and CIP, which are key inputs to the beginning of the process.

**Figure 2**
**Conceptual Model of Utility Financial Planning and Rate Making**




Financial policies and financial indicators are a second key input in the financial planning process. These policies and indicators help measure financial performance. An organization's financial performance is a key factor in establishing its credit rating, which affects the interest rate that will be charged on borrowed funds.

# 4. INPUTS TO THE FINANCIAL PLAN

The draft Financial Plan and ten-year Pro Forma shown in Appendix A have been prepared using an Excel-based capital planning model developed by PFM. Briefly, the model uses as inputs the following financial data:

1. **The beginning fund balance for the Department's Operating Fund (Fund 711),**
2. **Multi-year operating expenses, as modified by specific inflation factors,**
3. **Multi-year capital costs, including specific inflation factors, and**
4. **Multi-year debt service costs.**

The model then produces the following outputs:

1. **Multi-year revenue projections,**
2. **Financial performance metrics related to the debt service coverage ratio and financial reserve goals, and**
3. **The sizing and timing of new debt issues.**

## 4.1 KEY FINANCIAL POLICIES AND GOALS

Having and meeting goals for key financial performance indicators is central to good financial management. This Financial Plan is purposefully focused on defining and creating a clear and achievable method to meet a set of financial policies and performance indicators that will be necessary for the Department's financial success.

### 4.1.1 UTILITY CREDIT RATINGS

One typical measure of a Utility's financial performance is its credit rating. Table 1 below describes the factors considered by Credit Rating Agencies in assigning credit ratings.

**Table 1**

**Rating Agency Factors Used in Assigning an Agency Credit Rating**

| Rating Factor | Rating Sub-Factors & Description |
|---|---|
| **System Characteristics** | • asset condition<br>• service area wealth (median family income)<br>• gross county product<br>• unemployment rate<br>• annual utility bill as a % of median family income<br>• system size (O&M) |
| **Financial Strength** | • annual debt service coverage<br>• days cash on hand<br>• debt to operating revenues<br>• debt to capitalization ratio |
| **Management** | • rate management<br>• regulatory compliance<br>• capital planning<br>• financial planning (debt & investment policies)<br>• operational risk (water supply adequacy) |
| **Legal Provisions** | • rate covenant<br>• debt service reserve requirement |

Credit rating agencies consider a variety of factors in assigning a credit rating, and utilities that have the best credit ratings typically will include policies that specifically address the financial strength metrics listed in Table 1.

### 4.1.2 FINANCIAL GOALS AND PERFORMANCE INDICATORS

Over the years, the City Council has established some financial performance metrics for the Water Utility, including a Rate Stabilization Reserve in 1993, and Operating and Emergency Reserves in 2014. As of June 30, 2015, the Rate Stabilization Reserve Fund balance was $2.4 million and the Emergency Reserve Fund balance was $600,000. A 90 Day Operating Reserve Fund was also created in September 2014, but was not funded at June 30, 2015.

The Council's intent in creating the Rate Stabilization Reserve[2] in 1993 was to "shield the Water Fund from the financial effects of extraordinary circumstances." As originally approved by the Council at the time, the rate stabilization reserve would have been used to help the Department deal with one or a combination of the following conditions:

- **Increased CIP or capital outlay expenditures due to an extraordinary non-recurring need or circumstance;**
- **A fluctuation in water consumption revenues creating an unanticipated shortfall, or**
- **Catastrophic losses as the result of a natural disaster.**

In the 23 years since the City Council created this $2.3 million reserve, infrastructure and operating costs have increased substantially and in 2014 the Department recommended and the Council approved creating additional reserves. These additional reserves, one for 90 days of operating cash, and one to address natural disaster types of emergency conditions, effectively replaced the first and third purposes intended to be served by the original Rate Stabilization Reserve. These more substantial reserves also begin the process of moving the utility to a stronger financial position, which better prepares it to deal with future costs.

This Financial Plan incorporates and, in the Financial Plan implementation section later in this document, proposes a method to fund the following goals for key financial performance metrics:

- **Maintain the Rate Stabilization Reserve (Fund 713) of $2.3 million;**
- **Maintain a Water Emergency Reserve Fund (Fund 717) at minimum level of $3 million; and**
- **Create additional operating reserves equal to 180 days of operating expenses. This would be accomplished by Maintaining the new Water Operating Cash Reserve Fund (Fund 716) at the equivalent of 90 days of operating cash and maintaining a minimum fund balance in Operating Fund (Fund 711) at a minimum of an additional 90 days of operating cash.[3]**

Another key financial performance metric is a target for debt service coverage ratio (DSCR). The DSCR is a measure of net operating revenues to annual debt payments. The Water Department has issued relatively little debt over the past 20 years so hasn't formally established or used a debt service coverage ratio (DSCR) target in its financial planning. The

[2] See http://www.cityofsantacruz.com/home/showdocument?id=3255

[3] In Fiscal 2017, 90 days of operating cash is equivalent to $6.5 Million

bond covenant for utility debt issued in 2006 included a 1.25 DSCR. When that debt was refinanced in 2014, the DSCR was reduced to 1.15.

A financial plan that only supports meeting the legal minimum figure can put the utility at risk of technical default on its bonds if revenues are reduced by, say, drought conditions when water use restrictions are put into place. Establishing a target that is above the minimum legal requirement is a good idea because it builds into the system needed flexibility that makes the utility more financially resilient in the face of uncertainty. The LRFP specifically includes the following debt service coverage ratio target:

- **Maintain a minimum debt service coverage ratio target of 1.5, requiring that a ratio of 1.5 be maintained between annual net revenues and annual debt service.**

Typically the calculation of the debt service coverage ratio does not include funds held in reserve as including reserves in calculating the ratio could result in masking a structural problem in the way rates are set.

## 4.2 PROJECTED OPERATING BUDGETS

Table 2 shows anticipated operating and capital expenses for FYs 2017 through 2021. Appendix A includes the complete ten year Pro Forma from which the information in Table 2 was excerpted.

**Table 2**

**Anticipated Expenses FY 2017 – 2021**

| Operating Expenses | 2017 | 2018 | 2019 | 2020 | 2021 |
|---|---|---|---|---|---|
| **Personnel** | $12,741,984 | $13,868,008 | $15,086,021 | $15,882,276 | $16,733,349 |
| **Services, Supplies & Other** | 12,616,410 | 13,247,231 | 13,909,592 | 14,605,072 | 15,335,325 |
| **Capital Outlay** | 965,000 | 1,013,250 | 1,063,913 | 1,117,108 | 1,172,964 |
| **Total Operating** | **$26,323,394** | **$28,128,488** | **$30,059,525** | **$31,604,455** | **$33,241,638** |

Operating costs have been developed based on very modest changes to staffing and departmental operations over time. The changes in Operating costs are based on the annual inflation factors shown in Table 3. These inflation factors are based on actual historical experience and long term industry trends.

**Table 3[4]**

**Operating Budget Inflation Factors**

| Expense Category | Annual Inflation Factors (percent) | | |
|---|---|---|---|
| | 2017 | 2018 | 2019-2026 |
| Salaries & Wages | 3.0 | 3.0 | 3.0 |
| Employee Benefits | 9.0 | 9.0 | 9.0 |
| Operating Supplies and Chemicals | 9.2 | 5.0 | 5.0 |
| Energy | 9.1 | 5.0 | 5.0 |
| All Other Categories | 3.0 | 3.0 | 3.0 |

## 1.3 CAPITAL IMPROVEMENT PLAN

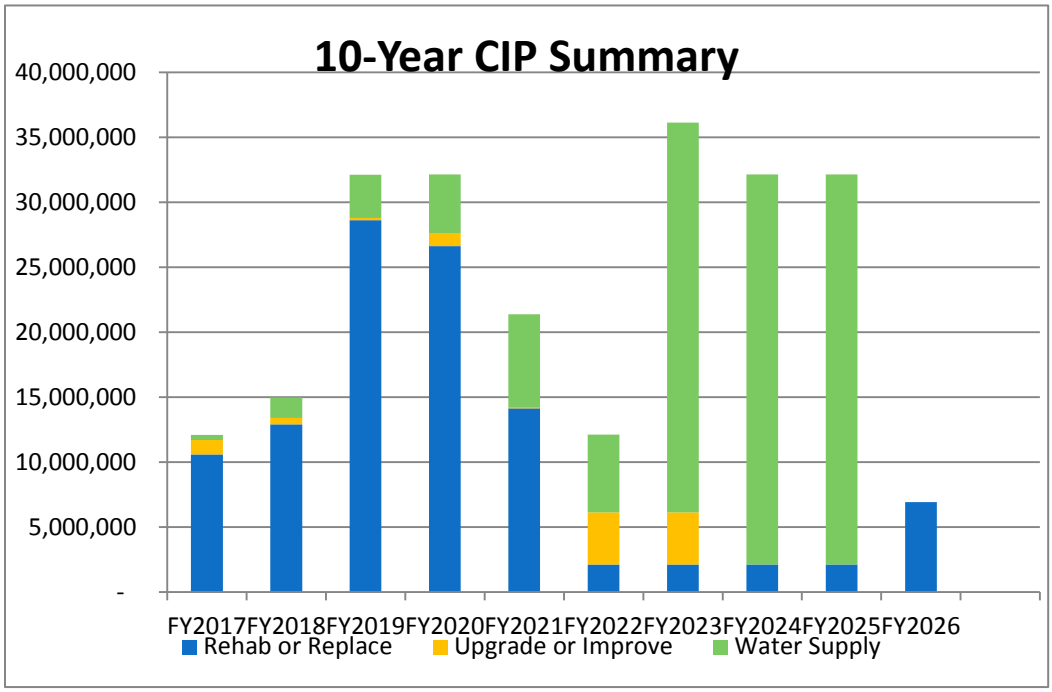
Section 1.1 describes the Department's anticipated capital spending of $127.9 million during the first five years covered by the Financial Plan. Capital projects during the first five years will be focused on system rehabilitation and replacement projects. Major expenses to implement the Water Supply Augmentation Strategy[5] are anticipated to occur in the second five years of the financial planning horizon. Figure 3 summarizes the planned capital spending in the three categories described in Section 1.1 Planned Capital Expenditures. Those categories are:

- **Rehabilitation and Replacement, including projects to meet regulatory requirements**
- **Upgrades and Improvements**
- **Water Supply Augmentation**

[4] Inflation factors were developed using a combination of actual historical experience (Energy and Chemicals), City projections (salaries and benefits) and industry trends for everything else. The Handy Whitman Index, which focuses on the inflation of construction cost for projects using significant quantities of concrete and steel, and is particularly applicable for water utilities, has been used to escalate the cost of projects in the Capital Improvement Program.

[5] The Water Supply Augmentation Strategy is the result of the community-based water supply planning process completed by the City Council appointed Water Supply Advisory Committee in October 2015.

**Figure 3**
**10 Year CIP**




Appendix B provides the details of the Ten Year Capital Improvement Plan, including both brief project descriptions and a ten year plan of spending.

## 5. LONG RANGE FINANCIAL PLAN RECOMMENDATIONS

This LRFP has been developed based on a specific five year forecast within a ten year planning horizon. The purpose of using the 10 year time frame is to ensure that steps taken during the first five years don't unduly constrain what financial capacity the Department has to address the financial investments needed during the second five years when it expects to construct one or more projects to augment water supply. The specific recommendations are limited to the first five years because that is as far ahead as the Department can establish rates under the limits set by California's Proposition 218.

**$113 M**

The elements of the Long Range Financial Plan integrate the key financial plan inputs included in Section 4 above, as well as a Capital Financing Strategy, a forecast of Revenue Requirements, and Water Rates needed to meet the Revenue Requirements.

## 5.1 CAPITAL FINANCING STRATEGY

The Financial Plan recommends that the identified CIP be funded with a combination of rate revenue and debt financing. Over the next five years, pay-as-you-go rate revenue would cover an average of 33% of capital costs, with debt financing covering 67%. Using debt financing to fund a major portion of the CIP provides for inter-generational equity and, by spreading these costs over time, helps to moderate and stabilize near term adjustments to water rates.

In a preliminary way, implementation of this recommendation has already begun. The Department's request for a loan of $25 million from the California Infrastructure and Economic Development Bank (I-Bank) was approved on March 22, 2016. Funding from the I-Bank is expected to be disbursed following completion of the anticipated Proposition 218 notification process planned for August 2016.

The I-Bank loan provides for the retro-active debt financing of significant capital expenditures that have resulted in depletion of the utility's fund balance in its main operating fund (Fund 711). This approach was authorized by the Council when it adopted a reimbursement resolution on April 8, 2014. Of the $25 Million I-Bank loan, the Department expects to replenish its fund balances by reimbursing itself for $22 Million in already expended capital costs. As discussed later in this Financial Plan, once the department has been reimbursed for prior capital costs, available funding will provide the resources needed to fully fund reserves. The remainder of the I-Bank funds would support additional capital projects planned to be completed in FY 2017 and 2018.

One of the reasons for developing the LRFP was to be able to assess the Department's capacity to use debt financing for major elements of its CIP. A measure of the Department's financial capacity is what portion of its revenues would be used for debt service. For example, the amount of financial flexibility of an organization is substantially reduced as the percent of its revenue dedicated to paying debt service rises.

During the first five years, the Department anticipates issuing debt totaling $85.9 million. The annual average debt service is not expected to exceed 8% of annual rate revenue during the first five years, but it would continue to rise to a maximum of about 24% of annual revenues at the end of the 10 year period. These figures are obviously significantly greater than the Department's figure of less than 5% of its revenues being currently dedicated to debt service, but the Department's financial advisors are satisfied that the Department has the debt capacity needed to support the implementation of the LRFP capital financing strategy, as long as the

Department is able to increase rates and charges as outlined in the LRFP, and is able to meet key financial targets, including maintaining financial reserves and meeting the 1.5 debt service coverage ratio.

## 5.2 REVENUE REQUIREMENTS FOR FY 2017 – FY 2021

As shown in Figure 2, a significant output of financial planning is the revenue requirements that inform the rate making process. Based on the recommendations and assumptions described in Section 4, the Department was able to calculate revenue requirements. Table 4 summarizes the revenue requirements, operating and capital costs, and debt service coverage in the first five years of the financial plan.

**Table 4**
**FY 2017 – FY 2021 Projected Revenue Requirements**

| | FY 2017 | FY 2018 | FY 2019 | FY 2020 | FY 2021 |
|---|---|---|---|---|---|
| **Infrastructure Reinvestment Fee Amount** | $5,990,512 | $8,700,797 | $9,166,040 | $10,169,506 | $11,239,068 |
| **Rate Stabilization Reserve Amount** | - | $3,342,224 | $3,342,224 | $3,342,224 | $3,342,224 |
| **O&M Revenue Requirement** | $26,323,394 | $28,128,488 | $30,059,525 | $31,604,455 | $33,241,638 |
| **TOTAL** | **$32,313,906** | **$40,171,529** | **$42,567,809** | **$45,116,205** | **$47,822,950** |

Revenue requirements have been set at a level needed to ensure that both a minimum 1.50 debt service coverage ratio and a minimum of 180 days of operating cash are maintained.

A more complete version of this table which provides the Department's detailed Financial Pro Forma can be found in Appendix A.

## 5.3 WATER RATES

Using the revenue requirements data developed as part of the financial planning work and shown in Table 4 above, a five-year schedule of water rates is proposed for implementation. The proposed water rate structure includes the following assumptions and provisions:

- **For the purposes of rate development, assume that the amount of water to be sold during the five-years covered by the proposed rates is 2.5 billion gallons per year[6].**
- **Adopt a rate structure that collects enough fixed fee revenue to recover the revenue necessary to cover the cost of meter reading, meter maintenance, billing preparation and distribution, and customer service. For FY 2017 this amounts to about 10% of total operating costs. Adopt volume-based user rates to collect the remaining revenues.**
- **Create a new fee called the Infrastructure Reinvestment Fee (IRF). This fee would generate the revenues needed to pay for "pay-as-you-go" capital investments and debt service for capital projects. The cost to customers of this fee would be based on customer water use which, again, supports achievement of high priority pricing objectives.**

The IRF is designed specifically to help focus and support customer communication about what water rates are paying for, particularly during the first five years of the CIP, which is emphasizing system rehabilitation and replacement projects for major elements of the system's backbone infrastructure.

- **Acknowledge and mitigate for the risks to revenue stability associated with moving to a more volume based rate using two strategies**:

  1. **Maintaining the conservative assumption at 2.5 billion gallons per year;**
  2. **Beginning with the planned July 1, 2018 rate increase, apply a $1.00 surcharge per unit of water consumption (a hundred cubic feet or CCF) to increase the amount of the Rate Stabilization Reserve from the current minimum level of $2.3 million to a total of $10 million. In any normal water year where 2.5 billion gallons of water is not sold, the revenue shortfall associated with this situation would be covered by resources from this fund.[7]**

In addition to the water rate structure changes and described above, the revenue requirements shown in Table 4 require a significant increase in FY 2017 to begin to fund the capital program, maintain operations, and establish the financial foundation described in Section 4. On a simple

[6] Note: Water sales in calendar year 2013 equaled 3 billion gallons, in calendar year 2014 equaled 2.5 billion gallons and in calendar year 2015 equaled 2.25 billion gallons.

[7] The Rate Stabilization Reserve Fund would be used to augment revenues during "normal" water years if the amount of water sold falls below 2.5 billion gallons. In water years where water restrictions are required due to inadequate supply, a Drought Cost Recovery charge would be used to ensure revenues are adequate to meet system costs and debt service obligations.

year over year basis, revenues need to increase 21% between FY 2016 and FY 2017, followed by a 24% increase in FY 2108, a by 6% a year in FY 2019, FY 2020 and FY 2021. The big driver of rate increases in FY 17 is capital spending, which is reflected in the Infrastructure Reinvestment Fee. In 2018, the big drivers are additional capital spending and initiating the effort to increase the Rate Stabilization Reserve Fund from the current $2.4 million to $10 million.

These percent increases in revenues are not translated directly to customer bills because of different use patterns and the recommended rate structures. For example, one impact of the recommended rate structure that emphasizes volume based rates is that it will tend to stabilize the cost of water for those whose use of water is very low. Conversely, customers whose use of water contributes to peaking will experience greater increases. And inside city customer will experience a greater increase than outside city customers due to the reduction in the outside city surcharge from 27.5% to 14.5%.

Additional details about the recommended rate structure and water rates can be found in Appendix C.

### 5.4 REVIEW AND REVISION OF THE LRFP

The LRFP is designed to be used as an ongoing guide for the Water Department as the plan is implemented. The financial planning and rate models that from the analytical basis of the LRFP are effective tools for support the Department's financial decision-making, and will be used and updated as new information is available. In 2021, the Department would expect to complete a new Cost of Service Analysis to use in setting rates of FY 2022 through FY 2026. Using these results as well as updated information on revenue requirements, the Department will comprehensively review and revise the LFRP to guide the next five years.

## 6. IMPLEMENTING THE LONG RANGE FINANCIAL PLAN

The LRFP is intended to be a living document that will provide a financial foundation for the Department to use in annual budget planning and management activities. A major review and revision of the LRFP will occur at the five year mid-point and, along with other relevant work such as an updated cost of service analysis, revisions to the Financial Plan and water rates will be developed as needed. The LFRP will also be used to measure progress toward meeting LRFP goals during each five year segment covered by the plan.

Working with its consultant team, Department staff has created a Financial Plan that is realistic and implementable. Details of the approaches needed to implement the Plan are presented in the following sections.

## 6.1 FUND BALANCE RESERVE GOALS

Reserve policies are particularly important to manage risks to an agency's financial condition. In addition, they help an organization establish and maintain a good bond rating, thereby reducing the cost of borrowing.

Beginning in 1993, the Department has built and maintained a Rate Stabilization Reserve Fund (Fund 713). In 2014, the City Council approved two additional reserve funds; a 90-Day Operating Cash Reserve Fund (716) and an Emergency Reserve Fund (717).

Apart from the Rate Stabilization Fund, the remaining reserves have not been fully funded as the utility's financial condition did not enable it to address this important goal. A major driver of the Department's inability to fund these new reserves was the drought, which had a significant negative impact on the Department's revenues. Table 5 provides information on the status at 6-30-2015 and goals of each of the Department's reserve funds.

**Table 5**
**Fund Balance Reserve Goals**

| Fund | | Fund Balance (6-30-2015) | Funding Goal |
|---|---|---|---|
| 711 | Water Operations & Maintenance | $4,321,718 | 90 Days Operating Cash $6.5M in 2017 |
| 713 | Water Rate Stabilization Reserve[8] | $2,447,938 | $10,000,000 |
| 716 | Water 90-Day Operating Cash Reserve | $0 | 90 Days Operating Cash$6.5 M in 2017 |
| 717 | Water Emergency Reserve | $600,000 | $3,000,000 |

[8] Once implemented in FY 2018, the expectation is that it would take two years to achieve the $10 million goal for the Rate Stabilization Reserve. For further discussion of how funds in the Rate Stabilization Reserve would be accrued and used, please see section 6.5.2.2.

Establishing the 90-Day Operating Cash Reserve Fund was an important step, however for bond rating purposes a 180-day reserve is preferable. To that end, the financial plan also envisions keeping a 90-day reserve in the operating fund (711) in addition to the 90-Day Operating Cash Reserve Fund (716). Providing a reserve equal to 180-days of operating expenses (between balances in Fund 711 and 716) is considered to be the minimum reserve to maintain a strong bond rating (AA category) and access to capital markets. Increasing these reserves above 180-days operating cash may be pursued if and when resources become available.

The Rate Stabilization Reserve Fund has been maintained at the historic $2.3 million level and seeks to provide a cushion to cover one-time situations where expenses exceed rate revenue. At 6-30-2015, this fund had increased to $2.4 million including interest income. As noted above, the $1/CCF surcharge will be used to help increase this fund to $10 million, as part of the mitigation for moving to a more volume based rate structure. This approach is discussed in greater detail in Section 6.5.2 below.

Initial funding of $600,000 for the Emergency Reserve Fund was made possible by using drought related one-time excessive use penalty revenue accrued during calendar year 2014. An additional $500,000 was accrued from penalty revenue in calendar year 2015 and is expected to be used to increase this reserve for a total of $1.1 Million. The goal for the Emergency Reserve Fund is to maintain a $3 million funding level that would provide funds in the event of an extreme event or natural disaster.

## 6.2 APPROACH TO FULLY FUNDING RESERVES

In April of 2014, the Water Department recommended that the City Council approve a reimbursement resolution that would allow the Department to debt finance capital improvement work already in construction. The purpose of this request was to allow the Department to reimburse the Department's main operating fund for cash expenditures for capital projects such as the $26 Million Bay Street Reservoir replacement project once a bond issue was completed.

From the $25 Million I-Bank loan mentioned previously, the Department expects to receive reimbursement of $22 million in past capital expenditures from the Department's fund balance. Resources from this cash balance would be used to fund the Department's reserves as follows:

- **$6.5 Million to fully fund the 90-Day Operating Cash Reserve Fund (716)**
- **$2.0 Million to bring the existing $1.1 Million in cash (from excess water use penalties received in FY 2014 and 2015) to $3.1 Million (Fund 717); and**

- **Additional resources needed to maintain a fund balance in the Department's Operating Fund (711) at 90 days of operating cash**

## 6.3 DEBT FINANCING ASSUMPTIONS

In evaluating future financing needs, the LRFP includes assumptions on the initial and ongoing costs associated with issuing debt. Table 6 shows the projected current interest rate and terms for various debt issuance mechanisms that would most likely be used in debt funding the planned CIP.

**Table 6**
**Debt Mechanism Estimated Rates & Terms**

| Debt Mechanism | Assumed Interest Rate (percent) | Term (years) |
|---|---|---|
| Tax-Exempt Financing (Bonds) | **5.0** | **30** |
| California Infrastructure & Economic Development Bank (I-Bank) | **3.24** | **30** |
| Drinking Water State Revolving Loan Fund | **1.6** | **30** |

For planning purposes, additional debt issuance is assumed to be tax-exempt bonds issued in seven series. In addition to borrowing, the Department will work to acquire grant funding for capital investments if and as available. Grant funds may most likely be an option to defray some of the costs of the projects included in the Water Supply Augmentation Strategy. The Department will also pursue below market Drinking Water State Revolving Loan Fund loans for rehabilitation and replacement projects that would score well in meeting that program's competitive criteria.

The size and timing of debt issues to finance these capital projects are summarized in Table 7. The draft LRFP envisions three debt issue series from FY 2017 through FY 2021 for a total of $85.9 million. Another four debt issues series are shown from FY 2022 to FY 2025 for a total of $140 million. The total for all seven series is $226 million.

**Table 7**

**Size and Timing of Debt Issues Needed to Fund Capital Program**

| Debt Issuance Assumptions | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Series | Series 2018 | Series 2020 | Series 2021 | Series 2022 | Series 2024 | Series 2025 | Series 2026 | 7 Series Total |
| Assumptions | | | | | | | | |
| Debt Proceeds | $ 37,515,936 | $ 29,775,262 | $ 18,648,772 | $ 51,733,379 | $ 39,162,683 | $ 42,572,248 | $ 6,798,552 | $ 226,206,832 |
| Term of Debt | 30 Years | 30 Years | 30 Years | 30 Years | 30 Years | 30 Years | 30 Years | |
| Call Date | 3/1/2028 | 3/1/2030 | 3/1/2031 | 3/1/2032 | 3/1/2034 | 3/1/2035 | 3/1/2036 | |
| Assumed Rate | 5.00% | 5.00% | 5.00% | 5.00% | 5.00% | 5.00% | 5.00% | |
| Project Fund Earnings | 1.00% | 1.00% | 1.00% | 1.00% | 1.00% | 1.00% | 1.00% | |

## 6.4 CONSIDERATIONS IN THE TIMING AND SIZING OF DEBT

In order to effectively use a debt financing approach to minimize interest costs associated with borrowing, it is necessary to actively manage the timing and sizing of debt issues to avoid paying interest on cash sitting idle in a bank account. Given this concern, when issuing debt, it makes sense to take into account the following:

- **Set a minimum debt financing amount of $15 million;**[9]
- **Consider the spending rate on current and near term capital projects;**[10]
- **Consider market conditions or interest rate changes that might be more or less favorable in the future;**
- **Explore the potential to use one or more bridge funding mechanisms such as a bank letter of credit or internal borrowing (from City reserve funds, for example) that would allow for debt issuance at a later date.**

The PFM model includes a debt sizing function that can be used to forecast capital expenditures and anticipate when additional borrowing is needed. The model uses both built in parameters, such as the minimum $15 million in borrowing, and the opportunities to consciously consider

[9] The reason for establishing a minimum issuance amount for a debt issue is based on reasoning that is similar to the advice of travel gurus regarding going to the ATM when you're on vacation in a foreign country. There are certain transaction costs associated with taking money out of the ATM that don't vary (or don't vary very much) with the size of the withdrawal. Therefore, it is more cost effective to go to the ATM fewer times and take out more money rather than doing the opposite. Issuing debt also has certain borrowing costs that accrue, and borrowing in bigger chunks helps manage and minimize the impact of some of these costs.

[10] The Department's CIP shows spending patterns that reflect the staff's best estimate of how the project will play out. The environmental review, right-of-way, and regulatory climate in California is complex and project spending can be greatly influenced by this reality. In sizing and timing debt issues, it will be important to use the most up-to-date information about progress on projects.

the sizing and timing of debt. City staff will be actively using this model in ongoing financial analyses and management activities, and the timing and sizing of each debt issue may be revised based on market conditions at the time.

## 6.5 WATER RATES NEEDED TO MEET REVENUE REQUIREMENTS

During FY 2016, Water Department staff worked with Raftelis Financial Consultants and the Santa Cruz Water Commission to evaluate several options for rate structures, each of which would need to address the City's priority pricing objectives as identified by the Council and the Water Commission during the winter of 2015. These pricing objectives are shown in Table 8 below, in priority order:

**Table 8**
**Priority Pricing Objectives**

| Composite Pricing Objectives for the City Council and Water Commission, March 2015 | |
|---|---|
| 1. Revenue sufficiency | 5. Revenue stability |
| 2. Promotes efficiency | 6. Understandable by customers |
| 3. Perceived to be fair by the public | 7. Promotes conservation |
| 4. Affordable for essential uses | 8. Rate stability |

In designing new rates for FY 2017 – FY 2021, the Department took into account these priorities and the very strong preference stated by customers in various forums to reduce the amount of revenue generated by fixed charges.

Santa Cruz's water customers are unusual in many respects, including their typically lower levels of water consumption. Even before the drought, 15% of single family customers used an average of 2 CCF or less per month. And 46% (15% + 31%) used an average of 5 or fewer CCF per month. Sixty-four percent used no more than 7 CCF per month.

In 2004, the Department changed its rate structure to increase the number of tiers for single family customers from three to five and also implemented a series of fairly significant price increases between 2004 and 2011. As a result of these actions, many single family residential customers were incentivized to reduce consumption of the more expensive blocks of water, contributing to the distribution patterns that were being observed prior to the drought. Included in this pattern was a shift of the total percent of annual consumption used between

May 1 and October 31 from 65% to 59%. Two years of water rationing for residential customers further reinforced these new use patterns.

Coupled with a strong conservation ethic in Santa Cruz is the concern for affordability of water for those customers using very low amounts of water. Fixed charges are viewed as diluting the conservation incentive that rates can provide as well as raising the cost of water for those routinely using small amounts of water.

### 6.5.1 CHANGES TO THE RATE STRUCTURE

The Department is recommending moving from its current rate structure in which about 35% of revenue is collected through fixed charges and 65% is collected through volume or commodity charges to one that collects substantially more of the total revenue through volume charges. Roughly 10% of operating costs would be collected in fixed costs based on meter size, with the remainder being collected in the form of charges related to the amount of water used.

Tiered rates for single family residential customer would be retained with the number of tiers being reduced from five to four[11]. Revised tiers would be as follows:

- **0 – 5 CCF = Tier 1 (average winter use)**
- **6 – 7 CCF = Tier 2 (average spring and fall use)**
- **8 – 9 CCF = Tier 3 (average summer use)**
- **≥ 10 CCF = Tier 4**

Multi-family residential rates would also be tiered using the same tiers as for single family but multiplying the tier allocations by the number of dwelling units in a master metered complex.[12]

Landscape irrigation accounts would be billed based on a simplified water budget system that would establish an allocation for each account. Usage up to that water budget allocation would be billed at tier 1 of the irrigation rates, up to 150% of the allocation would be billed at tier 2 of the irrigation rates, and all usage above 150% of the allocation would be billed at tier 3 of the landscape irrigation rates.

[11] The change in the number of tiers was the result of the analysis done by Raftelis Financial Consultants as part of the Cost of Service Study and was based on evolving water use patterns for residential customers.

[12] Master metered systems may include irrigation or have irrigation on a separate meter. For water utility billing purposes, individually metered multi-family units are treated as single family residential properties.

The remaining customer classes would be billed using uniform rates established for each class based on the Cost of Service Analysis. For example, this means that the University of California at Santa Cruz, whose water use includes some seasonal peaking, would pay a higher uniform rate than those customer classes that do not.

### 6.5.2 MITIGATING THE POTENTIAL REVENUE STABILITY RISKS OF MOVING TO A MORE VOLUME BASED RATE STRUCTURE

Moving to a more volume-based rate structure creates inherent revenue stability risks for a utility. In making a decision to move in this direction, Water Department staff carefully considered how this risk might influence revenues by evaluating the character and water use consumption patterns in the City's service area.

Even before the recent drought, Santa Cruz water customers were among the lowest water users in the state on both system-wide and residential gallons per capita per day metrics. During the drought, that pattern continued. Anecdotally, staff is observing some continuing shifts in water use that may reflect some long-term changes in use patterns that will ultimately be attributed to the drought becoming permanent. One very likely candidate for this kind of change is residential landscape irrigation.

Revenue streams that depend on the volume of water sold are particularly susceptible to weather driven changes in consumption, and changes in consumption due to price effects. The Department's recent experiences make it keenly aware of this dynamic. The challenges of managing ongoing operations and management of the water utility while simultaneously planning for and implementing major capital improvements aren't insurmountable with a more volume based rate structure, but certainly introduce an element of uncertainty that should be carefully considered before proceeding. This is what Department staff has done.

Rather than avoid recommending a rate structure that seems well-suited to the community's and policy maker's values and priorities, Department staff recommends planning for and implementing as part of the rate structure the mechanisms needed to mitigate these potential risks.

These risks come in two basic forms: drought risks, and non-drought risks. The risk mitigation approaches being recommended to address each is discussed in more detail below.

#### 6.5.2.1 DROUGHT RISKS

In 2014, the Water Department instituted a drought cost recovery fee mechanism that is put in place as a fixed charge. Table 9 shows the Drought Cost Recovery Fee revenue recovery target for each stage of the City's Water Shortage Contingency Plan and provides the amount charged for a typical single family residential customer using a 5/8$^{th}$ or 3/4$^{th}$ inch meter.

**Table 9**
**Drought Cost Recovery Fee Financial Targets and**
**Example Fixed Charge for 5/8$^{th}$ and 3/4$^{th}$ inch Meters**

| Drought Stage | Cutback Required | Targeted Cost Recovery | Fixed Charge per 5/8$^{th}$ or 3/4$^{th}$ inch meter |
|---|---|---|---|
| **Stage 1** | 5% | $1.0 Million | $2.45 |
| **State 2** | 15% | $2.5 Million | $6.12 |
| **Stage 3** | 25% | $4.0 Million | $9.79 |
| **Stage 4** | 35% | $5.5 Million | $13.46 |
| **Stage 5** | 50% | $7.5 Million | $18.35 |

Additional Details on the Drought Cost Recovery Fees for other meter sizes can be found in Appendix C.

A Drought Cost Recovery Fee was levied in Santa Cruz from October 1, 2014 through June 30, 2016. Levying the fee is explicitly linked to an action by the Santa Cruz City Council to declare a drought and establish curtailment stage in advance of each year's dry season (May through October).

The Department's 2014 Proposition 218 notice included the Drought Cost Recovery Fee Schedule. The planned summer 2016 Proposition 218 notice will also include publication of this fee.

#### 6.5.2.2 NON-DROUGHT RELATED RISKS

In the earlier discussion of rates in Section 5.3 above, the basic risk mitigation approach for non-drought years was described. It involved two basic strategies:

1 **Setting the assumption about how much water will be sold at a conservative 2.5 billion gallons per year;**
2 **Beginning in July 2018, apply a $1.00 per unit of water consumption surcharge to increase the amount of the Rate Stabilization Reserve from the current level of $2.3 million to a total of $10 million. In any "normal" year where 2.5 billion gallons of water is not sold, use revenues from the rate stabilization reserve to cover the resulting revenue shortfall.**

The planned $1.00 surcharge is not being designed to be an "on-off" mechanism but is currently proposed to be permanent. Use of these funds once the Rate Stabilization Reserve reaches $10 million is recommended to be used as follows:

- **Once the Rate Stabilization Reserve reaches its target level of $10 Million, funds from this surcharge would be allocated as needed to ensure that Operating Cash and Emergency Reserves are fully funded and then directed to fund "pay-as-you-go" capital expenditures, reducing the need to issue debt.**

### 6.5.3 ALLOCATIONS OF REVENUES THAT ARE HIGHER THAN EXPECTED

A reasonable question is what to do if revenue stability does not turn out to be an issue because consumption is either stable at 2.5 billion gallons per year or is greater than 2.5 billion gallons. The Department proposes the following conditional approach to addressing this situation if it occurs:

**If….**

- **the minimum debt service coverage ratio target of 1.5 is being consistently met, and**
- **reserves are fully funded, and**
- **"pay-as-you-go" capital is being funded at an average over the previous 3 years of at least 25%;**

**Then either…**

- **additional planned rate increases will be adjusted to the level needed to produce required revenues without any excess,[13] or**

[13] The public notices required under Proposition 218 are required to identify (and justify based on the cost of service) the maximum amount that will be charged for a service. A utility has the option of charging less than the maximum amount published in the required notices. The obverse, however, is not true, which is the major reason for building into a more heavily volumetric rate structure a mechanism to mitigate for lower than anticipated revenues due to lower than forecasted water sales.

- **The Water Department will ask the City Council for additional direction regarding adjusting the amount of funding in the Emergency Reserve and the Rate Stabilization Reserve to be an established percent of the Operating budget (rather than a fixed dollar amount), accelerating capital reinvestment in system infrastructure, or increasing the proportion of capital that is being paid for with "pay-as-you-go" funding.**

# Glossary

- **Bond covenant** – A legally binding term of an agreement between a bond issuer and a bond holder. Bond covenants are designed to protect the interests of both parties. Bond covenants are commitments that the City makes to the bondholders to ensure timely payment of principal and interest.
- **Capital Improvement Plan** – A multi-year plan that lists the rehabilitation, replacement, major maintenance, and new water system facilities and systems that are needed to maintain reliable and high quality water service or meet regulatory requirements;
- **CCF** (One Hundred cubic feet of water) – 748 gallons of water. A CCF is the unit used by the Santa Cruz Water Department as the basis for charges to customers based on water use.
- **Debt service coverage ratio** – The ratio of net operating revenue to annual debt payments.
- **Emergency reserve fund** – A reserve fund specifically designed to provide resources to address the consequences of natural disasters on water system facilities or resources or a catastrophic failure of a water system facility;
- **Pro forma** (financial statement) - A pro forma financial statement is a forecast of the utility's revenues and expenditures based on certain assumptions and projections;
- **Ninety-day operating cash reserve fund** – A reserve created to help ensure the utility's ability to meet operating expenses, provide financial stability, and resilience and support establishing and maintaining a good credit rating.
- **Operating budget** – The portion of the Department's overall budget that pays for ongoing operations of the utility, including the costs related to personnel, materials and services such as water treatment chemicals, and energy resources, and non-capital improvement project professional and technical services;
- **Pay-as-you-go capital funding** – paying for capital improvement projects using current year or accumulated rate revenues rather than the use of short or long term debt;
- **Proposition 218** – a 1996 California Constitutional Amendment that established the "cost-of-service" requirements for utility rates as well as certain noticing and public review process requirements related to water rate increases;[14]
- **Rate structure design** – Characteristics of water rates that provides for the amount of revenue produced by fixed and variable charges, the use of different tiers for different amounts of water use, etc.;

[14] Proposition 218 also includes other provisions that aren't relevant to water rates and finances.

- **Rate stabilization reserve** – a financial reserve specifically intended to provide a hedge against revenue variability resulting from weather conditions, such as a cool wet spring that results in less water than projected being used for outdoor irrigation.
- **Reimbursement resolution** – A Council action that authorizes the Department to reimburse itself for funds expended on capital projects using proceeds from future debt issues.
- **Water Supply Augmentation Strategy** – This is the plan developed by the Council appointed Water Supply Advisory Committee and accepted by the City Council for implementation in November 2015.

# APPENDIX A – FINANCIAL PRO FORMA

This Appendix includes a 10 year Pro Forma from the Department's financial Model.

# City of Santa Cruz Water Department FY 2017 – FY 2026 Financial Pro-Forma

| City of Santa Cruz Water Department Pro-Forma Projections | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Year | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 |
| Revenues | | | | | | | | | | |
| Rate Revenue | | | | | | | | | | |
| *Fixed Fee Revenue* | $ 4,655,461 | $ 2,960,622 | $ 3,153,062 | $ 3,358,011 | $ 3,576,282 | $ 3,808,740 | $ 4,056,308 | $ 4,319,968 | $ 4,600,766 | $ 4,899,816 |
| *Volumetric Revenue* | $ 27,555,340 | $ 33,747,904 | $ 35,941,518 | $ 38,277,717 | $ 40,765,768 | $ 43,415,543 | $ 46,237,553 | $ 49,242,994 | $ 52,443,789 | $ 55,852,635 |
| *Elevation Surcharges* | $ 103,105 | $ 120,759 | $ 130,985 | $ 138,233 | $ 138,656 | $ 139,242 | $ 139,830 | $ 140,421 | $ 141,015 | $ 141,611 |
| *Rate Stabilization Surcharge* | $ - | $ 3,342,244 | $ 3,342,244 | $ 3,342,244 | $ 3,342,244 | $ 3,342,244 | $ 3,342,244 | $ 3,342,244 | $ 3,342,244 | $ 3,342,244 |
| Total Rate Revenue | $ 32,313,906 | $ 40,171,529 | $ 42,567,809 | $ 45,116,205 | $ 47,822,950 | $ 50,705,769 | $ 53,775,936 | $ 57,045,628 | $ 60,527,814 | $ 64,236,306 |
| | | | | | | | | | | |
| Non-Rate Revenue | | | | | | | | | | |
| *Other Income* | $ 203,600 | $ 203,600 | $ 203,600 | $ 203,600 | $ - | $ - | $ - | $ - | $ - | $ - |
| *Investment Income* | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| Total Non-Rate Revenue | $ 203,600 | $ 203,600 | $ 203,600 | $ 203,600 | $ - | $ - | $ - | $ - | $ - | $ - |
| Total Revenues | $ 32,517,506 | $ 40,375,129 | $ 42,771,409 | $ 45,319,805 | $ 47,822,950 | $ 50,705,769 | $ 53,775,936 | $ 57,045,628 | $ 60,527,814 | $ 64,236,306 |
| Operating Expenses | | | | | | | | | | |
| Personnel | $ 12,741,984 | $ 13,868,008 | $ 15,086,021 | $ 15,882,276 | $ 16,733,349 | $ 17,643,670 | $ 18,618,048 | $ 19,661,714 | $ 20,780,352 | $ 21,980,139 |
| Services, Supplies & Other | $ 12,616,410 | $ 13,247,231 | $ 13,909,592 | $ 14,605,072 | $ 15,335,325 | $ 16,102,091 | $ 16,907,196 | $ 17,752,556 | $ 18,640,184 | $ 19,572,193 |
| Capital Outlay | $ 965,000 | $ 1,013,250 | $ 1,063,913 | $ 1,117,108 | $ 1,172,964 | $ 1,231,612 | $ 1,293,192 | $ 1,357,852 | $ 1,425,745 | $ 1,497,032 |
| Other Operating Expenses | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| Total Operating Expenses | $ 26,323,394 | $ 28,128,488 | $ 30,059,525 | $ 31,604,455 | $ 33,241,638 | $ 34,977,373 | $ 36,818,437 | $ 38,772,122 | $ 40,846,280 | $ 43,049,364 |
| Net Operating Revenues | $ 6,194,112 | $ 12,246,641 | $ 12,711,884 | $ 13,715,350 | $ 14,581,312 | $ 15,728,396 | $ 16,957,500 | $ 18,273,506 | $ 19,681,534 | $ 21,186,943 |
| Capital Expenditures | $ 12,457,850 | $ 15,886,978 | $ 35,774,344 | $ 37,574,757 | $ 26,251,158 | $ 15,635,558 | $ 48,913,507 | $ 45,672,352 | $ 47,955,970 | $ 10,854,470 |
| Grant Funded | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| SRF Funded | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| Currently Funded | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| Pay-Go Funded | $ 12,457,850 | $ 9,092,599 | $ 5,052,786 | $ 7,799,495 | $ 7,602,387 | $ 7,467,490 | $ 5,348,196 | $ 6,509,669 | $ 5,383,722 | $ 4,055,918 |
| Debt Funded | $ - | $ 6,794,378 | $ 30,721,558 | $ 29,775,262 | $ 18,648,772 | $ 8,168,068 | $ 43,565,311 | $ 39,162,683 | $ 42,572,248 | $ 6,798,552 |
| Debt Service | $ 1,110,238 | $ 2,089,418 | $ 3,364,562 | $ 4,286,397 | $ 6,171,547 | $ 7,404,928 | $ 10,701,862 | $ 10,800,876 | $ 13,275,920 | $ 16,046,053 |
| Net Income | $ (7,373,976) | $ 1,064,624 | $ 4,294,536 | $ 1,629,457 | $ 807,378 | $ 855,979 | $ 907,441 | $ 962,961 | $ 1,021,892 | $ 1,084,972 |
| Total Cash Balances | | | | | | | | | | |
| Beginning Total Cash Balance | $ 4,071,118 | $ 18,697,143 | $ 22,761,766 | $ 27,056,302 | $ 28,685,759 | $ 29,493,137 | $ 30,349,115 | $ 31,256,557 | $ 32,219,518 | $ 33,241,410 |
| *I-Bank Reimbursements* | $ 22,000,000 | $ 3,000,000 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| *Calculated Change to Cash Balances* | $ (7,373,976) | $ 1,064,624 | $ 4,294,536 | $ 1,629,457 | $ 807,378 | $ 855,979 | $ 907,441 | $ 962,961 | $ 1,021,892 | $ 1,084,972 |
| Ending Total Cash Balance | $ 18,697,143 | $ 22,761,766 | $ 27,056,302 | $ 28,685,759 | $ 29,493,137 | $ 30,349,115 | $ 31,256,557 | $ 32,219,518 | $ 33,241,410 | $ 34,326,381 |
| Beginning Cash Balances by Fund | | | | | | | | | | |
| Fund 717 (Emergency Reserve) | $ 1,100,000 | $ 3,100,000 | $ 3,100,000 | $ 3,100,000 | $ 3,100,000 | $ 3,100,000 | $ 3,100,000 | $ 3,100,000 | $ 3,100,000 | $ 3,100,000 |
| Fund 713 (Rate Stabilization) | $ 2,447,939 | $ 2,447,939 | $ 5,790,183 | $ 9,132,427 | $ 10,000,000 | $ 10,000,000 | $ 10,000,000 | $ 10,000,000 | $ 10,000,000 | $ 10,000,000 |
| Fund 716 (90 Day Operating Reserve) | $ - | $ 6,490,700 | $ 6,935,792 | $ 7,411,938 | $ 7,792,879 | $ 8,196,568 | $ 8,624,558 | $ 9,078,519 | $ 9,560,249 | $ 10,071,685 |
| Fund 711 (Water Operations) | $ 523,179 | $ 6,658,504 | $ 6,935,792 | $ 7,411,938 | $ 7,792,879 | $ 8,196,568 | $ 8,624,558 | $ 9,078,038 | $ 9,559,269 | $ 10,069,724 |
| Changes to Cash Balances by Fund | | | | | | | | | | |
| Fund 717 (Emergency Reserve) | $ 2,000,000 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| Fund 713 (Rate Stabilization) | $ - | $ 3,342,244 | $ 3,342,244 | $ 867,573 | $ - | $ - | $ - | $ - | $ - | $ - |
| Fund 716 (90 Day Operating Reserve) | $ 6,490,700 | $ 445,092 | $ 476,146 | $ 380,942 | $ 403,689 | $ 427,989 | $ 453,961 | $ 481,731 | $ 511,436 | $ 543,226 |
| Fund 711 (Water Operations) | $ 6,135,324 | $ 277,288 | $ 476,146 | $ 380,942 | $ 403,689 | $ 427,989 | $ 453,480 | $ 481,231 | $ 510,456 | $ 541,746 |
| Ending Cash Balances by Fund | | | | | | | | | | |
| Fund 717 (Emergency Reserve) | $ 3,100,000 | $ 3,100,000 | $ 3,100,000 | $ 3,100,000 | $ 3,100,000 | $ 3,100,000 | $ 3,100,000 | $ 3,100,000 | $ 3,100,000 | $ 3,100,000 |
| Fund 713 (Rate Stabilization) | $ 2,447,939 | $ 5,790,183 | $ 9,132,427 | $ 10,000,000 | $ 10,000,000 | $ 10,000,000 | $ 10,000,000 | $ 10,000,000 | $ 10,000,000 | $ 10,000,000 |
| Fund 716 (90 Day Operating Reserve) | $ 6,490,700 | $ 6,935,792 | $ 7,411,938 | $ 7,792,879 | $ 8,196,568 | $ 8,624,558 | $ 9,078,519 | $ 9,560,249 | $ 10,071,685 | $ 10,614,912 |
| Fund 711 (Water Operations) | $ 6,658,504 | $ 6,935,792 | $ 7,411,938 | $ 7,792,879 | $ 8,196,568 | $ 8,624,558 | $ 9,078,038 | $ 9,559,269 | $ 10,069,724 | $ 10,611,470 |
| Coverage and Targets | | | | | | | | | | |
| Debt Service Coverage (W/Out Reserves) | 5.58x | 4.26x | 2.78x | 3.00x | 2.36x | 2.12x | 1.58x | 1.69x | 1.48x | 1.32x |
| Debt Service Coverage Target | 1.50x | 1.50x | 1.50x | 1.50x | 1.50x | 1.50x | 1.50x | 1.50x | 1.50x | 1.50x |
| Debt Service Coverage (W/Reserves) | 22.42x | 16.76x | 11.82x | 9.89x | 7.14x | 6.22x | 4.51x | 4.67x | 3.99x | 3.46x |
| Days' Cash (Includes only Funds 711 & 716) | 182 | 180 | 180 | 180 | 180 | 180 | 180 | 180 | 180 | 180 |
| Days' Cash Target | 180 | 180 | 180 | 180 | 180 | 180 | 180 | 180 | 180 | 180 |

# APPENDIX B – 10 YEAR CIP

This Appendix includes a spreadsheet listing projects, funding and schedules and project descriptions

# Water Department FY 2017 – FY 2018 Capital Improvement Program

| 10-Year CIP by Primary Driver | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | FY2017 | FY2018 | FY2019 | FY2020 | FY2021 | FY2022 | FY2023 | FY2024 | FY2025 | FY2026 |
| **Rehabilitate or Replace** | | | | | | | | | | |
| Felton Diversion Replacement & Pump Station | | 1,500,000 | 1,500,000 | 1,500,000 | | | | | | |
| Laguna Dam | | | | | | | | | | 500,000 |
| Majors Creek Diversion | | | | | | | | | | 300,000 |
| San Lorenzo River Diversion & Tait Wells | | | | | | | | | | |
| Newell Creek Pipeline Rehabilitation | 1,000,000 | 1,000,000 | 8,000,000 | 8,000,000 | | | | | | |
| Newell Creek Dam I/O Pipeline & Aerators | 2,000,000 | 2,000,000 | 14,000,000 | 12,000,000 | 12,000,000 | | | | | |
| North Coast System Rehab | 4,150,000 | | | | | | | | | 4,000,000 |
| WTP Concrete Tank Evaluation & Replacement | 600,000 | 3,000,000 | 3,000,000 | 3,000,000 | | | | | | |
| WTP Solids Handling | 500,000 | | | | | | | | | |
| Water Main Replacements - City Engineering | 1,395,000 | 1,440,000 | 1,440,000 | 1,440,000 | 1,500,000 | 1,500,000 | 1,500,000 | 1,500,000 | 1,500,000 | 1,500,000 |
| Water Main Replacements - Outside Agency | 250,000 | 250,000 | 250,000 | 250,000 | 250,000 | 250,000 | 250,000 | 250,000 | 250,000 | 250,000 |
| Water Main Replacements - Customer Initiated | 50,000 | 50,000 | 50,000 | 50,000 | 50,000 | 50,000 | 50,000 | 50,000 | 50,000 | 50,000 |
| Water Main Replacements - Distribution | 325,000 | 325,000 | 325,000 | 325,000 | 325,000 | 325,000 | 325,000 | 325,000 | 325,000 | 325,000 |
| Pressure Regulating Stations | 10,000 | 60,000 | 60,000 | 60,000 | | | | | | |
| Recoat University Reservoir No. 4 | 75,000 | 1,300,000 | | | | | | | | |
| Recoat University Reservoir No. 5 | 75,000 | 1,675,000 | | | | | | | | |
| Beltz 11 | 70,000 | 300,000 | | | | | | | | |
| Water Treatment Upgrades | 100,000 | | | | | | | | | |
| **Subtotal** | **10,600,000** | **12,900,000** | **28,625,000** | **26,625,000** | **14,125,000** | **2,125,000** | **2,125,000** | **2,125,000** | **2,125,000** | **6,925,000** |
| **With inflation** | **10,918,000** | **13,685,610** | **31,886,676** | **31,141,725** | **17,347,257** | **2,740,252** | **2,877,265** | **3,021,128** | **3,172,185** | **10,854,470** |
| **Upgrade or Improve** | | | | | | | | | | |
| Advance Metering Infrastructure (AMI) | | | | | 50,000 | 4,000,000 | 4,000,000 | | | |
| Loch Lomond Rec Improvements | | | 165,000 | 1,000,000 | | | | | | |
| Photovoltaic/SolarProjects | | 500,000 | | | | | | | | |
| Water Resources Building | 1,000,000 | | | | | | | | | |
| Security Camera & Building Access Upgrades | 95,000 | | | | | | | | | |
| **Subtotal** | **1,095,000** | **500,000** | **165,000** | **1,000,000** | **50,000** | **4,000,000** | **4,000,000** | - | - | - |
| **With inflation** | **1,127,850** | **530,450** | **183,801** | **1,169,642** | **61,406** | **5,158,122** | **5,416,028** | - | - | - |
| **Water Supply Reliability** | | | | | | | | | | |
| Aquifer Storage & Recovery | | 1,075,000 | 325,000 | 300,000 | | | | | | |
| Recycled Water | | | | | | | | | | |
| Water Supply- WSAS Implementation | | | | 1,200,000 | 7,200,000 | 6,000,000 | 30,000,000 | 30,000,000 | 30,000,000 | |
| Source Water Evaluation & Implementation | 400,000 | 500,000 | 3,000,000 | 3,000,000 | | | | | | |
| **Subtotal** | **400,000** | **1,575,000** | **3,325,000** | **4,500,000** | **7,200,000** | **6,000,000** | **30,000,000** | **30,000,000** | **30,000,000** | - |
| **With inflation** | **412,000** | **1,670,918** | **3,703,867** | **5,263,390** | **8,842,495** | **7,737,183** | **40,620,213** | **42,651,224** | **44,783,785** | - |
| Total Projects w/o Inflation | 12,095,000 | 14,975,000 | 32,115,000 | 32,125,000 | 21,375,000 | 12,125,000 | 36,125,000 | 32,125,000 | 32,125,000 | 6,925,000 |
| Handy-Whitman Construction Inflation Factor | 3% | 3% | 5% | 5% | 5% | 5% | 5% | 5% | 5% | 5% |
| Total Projects with Cumulative Inflation | 12,457,850 | 15,886,978 | 35,774,344 | 37,574,757 | 26,251,158 | 15,635,558 | 48,913,507 | 45,672,352 | 47,955,970 | 10,854,470 |

| REHABILITATE OR REPLACE |
|---|
| **Felton Diversion Replacement & Pump Station (c701602)**<br>This project consists of evaluating the existing dam and pump station with recommendations to rehabilitate or replace existing facilities. Alternate diversions to be considered will include horizontal collector wells and other subsurface intake(s). This project will replace aging facilities and evaluate potentially more efficient ways to divert water from the San Lorenzo River at Felton. Additional funding for construction in FY2019. |
| **Laguna Dam (c70xxxx)**<br>Evaluate condition of dam and make recommended modifications. The project will follow completion of anadromous Habitat Conservation Plan. |
| **Majors Creek Diversion (c701302)**<br>Majors Creek Diversion is nearly 100 years old. This project will evaluate the condition of the structure, make recommendations to replace or repair, and complete the construction. Evaluation of facility to occur in FY2017 with scheduling of rehabilitation TBD. |
| **San Lorenzo River Diversion & Tait Wells (c709872)**<br>Conduct a condition assessment of the existing diversion and wells including consideration of sanding issues, potential dam replacement, the potential use of infiltration gallery, and relocation of existing wells. Project will ensure reliable and efficient diversion of water from the San Lorenzo River at Tait St. Condition assessment followed by recommended intake modifications and/or new wells. Current project consists of replacing 2 wells, rehabilitating 1 existing well, and abandoning 1 well. (Project title modified from San Lorenzo Tait Intake.) |
| **Newell Creek Pipeline Rehabilitation (c701701)**<br>Conduct a condition assessment and program level environmental review followed by full or partial replacement of the pipeline between the base of Loch Lomond Reservoir and the Graham Hill Water Treatment Plant. This pipeline was constructed in the 1960s. This project is intended to ensure continued reliability of this water supply transmission main. (Project title modified from Newell Creek Supply Main Rehabilitation.) |
| **Newell Creek Dam I/O Pipeline & Aerators (c701606)**<br>The Newell Creek Dam was installed in the 1960's. A pipeline runs through the base of the dam to deliver water to the reservoir from Felton Diversion and from the reservoir to the Graham Hill Water Treatment Plant. The pipeline rehabilitation includes inspection of the pipeline and its appurtenances which will result in rehabilitation or replacement of all or parts of the facility. |
| **North Coast System Rehab (c709835)**<br>Springs and streams along the coast north of the City limits supply approximately 25% of the City's raw water. Some of the facilities related to these water supplies are reaching the end of their useful life. This program consists of multiple projects over the next 15 to 20 years to evaluate, rehabilitate, and replace portions of the existing infrastructure to ensure continued reliability. Engineering, environmental review, and permitting for the coast segment (Phase 3) began in FY 2013 and continues through FY 2017. Construction scheduled to begin in FY 2016. |
| **WTP Concrete Tank Evaluation & Replacement (c701501)**<br>As part of an overall plan to ensure compliance with changing water quality regulations, improvements are needed at the Graham Hill Water Treatment Plant. This project will evaluate |

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| the condition of four concrete tanks located at the site (as well as an off-site concrete tank), make improvement recommendation, and construction. Project title modified from WTP Filter Water Tank. Includes $145,000 endowment for MHJB HCP mitigation. |
| **WTP Solids Handling (c701605)**<br>Solids produced at the Graham Hill Water Treatment Plant are currently disposed of in the City's sewer collection system. Treatment and disposal of these solids needs to be evaluated with the existing Water Treatment Plant Concrete Tank Assessment and Rehabilitation project (c701501) with improvements made accordingly. |
| **Water Main Replacements - City Engineering (c700002, c709833, and c700017)**<br>Recurring program to replace deteriorated or undersized mains as identified and prioritized by the Department. Priorities are based on the need to maintain water system reliability, deliver adequate fire flows, improve circulation and water quality, and reduce maintenance costs. These projects focus on pipes less than 10" in diameter and are typically installed by contractors according to bid plans and specifications. |
| **Water Main Replacements - Outside Agency (c700003)**<br>Water main, service line, valve, or water meter relocation necessitated by County or other Agency road improvement, storm drain improvement projects, and/or other projects that conflict with existing water infrastructure. |
| **Water Main Replacements - Customer Initiated (c700004)**<br>Recurring program similar to the other Main Replacement Projects; however, these projects are initiated on an as-needed basis to accommodate customer-requested service connections to undersized or inadequate mains. Funds, to the extent of the appropriation, are disbursed to customers on a first-come, first-served basis. This project is funded by System Development Charges (100% SDC – Fund 715). |
| **Water Main Replacements – Distribution (c701507)**<br>Recurring program to replace deteriorated or undersized water mains, as identified and prioritized by the Department and implemented by the Distribution Section. Projects are typically based on leak history, but also address water quality and fire flow issues. |
| **Pressure Regulating Stations (c701703)**<br>Evaluation and replacement of pressure regulating stations (PRS). A PRS maintains (sustains or reduces) downstream pressure in order to deliver sufficient water pressure. The water distribution system contains 15 PRS and they vary in age from 66 years old to 8 years old. This project will evaluate the condition of each PRS and prioritize rehabilitation or replacement. |
| **Recoat University Reservoir No. 4 (c701505)**<br>Perform engineering analysis and condition assessment of the aging University 4 tank to ensure continued reliable service. Establish scope of work for recoating/rehabilitation project. Acquire construction easements from UCSC and perform environmental analysis to install temporary tank for use during construction. Create plans and specifications for recoating/rehabilitation project. |

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|---|
| **Recoat University Reservoir No. 5 (c701506)**<br>Perform engineering analysis and condition assessment of the aging University 5 tank to ensure continued reliable service. Establish scope of work for recoating/rehabilitation project. Create plans and specifications for recoating/rehabilitation project. Install temporary tank and variable speed pumps for use during construction. Construct recoating/rehabilitation project. |
| **Beltz 11 (c700026)**<br>This project would convert an existing monitoring well to a production well, renamed Beltz 11. Beltz 11 would pump from the Santa Margarita aquifer. The project would reduce pumping from the Purisima Formation which is impacted by pumping by the City and other users. Project includes feasibility study, pump test, CEQA and construction efforts. |
| **Water Treatment Upgrades (c700025)**<br>Upgrades to the Graham Hill Water Treatment Plant are necessary to meet new and planned regulatory requirements, and increase overall system reliability. This is a recurring project to prioritize needs and make smaller improvements. The current project includes upgrades to the bulk chemical storage area. |
| **UPGRADE OR IMPROVE** |
| **Advance Metering Infrastructure (AMI) (c701603)**<br>Evaluate the use of AMI as replacement to the current AMR metering (Automatic Meter Reading). AMR provides 1-way communication between a meter and the City and AMI provides two-way communication between a meter and the City as well as between a meter and the customer. Benefits include early leak detection, customer conservation affect, and workflow management. Implementation to occur in future years. |
| **Loch Lomond Rec Improvements (c701301)**<br>Complete facilities assessment and improvement program at Loch Lomond. A Use study was completed in FY 2013 which resulted in a number of planned projects to enhance the recreation area usability for its visitors. Several ADA and other recreational improvements are being pursued over the next 5 years. |
| **Photovoltaic/Solar Projects (c701607)**<br>Ongoing project to evaluate, design and construct PV systems on various water department facilities. The current project is at the Bay Street Tank Site. Once installed, each project will add to the departments and City's green energy portfolio and work towards meeting and exceeding our climate action goals. |
| **Water Resources Building (c701702)**<br>The Watershed Resources Division is currently housed in temporary trailers. This project consists of a needs assessment, design, and construction. The needs assessment portion of the project has been completed; FY 2016 will focus on site selection and design; FY 2017 will be construction. |
| **Security Camera & Building Access Upgrades (c701704)**<br>Evaluation and implementation of security camera and building access upgrades at various Water facilities. Current security equipment is proprietary and could be improved. A transition to a new system will require camera replacement and additional video storage equipment. |

| WATER SUPPLY RELIABILITY |
| --- |
| **Aquifer Storage & Recovery (c701609 and c701610)**<br>Evaluate the feasibility of Aquifer Storage and Recovery as per the recommendations of the Water Supply Advisory Committee. Funds in FY 2016 and 2017 will be used for Phase 1 of the proposed study. Phase 2 will include pilot work and be funded in FY 2018. Project would potentially provide additional potable water to City and other agency customers, addressing part or all of water supply deficiencies. |
| **Recycled Water (c701611 and c701612)**<br>Evaluate the feasibility of using advanced treated wastewater for beneficial uses as per the recommendations of the Water Supply Advisory Committee. The project will be collaboration amongst the Water and Public Works Departments. The project would potentially provide additional water to City and other agency customers, addressing all or part of water supply deficiencies. |
| **Water Supply- WSAS Implementation (c70xxxx)**<br>Funding tentatively scheduled for FY2020. |
| **Source Water Evaluation & Implementation (c701608)**<br>Evaluate source water quality, operational and infrastructure alternatives to maximize use of surface water. This project was prompted in part by the recommendations of the Water Supply Advisory Committee, accepted by Council in Nov 2015, to evaluate use of additional winter flows in the San Lorenzo River for various purposes to solve the regional water supply issues. |

# APPENDIX C – PROPOSED WATER RATES AND FEES FOR FY 2017-FY 2021

The tables below were excerpted from a more complete presentation on water rates and charges prepared for and presented to the Santa Cruz Water Commission on June 6, 2016. That presentation can be accessed online at the Water Commission's website. (see http://www.cityofsantacruz.com/departments/water/city-water-commission/meetings-and-agenda)

**Table C-1**

**Inside City Customer Fixed Monthly Charges**

| Inside | | FY 2017 | FY 2018 | FY 2019 | FY 2020 | FY 2021 |
|---|---|---|---|---|---|---|
| Meter Size | # of Meters | Proposed Ready-to-Serve ($/Meter) | 9% | 7% | 5% | 5% |
| 5/8-in | 14,348 | $ 8.78 | $ 9.53 | $ 10.18 | $ 10.71 | $ 11.26 |
| 3/4-in | 150 | $ 9.01 | $ 9.78 | $ 10.45 | $ 10.99 | $ 11.56 |
| 1-in | 748 | $ 9.70 | $ 10.53 | $ 11.25 | $ 11.83 | $ 12.44 |
| 1 1/2-in | 294 | $ 10.61 | $ 11.52 | $ 12.31 | $ 12.94 | $ 13.61 |
| 2-in | 250 | $ 13.14 | $ 14.26 | $ 15.24 | $ 16.02 | $ 16.85 |
| 3-in | 35 | $ 31.74 | $ 34.45 | $ 36.82 | $ 38.71 | $ 40.71 |
| 4-in | 15 | $ 38.63 | $ 41.93 | $ 44.81 | $ 47.11 | $ 49.55 |
| 6-in | 6 | $ 54.70 | $ 59.37 | $ 63.45 | $ 66.71 | $ 70.16 |
| 8-in | 3 | $ 73.07 | $ 79.31 | $ 84.76 | $ 89.11 | $ 93.73 |
| 10-in | 3 | $ 93.74 | $ 101.75 | $ 108.73 | $ 114.32 | $ 120.24 |

**Table C-2**

**Inside City Customer Volume Rates**

| Inside | FY 2017 Commodity Rate ($/ccf) | FY 2018 Commodity Rate ($/ccf) | FY 2019 Commodity Rate ($/ccf) | FY 2020 Commodity Rate ($/ccf) | FY 2021 Commodity Rate ($/ccf) |
|---|---|---|---|---|---|
| **SFR & MFR** | | | | | |
| Tier 1 | $ 7.30 | $ 8.97 | $ 9.49 | $ 10.03 | $ 10.60 |
| Tier 2 | $ 8.75 | $ 10.56 | $ 11.18 | $ 11.86 | $ 12.59 |
| Tier 3 | $ 10.28 | $ 12.25 | $ 12.97 | $ 13.78 | $ 14.64 |
| Tier 4 | $ 12.65 | $ 14.85 | $ 15.73 | $ 16.75 | $ 17.84 |
| **COM** | | | | | |
| Uniform | $ 8.84 | $ 10.67 | $ 11.29 | $ 11.97 | $ 12.70 |
| **UCSC** | | | | | |
| Uniform | $ 9.11 | $ 10.96 | $ 11.60 | $ 12.31 | $ 13.06 |
| **North Coast AG** | | | | | |
| Uniform | $ 6.63 | $ 8.29 | $ 8.74 | $ 9.34 | $ 9.99 |
| **Landscape** | | | | | |
| Tier 1 | $ 9.68 | $ 11.59 | $ 12.27 | $ 13.04 | $ 13.86 |
| Tier 2 | $ 13.38 | $ 15.65 | $ 16.58 | $ 17.67 | $ 18.83 |
| Tier 3 | $ 14.54 | $ 16.91 | $ 17.93 | $ 19.10 | $ 20.33 |
| **Elevation Surcharge** | | | | | |
| Elevation Surcharge | $ 0.42 | $ 0.46 | $ 0.49 | $ 0.51 | $ 0.54 |

**Table C-3**
**Outside City Customer Fixed Monthly Charges**

| Outside | | FY 2017 | FY 2018 | FY 2019 | FY 2020 | FY 2021 |
|---|---|---|---|---|---|---|
| Meter Size | # of Meters | Proposed Ready-to-Serve ($/Meter) | 9% | 7% | 5% | 5% |
| 5/8-in | 7,507 | $ 10.05 | $ 10.91 | $ 11.66 | $ 12.26 | $ 12.89 |
| 3/4-in | 65 | $ 10.32 | $ 11.20 | $ 11.97 | $ 12.59 | $ 13.24 |
| 1-in | 574 | $ 11.11 | $ 12.06 | $ 12.89 | $ 13.55 | $ 14.25 |
| 1 1/2-in | 164 | $ 12.16 | $ 13.20 | $ 14.10 | $ 14.83 | $ 15.60 |
| 2-in | 157 | $ 15.05 | $ 16.34 | $ 17.46 | $ 18.35 | $ 19.30 |
| 3-in | 14 | $ 36.36 | $ 39.47 | $ 42.17 | $ 44.34 | $ 46.64 |
| 4-in | 9 | $ 44.25 | $ 48.03 | $ 51.33 | $ 53.96 | $ 56.76 |
| 6-in | 5 | $ 62.66 | $ 68.01 | $ 72.68 | $ 76.42 | $ 80.37 |
| 8-in | 1 | $ 83.71 | $ 90.86 | $ 97.10 | $ 102.09 | $ 107.38 |
| 10-in | - | $ 107.38 | $ 116.55 | $ 124.55 | $ 130.95 | $ 137.74 |

**Table C-4**
**Outside City Customer Volume Rates**

| Outside | FY 2017 Commodity Rate ($/ccf) | FY 2018 Commodity Rate ($/ccf) | FY 2019 Commodity Rate ($/ccf) | FY 2020 Commodity Rate ($/ccf) | FY 2021 Commodity Rate ($/ccf) |
|---|---|---|---|---|---|
| **SFR & MFR** | | | | | |
| Tier 1 | $ 8.38 | $ 10.15 | $ 10.75 | $ 11.37 | $ 12.03 |
| Tier 2 | $ 10.05 | $ 12.00 | $ 12.70 | $ 13.49 | $ 14.32 |
| Tier 3 | $ 11.85 | $ 13.96 | $ 14.79 | $ 15.73 | $ 16.72 |
| Tier 4 | $ 14.60 | $ 16.98 | $ 18.01 | $ 19.18 | $ 20.43 |
| **COM** | | | | | |
| Uniform | $ 10.13 | $ 12.07 | $ 12.79 | $ 13.57 | $ 14.40 |
| **Landscape** | | | | | |
| Tier 1 | $ 11.09 | $ 13.13 | $ 13.91 | $ 14.79 | $ 15.73 |
| Tier 2 | $ 15.32 | $ 17.78 | $ 18.85 | $ 20.10 | $ 21.42 |
| Tier 3 | $ 16.66 | $ 19.23 | $ 20.40 | $ 21.73 | $ 23.14 |
| **Elevation Surcharge** | | | | | |
| Elevation Surcharge | $ 0.48 | $ 0.52 | $ 0.56 | $ 0.59 | $ 0.62 |

**Table C-5**

**Drought Cost Recovery Fees**

| Meter Size | Stage 1 – 5% cutback | Stage 2 – 15% cutback | Stage 3 – 25% cutback | Stage 4 – 35% cutback | Stage 5 – 50% cutback |
|---|---|---|---|---|---|
| **5/8-in** | $2.45 | $6.12 | $9.79 | $13.46 | $18.35 |
| **3/4-in** | $2.45 | $6.12 | $9.79 | $13.46 | $18.35 |
| **1-in** | $6.13 | $15.30 | $24.48 | $33.65 | $45.88 |
| **1 1/2-in** | $12.25 | $30.60 | $48.95 | $67.30 | $91.75 |
| **2-in** | $19.60 | $48.96 | $78.32 | $107.68 | $146.80 |
| **3-in** | $36.75 | $91.80 | $146.85 | $201.90 | $275.25 |
| **4-in** | $61.25 | $153.00 | $244.75 | $336.50 | $458.75 |
| **6-in** | $122.50 | $306.00 | $489.50 | $673.00 | $917.50 |
| **8-in** | $281.75 | $703.80 | $1,125.85 | $1,547.90 | $2,110.25 |
| **10-in** | $347.90 | $869.04 | $1,390.18 | $1,911.32 | $2,605.70 |

Back Cover

CITY OF SANTA CRUZ

# Water Department Prop. 218 Notice Proposed Rates

July 2016

# Building a Water System for Our Future

The mission of the City of Santa Cruz Water Department is to provide a safe, clean and continuous supply of water that meets or exceeds local, state and federal standards for public health and environmental quality, and to provide courteous, responsive and efficient service in the most cost-effective manner to our customers. We provide service to about 95,000 customers, 24 hours a day, 365 days a year.

The City of Santa Cruz Water Department is proposing a rate increase and changes to rate structures.

The nation's water utilities face a significant challenge due to a need to repair and replace aging water systems, a decrease in water sales due to increased conservation, a changing climate that creates supply instability, and changes in regulatory requirements. The Santa Cruz water system faces all of these challenges and our current rates will not support the work needed to be done to respond to them. We are proposing increases to water rates and a change to the current rate structures, and new fees that will go directly to support projects that both maintain existing back-bone infrastructure and build critical new infrastructure.

When we raised rates in fall 2014, we committed to use the increased rates to fund ongoing Water Department projects and operations, as well as to complete several critical infrastructure projects. As promised, by the end of 2016 we will have completed:

- The $25 million Bay Street Tanks;
- A $6 million rehabilitation of six filter basins at the Graham Hill Water Treatment Facility;
- The $4.9 million Beltz 12 Well and Water Treatment Facility;
- The $10.3 million Phase 3 of the North Coast System; and
- Replacement of the $267,000 Ocean Street trunk main valve.

In addition, we have completed both the rate studies and financial planning work directed by the City Council in 2014, which results in this proposal to increase current rates, change current rate structures, and add new fees to directly support new infrastructure reinvestment.



# Proposed Rate Changes

Historically, capital projects have been financed on a "pay-as-you-go" basis and in consequence, have depleted the Department's available funds. Now, with several new capital projects facing the water system with significantly higher price tags than past projects, it would be impossible for the Department to continue to fund projects through "pay-as-you-go" without ongoing and unacceptably large increases to current rates. Accordingly, the Department will begin issuing debt to finance about two-thirds of planned capital spending. In addition to the financial constraints of "pay-as-you-go," there is also an equity consideration; it is more equitable to spread costs of major system improvements out over time because projects funded and built today continue to benefit water users and rate payers for decades to come.

The proposed rate changes reflect the strong conservation values of the community by shifting away from collecting a large portion of water service costs from fixed charges (such as the Ready-to-Serve charge), to collecting over 90% of revenues through volumetric-pricing based on customer use. Though customers will see a decrease in their Ready-to-Serve charge, the proposed cost per unit of water will increase on all types of accounts and depending upon the amount of water used, customers may see a big jump in their water bill. Changes to rate structures are also proposed so that multi-family accounts will now pay the same per-unit costs as single families, and proposed changes to irrigation accounts include an assigned water budget that reflects efficient irrigation practices for each property.

The costs to treat and distribute drinking water are fixed; the shift to collect needed revenue through fluctuating water sales comes with some risk. To mitigate that risk while still implementing a more volume-based rate structure that encourages conservation, a $1 per unit of water Rate Stabilization fee will be charged beginning in 2017.

The newest change proposed to your water bill is an Infrastructure Reinvestment Fee that will support reinvestment in critical infrastructure projects. Since the rate increase in 2014, infrastructure projects have been added to the Water Department's work plan at significantly greater costs than past projects: a state-required rehabilitation of the inlet-outlet pipeline in the Newell Creek dam for $42 million; rehabilitation of the pipeline between Loch Lomond and Felton for $18 million; replacement and improvements to the pump station at the Felton diversion dam for $4.5 million; replacement of several concrete tanks at the Graham Hill Water Treatment Plant for $9 million; and initial feasibility work on a water supply project, as directed by the Council-approved work of the Water Supply Advisory Committee, which was completed in fall 2015.

We are also proposing a continuation of the Drought Cost Recovery fee, which will only go into effect in the event that the Council imposes restrictions on water use due to drought.

## For those customers who…

**Are charged an Elevation Surcharge for the increased energy used to pump water to homes in higher elevations** – the proposed new surcharge will be $0.42.

**Have private fire protection/ sprinkler service** – there is a proposed new $1 per fire-service meter charge, per month, to cover the costs for maintaining separate fire protection meters. There is no charge for water used to respond to a fire, but leaking fire services will be charged at the commercial per-unit rate for water, which is intended to incentivize prompt repairs to leaks.



# Inside City Rates

## Inside City Fixed Rates - Ready to Serve

| Meter Size | Ready to Serve ($/Meter) | | | | |
|---|---|---|---|---|---|
| | As of 10/1/16 | As of 7/1/17 | As of 7/1/18 | As of 7/1/19 | As of 7/1/20 |
| 5/8-in | $ 8.78 | $ 9.53 | $ 10.18 | $ 10.71 | $ 11.26 |
| 3/4-in | $ 9.01 | $ 9.78 | $ 10.45 | $ 10.99 | $ 11.56 |
| 1-in | $ 9.70 | $ 10.53 | $ 11.25 | $ 11.83 | $ 12.44 |
| 1 1/2-in | $ 10.61 | $ 11.52 | $ 12.31 | $ 12.94 | $ 13.61 |
| 2-in | $ 13.14 | $ 14.26 | $ 15.24 | $ 16.02 | $ 16.85 |
| 3-in | $ 31.74 | $ 34.45 | $ 36.82 | $ 38.71 | $ 40.71 |
| 4-in | $ 38.63 | $ 41.93 | $ 44.81 | $ 47.11 | $ 49.55 |
| 6-in | $ 54.70 | $ 59.37 | $ 63.45 | $ 66.71 | $ 70.16 |
| 8-in | $ 73.07 | $ 79.31 | $ 84.76 | $ 89.11 | $ 93.73 |
| 10-in | $ 93.74 | $ 101.75 | $ 108.73 | $ 114.32 | $ 120.24 |
| Fire Service - All Sizes * | $1 /month | $1.09 /month | $1.15 /month | $1.21 /month | $1.26 /month |

## Inside City Volume (Commodity) Rates - Consumption

| | As of 10/1/16 | As of 7/1/17 | As of 7/1/18 | As of 7/1/19 | As of 7/1/20 |
|---|---|---|---|---|---|
| **Single Family Residential and Multi-Family Residential** (calculation is based upon the number of dwelling units multiplied by the tier width) | | | | | |
| Tier 1 (0-5 ccf**) | $ 5.75 | $ 6.24 | $ 6.66 | $ 7.01 | $ 7.37 |
| Tier 2 (6-7 ccf) | $ 6.42 | $ 6.97 | $ 7.45 | $ 7.83 | $ 8.24 |
| Tier 3 (8-9 ccf) | $ 7.41 | $ 8.05 | $ 8.60 | $ 9.04 | $ 9.51 |
| Tier 4 (10 ccf & above) | $ 8.79 | $ 9.54 | $ 10.20 | $ 10.72 | $ 11.28 |
| **Commerical: Business, Industrial, Restaurant, Hotel, Golf, Municipal, Bulk, Fire Service Leaks** | | | | | |
| Uniform | $ 6.57 | $ 7.13 | $ 7.62 | $ 8.01 | $ 8.43 |
| **UCSC** | | | | | |
| Uniform | $ 6.70 | $ 7.27 | $ 7.77 | $ 8.17 | $ 8.60 |
| **Landscape / Irrigation** (tiers based on percent of water budget) | | | | | |
| Tier 1 (≤100% of budget) | $ 6.86 | $ 7.44 | $ 7.95 | $ 8.36 | $ 8.80 |
| Tier 2 (101% - 150%) | $ 9.15 | $ 9.93 | $ 10.62 | $ 11.16 | $ 11.74 |
| Tier 3 (150% & above) | $ 10.27 | $ 11.14 | $ 11.91 | $ 12.52 | $ 13.17 |
| **Elevation Surcharge** | | | | | |
| As Applicable | $ 0.42 | $ 0.46 | $ 0.49 | $ 0.51 | $ 0.54 |

## Inside City Volume (Commodity) Rates - Infrastructure Reinvestment Fee

| | As of 10/1/16 | As of 7/1/17 | As of 7/1/18 | As of 7/1/19 | As of 7/1/20 |
|---|---|---|---|---|---|
| **Single Family Residential and Multi-Family Residential** (calculation is based upon the number of dwelling units multiplied by the tier width) | | | | | |
| Tier 1 (0-5 ccf**) | $ 1.55 | $ 1.73 | $ 1.82 | $ 2.02 | $ 2.23 |
| Tier 2 (6-7 ccf) | $ 2.32 | $ 2.59 | $ 2.73 | $ 3.03 | $ 3.34 |
| Tier 3 (8-9 ccf) | $ 2.86 | $ 3.20 | $ 3.37 | $ 3.74 | $ 4.13 |
| Tier 4 (10 ccf & above) | $ 3.85 | $ 4.30 | $ 4.53 | $ 5.02 | $ 5.55 |
| **Commerical: Business, Industrial, Restaurant, Hotel, Golf, Municipal, Bulk** | | | | | |
| Uniform | $ 2.27 | $ 2.53 | $ 2.66 | $ 2.96 | $ 3.27 |
| **UCSC** | | | | | |
| Uniform | $ 2.40 | $ 2.68 | $ 2.82 | $ 3.13 | $ 3.46 |
| **Landscape / Irrigation** (tiers based on percent of water budget) | | | | | |
| Tier 1 (≤100% of budget) | $ 2.82 | $ 3.14 | $ 3.31 | $ 3.67 | $ 4.06 |
| Tier 2 (101% - 150%) | $ 4.22 | $ 4.71 | $ 4.96 | $ 5.50 | $ 6.08 |
| Tier 3 (150% & above) | $ 4.27 | $ 4.77 | $ 5.02 | $ 5.57 | $ 6.16 |

## Inside City Volume (Commodity) Rates - Rate Stabilization Fee

| | As of 10/1/16 | As of 7/1/17 | As of 7/1/18 | As of 7/1/19 | As of 7/1/20 |
|---|---|---|---|---|---|
| All accounts (Per ccf) | $ - | $ 1.00 | $ 1.00 | $ 1.00 | $ 1.00 |

*This amount may be billed annually and will be added to any other applicable water use fixed and volume charges. **ccf equals 100 cubic foot of water.

# Outside City Rates

## Outside City Fixed Rates - Ready to Serve

| Meter Size | Ready to Serve ($/Meter) | | | | |
|---|---|---|---|---|---|
| | As of 10/1/16 | As of 7/1/17 | As of 7/1/18 | As of 7/1/19 | As of 7/1/20 |
| 5/8-in | $ 10.05 | $ 10.91 | $ 11.66 | $ 12.26 | $ 12.89 |
| 3/4-in | $ 10.32 | $ 11.20 | $ 11.97 | $ 12.59 | $ 13.24 |
| 1-in | $ 11.11 | $ 12.06 | $ 12.89 | $ 13.55 | $ 14.25 |
| 1 1/2-in | $ 12.16 | $ 13.20 | $ 14.10 | $ 14.83 | $ 15.60 |
| 2-in | $ 15.05 | $ 16.34 | $ 17.46 | $ 18.35 | $ 19.30 |
| 3-in | $ 36.36 | $ 39.47 | $ 42.17 | $ 44.34 | $ 46.64 |
| 4-in | $ 44.25 | $ 48.03 | $ 51.33 | $ 53.96 | $ 56.76 |
| 6-in | $ 62.66 | $ 68.01 | $ 72.68 | $ 76.42 | $ 80.37 |
| 8-in | $ 83.71 | $ 90.86 | $ 97.10 | $ 102.09 | $ 107.38 |
| 10-in | $ 107.38 | $ 116.55 | $ 124.55 | $ 130.95 | $ 137.74 |
| Fire Service - All Sizes * | $1.15 /month | $1.23 /month | $1.30 /month | $1.35 /month | $1.40 /month |

## Outside City Volume (Commodity) Rates - Consumption

| | As of 10/1/16 | As of 7/1/17 | As of 7/1/18 | As of 7/1/19 | As of 7/1/20 |
|---|---|---|---|---|---|
| **Single Family Residential and Multi-Family Residential** (calculation is based upon the number of dwelling units multiplied by the tier width) | | | | | |
| Tier 1 (0-5 ccf**) | $ 6.59 | $ 7.16 | $ 7.65 | $ 8.04 | $ 8.46 |
| Tier 2 (6-7 ccf) | $ 7.37 | $ 8.00 | $ 8.55 | $ 8.99 | $ 9.46 |
| Tier 3 (8-9 ccf) | $ 8.54 | $ 9.27 | $ 9.90 | $ 10.41 | $ 10.95 |
| Tier 4 (10 ccf & above) | $ 10.15 | $ 11.02 | $ 11.78 | $ 12.38 | $ 13.02 |
| **Commerical: Business, Industrial, Restaurant, Hotel, Golf, Municipal, Bulk, Fire Service Leaks** | | | | | |
| Uniform | $ 7.53 | $ 8.17 | $ 8.73 | $ 9.18 | $ 9.66 |
| **North Coast AG** | | | | | |
| Uniform | $ 3.58 | $ 3.88 | $ 4.15 | $ 4.36 | $ 4.59 |
| **Landscape / Irrigation** (tiers based on percent of water budget) | | | | | |
| Tier 1 (≤100% of budget) | $ 7.85 | $ 8.53 | $ 9.11 | $ 9.58 | $ 10.08 |
| Tier 2 (101% - 150%) | $ 10.48 | $ 11.38 | $ 12.16 | $ 12.79 | $ 13.45 |
| Tier 3 (150% & above) | $ 11.76 | $ 12.77 | $ 13.64 | $ 14.34 | $ 15.09 |
| **Elevation Surcharge** | | | | | |
| As Applicable | $ 0.48 | $ 0.52 | $ 0.56 | $ 0.59 | $ 0.62 |

## Outside City Volume (Commodity) Rates - Infrastructure Reinvestment Fee

| | As of 10/1/16 | As of 7/1/17 | As of 7/1/18 | As of 7/1/19 | As of 7/1/20 |
|---|---|---|---|---|---|
| **Single Family Residential and Multi-Family Residential** (calculation is based upon the number of dwelling units multiplied by the tier width) | | | | | |
| Tier 1 (0-5 ccf**) | $ 1.78 | $ 1.99 | $ 2.10 | $ 2.33 | $ 2.57 |
| Tier 2 (6-7 ccf) | $ 2.68 | $ 2.99 | $ 3.15 | $ 3.49 | $ 3.86 |
| Tier 3 (8-9 ccf) | $ 3.30 | $ 3.69 | $ 3.88 | $ 4.31 | $ 4.76 |
| Tier 4 (10 ccf & above) | $ 4.44 | $ 4.96 | $ 5.22 | $ 5.80 | $ 6.41 |
| **Commerical: Business, Industrial, Restaurant, Hotel, Golf, Municipal, Bulk** | | | | | |
| Uniform | $ 2.59 | $ 2.90 | $ 3.05 | $ 3.38 | $ 3.74 |
| **North Coast AG** | | | | | |
| Uniform | $ 3.05 | $ 3.40 | $ 3.58 | $ 3.98 | $ 4.39 |
| **Landscape / Irrigation** (tiers based on percent of water budget) | | | | | |
| Tier 1 (≤100% of budget) | $ 3.23 | $ 3.60 | $ 3.79 | $ 4.21 | $ 4.65 |
| Tier 2 (101% - 150%) | $ 4.83 | $ 5.39 | $ 5.68 | $ 6.30 | $ 6.97 |
| Tier 3 (150% & above) | $ 4.89 | $ 5.46 | $ 5.75 | $ 6.38 | $ 7.05 |

## Outside City Volume (Commodity) Rates - Rate Stabilization Fee

| | As of 10/1/16 | As of 7/1/17 | As of 7/1/18 | As of 7/1/19 | As of 7/1/20 |
|---|---|---|---|---|---|
| All accounts (Per ccf) | $ - | $ 1.00 | $ 1.00 | $ 1.00 | $ 1.00 |

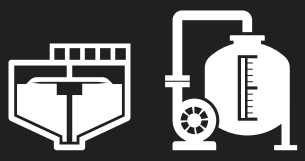
*This amount may be billed annually and will be added to any other applicable water use fixed and volume charges. **ccf equals 100 cubic foot of water.

# Drought Cost Recovery Fee (DCRF)

| | Stage 1 – 5% Shortage | Stage 2 – 15% Shortage | Stage 3 – 25% Shortage | Stage 4 – 35% Shortage | Stage 5 – 50% Shortage |
|---|---|---|---|---|---|
| Maximum Targeted Cost Recovery | $ 1,000,000 | $ 2,500,000 | $ 4,000,000 | $ 5,500,000 | $ 7,500,000 |
| 5/8-in | $ 2.45 | $ 6.12 | $ 9.79 | $ 13.46 | $ 18.35 |
| 3/4-in | $ 2.45 | $ 6.12 | $ 9.79 | $ 13.46 | $ 18.35 |
| 1-in | $ 6.13 | $ 15.30 | $ 24.48 | $ 33.65 | $ 45.88 |
| 1 1/2-in | $ 12.25 | $ 30.60 | $ 48.95 | $ 67.30 | $ 91.75 |
| 2-in | $ 19.60 | $ 48.96 | $ 78.32 | $ 107.68 | $ 146.80 |
| 3-in | $ 36.75 | $ 91.80 | $ 146.85 | $ 201.90 | $ 275.25 |
| 4-in | $ 61.25 | $ 153.00 | $ 244.75 | $ 336.50 | $ 458.75 |
| 6-in | $ 122.50 | $ 306.00 | $ 489.50 | $ 673.00 | $ 917.50 |
| 8-in | $ 281.75 | $ 703.80 | $ 1,125.85 | $ 1,547.90 | $ 2,110.25 |
| 10–in | $ 347.90 | $ 869.04 | $ 1,390.18 | $ 1,911.32 | $ 2,605.70 |

The Drought Cost Recovery Fee maximum amounts set forth above are a fixed fee and are hereby established and shall be applicable for the full fiscal year (twelve months) following the water shortage declaration made by City Council. The maximum targeted cost recovery amount is indicated below and is linked to the water shortage stage declared by the City Council.

# How Your Money Has Been Spent



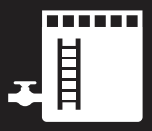
Beltz Well #12 and Treatment Plant
**$4.9 million**



Ocean Street Trunk Main Valve Replacement
**$267K**



Filters at Graham Hill Treatment Plant
**$6 million**



Bay Street Reservoir
**$25 million**



North Coast System – Phase 3
**$10.3 million**




## What is the need to increase water rates?

Much of the City's water infrastructure has reached or is reaching the end of its functional lifespan. Therefore the Water Department is planning a major infrastructure reinvestment program, with $128 million needed for projects over the next five years.

## What are the proposed changes to rates?

The Water Department is proposing changes to both how rates are structured and to the per-unit costs. Water rates are currently structured so that about 1/3 of revenue comes from fixed rates, such as the Ready-to-Serve charge. The new rate structure will collect less from fixed charges and more from the volume of water used. Because fixed-fee revenues are going down, per unit water rates will be going up to produce needed revenues. This design is more in line with the values expressed by the community, which is to encourage less water use.

## How much more will customers pay with the proposed rate increases?

It depends on how much water a customer uses. Very low water users will actually pay less than they currently pay; very high users will pay substantially more.

## Customers were told to conserve water, but are now being told that the drop in water sales is causing the need to raise rates. That doesn't seem fair?

It's true that the loss in revenue from selling less water is part of the need to increase rates. However it's a small part. The driving force behind raising rates is the need to reinvest in the City's drinking water treatment and delivery infrastructure.

## What will customers get for their money?

Major rehabilitation of the inlet-outlet pipeline in the dam at Loch Lomond; rehabilitation or replacement of the Felton Diversion Dam and Pump Station and the Felton-to-Loch Lomond pipeline; and additional rehabilitation of the Graham Hill Water Treatment Plant are all projects that will be completed.

## What's the difference between the current Ready-to-Serve charge and the proposed new Infrastructure Reinvestment Fee?

The Ready-to-Serve charge pays for ongoing operations, such as meter reading and maintenance, producing and delivering bills, and customer service. The proposed Infrastructure Reinvestment Fee is specifically for pay-as-you-go capital investment and debt service for capital expenditures.

## What's the difference in the Rate Stabilization Fee proposed and the Drought Cost Recovery Fee?

The Drought Cost Recovery Fee will only be levied during an official declaration of water restrictions. The Rate Stabilization Fee was created to mitigate the risk inherent in basing so much revenue on the volume of water sold.

## Will there be a "lifeline" rate for those on fixed and low incomes?

Proposition 218 requires that all customers be charged only for the costs of service provided – no more; no less. Unfortunately it therefore does not make allowances for "lifeline" rates.

# Notice of Public Hearing

## The City Council for the City of Santa Cruz will hold a Public Hearing Tuesday, August 23, 2016, during the regular meeting of the City Council at 7:00 pm.

The City Council will consider adoption of a proposed water rate increase affecting all water customers. Interested persons are encouraged to attend and comment on the issues being discussed. The meeting will be held in City Council Chambers at 809 Center Street.

Written protests: Any property owner or a tenant who is a customer of the Water Department may protest the proposed water rates. Only one written protest per parcel, filed by an owner or a tenant who is a customer, will be counted. Only written and signed protests that include the writer's address and/or assessor parcel number will be counted to determine whether a majority protest to the proposed water rate increase exists. Written protests may be mailed or hand delivered to the Mayor and Council of Santa Cruz at 809 Center Street, Room 10, Santa Cruz, CA 95060.

If you oppose the proposed rate increases, Proposition 218 requires that your protest be submitted in writing to be counted, even if you plan to attend the Public Hearing. To be counted, the protest must: 1) be in writing; 2) state opposition to the proposed rate increase; 3) identify the parcel by assessor's parcel number or street address; 4) include the printed name and original signature of the owner of record or a tenant who is a customer of the Water Department; 5) be received before the conclusion of the Public Hearing on August 23, 2016.

**For more information, visit www.cityofsantacruz.com/h2orates.**

CITY OF SANTA CRUZ

Santa Cruz Water District
212 Locust Street
Santa Cruz, CA 95060

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Notice of Public Hearing
**Proposed Water Rates**
**Affecting Your Area**

# Technical Memorandum

| | |
|---|---|
| Prepared for: | The City of Santa Cruz |
| Project Title: | Water Conservation Master Plan, Phase 2 |
| Subject: | Overview of Current Findings from Water Conservation Master Planning Effort |
| Date: | March 30, 2016 |
| To: | Toby Goddard, City of Santa Cruz Water Department |
| From: | Lisa Maddaus, Maddaus Water Management Inc. |
| | Bill Maddaus, Maddaus Water Management Inc. |

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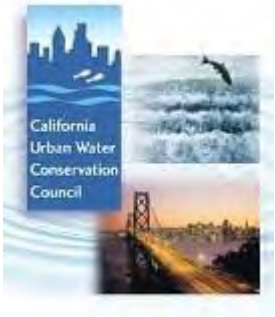
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# 1. INTRODUCTION

This technical memorandum provides an overview of current findings from the water conservation master planning effort.

## 1.1 Background

Water is a precious natural resource that is vital to the health and welfare and to the economy of the Central Coast region. The City of Santa Cruz relies entirely on local sources for the community's drinking water supply. Because water supplies are limited, it is important that everyone uses water efficiently. The City of Santa Cruz has had a long-standing commitment to water conservation and offers a variety of programs, informational materials, and incentives to help City water customers become more water-efficient.




In 2000, the City adopted a Water Conservation Plan, the goal of which was to reduce water demand system-wide by 282 million gallons per year in 2010. Through plumbing fixture and appliance rebate programs, technical assistance, regulations, and other strategies, residential and commercial customers have saved over 330 million gallons of water per year so far. The City is also a member of the California Urban Water Conservation Council (CUWCC) and is active in promoting water conservation statewide.

In 2013, the Water Conservation Office contracted with Maddaus Water Management (MWM) to develop an updated Water Conservation Master Plan. The goal of the updated plan is to define the next generation of water conservation activities and serve as a roadmap to help our community achieve maximum, practical water use efficiency. Strengthening water conservation efforts has been identified as top priority by the City Council, the City's Water Commission, and more recently by the City's Water Supply Alternatives Committee in its effort aimed at delivering a safe, adequate, affordable, and environmentally sustainable water supply.

## 1.2 Need and Plan Objectives

The City of Santa Cruz's Water Conservation Master Plan (WCMP or Plan) strives to maximize the community's efficient use of water in the most equitable and cost-effective manner to the extent practical for implementation by City staff.

Key priorities of the WCMP include the following:

- Capitalize on opportunities to meet the future water needs of the Santa Cruz Water Department customers through cost-effective and sustained water conservation and water use efficiency efforts
- Demonstrate environmental stewardship and foster innovative, responsible and efficient practices
- Commit to and implement a water conservation program that supports the health of rivers, streams, and groundwater integral to the region's quality of life and economy
- Monitor and measure performance to ensure conservation potential is being met as forecasted

Achieving these goals will allow the Water Department to:

- Maintain and exceed the water savings already achieved by the City of Santa Cruz as well as identify the best path to achieve those savings and to monitor commitments to the CUWCC Memorandum of Understanding (MOU) Regarding Urban Water Conservation;
- Maintain a long-term plan for compliance with SB X7-7 to meet the gallons per capita per day (GPCD) target by 2020; and
- Meet the City's integrated water resource management goals to reduce peak season demands.

## 1.3 WSAC Recommended Approach to Demand Management

The City's Water Supply Advisory Committee (WSAC) was supported by City staff and Maddaus Water Management in its review of remaining conservation potential to future goals for the City's Conservation Program. In the WSAC's Final Report

published in October 2015, the following key assumptions about the demand management program (Recommended Program) were presented:

- "The Econometric Demand Forecast [building on previous assumptions prepared by MWM in the DSS Model] includes significant demand reductions associated with the implementation of existing plumbing and building codes, the continuation of existing demand management programs (as a baseline) and as a function of the effect on demand of expected increases in water rates.
- "A focus of new demand management programs will be on peak season demand reduction, which is also a significant focus of the expected demand reduction associated with anticipated price increases.
- "New and enhanced demand management programs will be developed to build on the Water Department's current program that has contributed to reducing per capita demand in Santa Cruz to one of the lowest levels in the state.
- "The programs to be implemented in the coming decade[s] are a mix of lower cost and some higher cost measures. Those higher cost measures are meant as small-scale experiments that may be broadened if they prove popular and their costs decline over time. Together these measures incur an average total program cost of no more than $10,000 per million gallons of water saved. This figure is lower than the expected cost of supply augmentation projects recommended to be pursued as a result of WSAC's work."

## 2. PLAN DEVELOPMENT (SUMMARY OF PROCESS)

Work on the Water Conservation Master Plan began with a kick-off meeting in January 2013. Since that time, the Water Commission has developed the goals of the planning effort; identified and selected a suite of potential quantifiable conservation measures for technical analysis; and evaluated system-wide conservation potential through selection of a recommended program scenario.

In preparation for this project, the City completed a Residential and Commercial Baseline Water Use Survey in May 2013 to assess the current status of plumbing fixtures, appliances, and landscape characteristics present in the City's water service area.

There have been two (2) main phases in the City's planning process separated by an intervening year that included an in-depth review of the work by WSAC. The process followed in the Plan is summarized as follows:

**Phase 1: January 2013-October 2014**

- Analyze water use and review City's Baseline Survey for remaining conservation potential
- Identify, screen, and prioritize measures, with significant public input via Water Commission Meetings and workshops
- Model measures
- Formulate programs, leading to a recommended Program "C" to maximize total annual water savings based on conservation potential
- Present outcomes to Water Commission on October 6, 2014

**WSAC Review: October 2014-September 2015**

- Review prior Phase 1 analytical results from the Least Cost Decision Support System Model (DSS Model – Model described in Appendix A) and seek to answer additional questions with City and MWM technical assistance
- Shift conservation program emphasis to peak season (April-October) water savings rather than maximizing overall higher annual volume and/or more cost-effective water efficiency savings to better address the City's supply-demand gap.
- Prepare and adopt a new econometric-based demand forecast

- Produce recommendations for additional conservation measures to be included in the Final Water Conservation Master Plan

**Phase 2: October 2015-present**

- Recalibrate model to updated econometric demand forecast and reset planning horizon to 2015-2035
- Incorporate input (changes to existing measures and adding new measures) from WSAC process, with focus on peak season demand reduction
- Incorporate new plumbing code changes based on the State's Emergency Drought Regulations, effective December 1, 2015
- Formulate the "Recommended Program" into the DSS Model and evaluate results

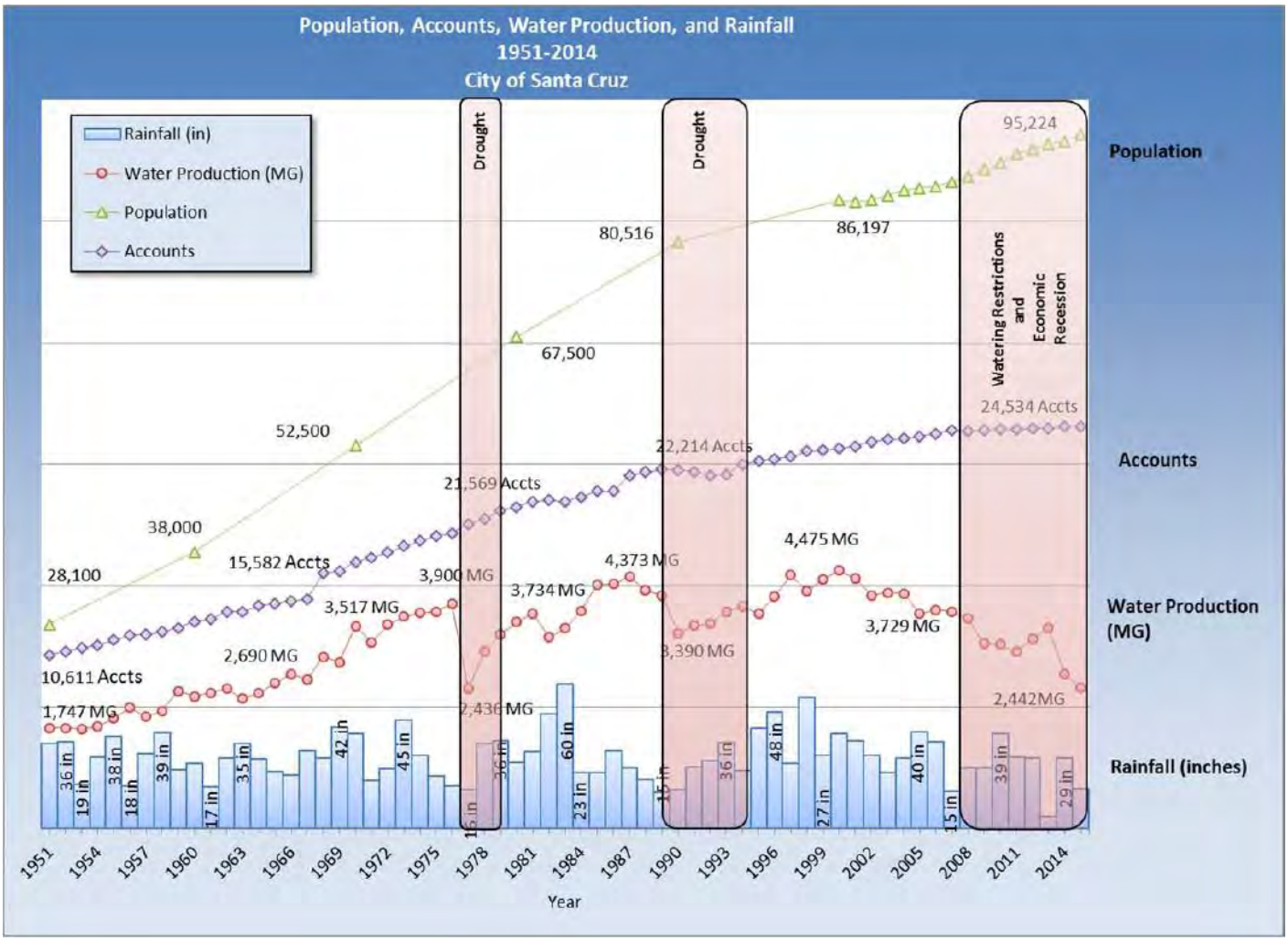
# 3. BASELINE DEMANDS

The WCMP process comprises four distinct steps: 1) input/analysis of system-wide demand projections to establish demand planning baseline with and without plumbing and building codes; 2) evaluation of system-wide conservation potential; 3) identification and study of potential conservation measures; and 4) deliberation and adoption of preferred long-term conservation program. Each of these steps is described in more detail in the following sections. This section presents a summary of the City's historical demand trends as well as the basis for the demand forecast.

## 3.1 Historical Trends

As seen in Figure 3-1, the historic trend in system water use paralleled account growth and population, except during two major drought periods. Around 2000, the pattern changed and system demand began a long period of decline, accelerated in 2009 by drought, economic downturn, and other influencing factors. The City has not seen a full demand recovery since the recent economic recession due to the ongoing drought. In 2013 system-wide demand was 3,364 million gallons per year, with Stage 1 water shortage regulations and restrictions in effect. In 2015 with the full rationing scheme in place, the City reduced production to 2,442 million gallons on the level not seen since the drought in the 1970s. Water demands are projected to remain depressed after the year 2015 due to persistent drought conditions and long-term behavioral changes related to water use. While it is prudent to assume that future demands will eventually recover when rainfall patterns/drought conditions and the economy normalize, it might not be to the same level as before due to widespread, long-term conservation measures taken in response to drought and ongoing adjustments in water rates.

**Figure 3-1. Historical Trends for City of Santa Cruz**




## 3.2 Basis for Demand Forecast

Maddaus Water Management (MWM) employed its Least Cost Planning Decision Support System Model (DSS Model) for the technical analysis. In addition to considering historical demand trends based on billing consumption data, the DSS Model takes into account the following parameters: total population, single family population, multifamily population, UC Santa Cruz population, commercial employment, business-industrial growth, and municipal growth.

In the M.Cubed August 2015 "City of Santa Cruz Water Demand Forecast," David Mitchell conducted an econometric analysis of water demand and forecasts of class-level customer demands and total system production through 2035. The report was commissioned by the City of Santa Cruz Water Department and the City's Water Supply Advisory Committee. Its purpose was to update the Department's existing demand forecast adopted as part of the 2010 UWMP to reflect current information on water usage and to account for effects of current conservation (using DSS Model Program A), water rates, and other factors expected to impact the future demand for water. With the start of Phase 2, MWM's DSS Model was carefully updated to incorporate this econometric analysis by inputting the regression equations and data sets used by M.Cubed and calibrated to ensure consistency between the two demand forecast models.

The updated DSS model starts with a "baseline" demand forecast, which is <u>not</u> the same forecast as presented by M.Cubed. It differs in that it backs out the earlier estimates for plumbing code savings and the estimated future water saving associated with the City's current water conservation program that were provided by MWM to M.Cubed in 2015 and embedded in that final demand forecast. All other variables, including average water use per account, forecasts of account growth, and economic factors used to forecast water use in the M.Cubed report, were taken directly from that model and used to populate the DSS model.

Table 3-1 below compares the primary water demand forecast presented by M.Cubed without the code savings and program savings that were previously generated from the DSS Model analysis completed in October 2014 compared to the updated DSS "baseline" demand completed in February 2016.

**Table 3-1. Comparison of M.Cubed Demand Forecast and DSS "Baseline" Forecast (MG)**

| Demand (MG) | 2020 | 2025 | 2030 | 2035 |
|---|---|---|---|---|
| **M.Cubed Final Demand Forecast, October 2015** | 3,385 | 3,351 | 3,388 | 3,442 |
| **2014 Estimate of Plumbing Code Savings (Prior DSS Model version)** | 65 | 132 | 197 | 235 |
| **2014 Estimate of Conservation Program Savings – Program "A" (Prior DSS Model version)** | 110 | 143 | 139 | 134 |
| **M.Cubed Final Demand Forecast without Plumbing Code or Conservation Program Savings** | 3,560 | 3,626 | 3,724 | 3,811 |
| **DSS Model "Baseline" Demand** | 3,560 | 3,636 | 3,743 | 3,838 |
| **Difference, MG** | 0 | 10 | 19 | 27 |
| **Difference, %** | 0.0% | 0.3% | 0.5% | 0.7% |

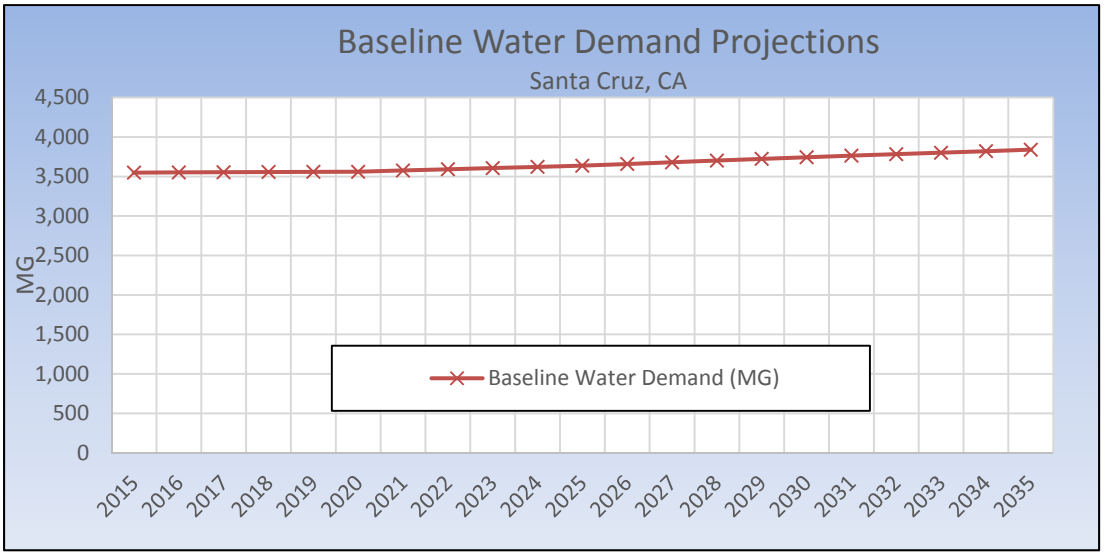
**Note: Plumbing code and program savings: M.Cubed, 2015, Attachment 8, were originally based on results from the DSS Model prior work in 2014 by Maddaus Water Management, which are updated with the most recent DSS Model results from February 2016.**

As can be seen in the above table, the two models are in close agreement and in all years differ by less than 1%.

The baseline demand forecast is shown in the following Figure 3-2. As referenced in the M Cubed report, the baseline forecast is predicated on average weather and normal economic conditions and is not expected to match realized demand, especially in the short term. City staff will continue to monitor production and consumption through and following the drought.

The next step involves calculating the effect of passive savings against the "baseline" demand. The results differ from earlier estimates of plumbing code savings presented in 2014-15 for two reasons: 1) lower baseline demand and 2) additional passive savings due to recent changes in California codes resulting from 2015 emergency conservation regulations adopted in California, effective December 1, 2015 (after the publication of the M.Cubed report).

**Figure 3-2. Baseline Demand Forecast Without Plumbing Code Savings**




Source: City of Santa Cruz. DSS Model, Section: Demand Analysis, Feb 16, 2016.

# 4. BASELINE DEMANDS WITH PASSIVE SAVINGS 2015-2035

Future community-wide conservation savings will be achieved by implementing both passive and active measures. Passive measures are federal and state codes and standards that increase conservation savings as older appliances and fixtures are replaced over time naturally with more water efficient models. Active measures are those in which the City will invest to promote water conservation, such as incentives and educational programs.

## 4.1 Basis for Plumbing Code Savings

Since it is beneficial to model the impact of the natural changes in the mix of types of appliances, the DSS Model forecasts service area water fixture use. In the codes and standards part of the DSS Model, specific fixture end-use type (point of use fixture or appliance), average water use, and lifetime are compiled. Additionally, state and national plumbing codes and appliance standards for toilets, urinals, showers, and clothes washers are modeled by customer category. These fixtures and plumbing codes can be added to, edited, and/or deleted by the user. This yields two demand forecasts – one with and one without plumbing code savings.

A key input in the model is fixture water use and life, as well as the initial proportions of individual fixtures in each customer class. The following Figure 4-1 presents an example of the initial proportions used in existing single family accounts. Table 4-1 on the following page provides the list of fixtures, average water use, and assumptions for fixture life used in this analysis.

**Figure 4-1. Initial Fixture Proportions for Single Family Toilets (screen shot from the DSS Model)**

| Initial Fixture Proportions - Single Family Toilets | |
|---|---|
| 1.28 gpf HET Residential | 7.2% |
| 1.6 gpf ULFT Residential | 82.7% |
| High Use Toilet Residential | 10.1% |
| <1.0 gpf Toilet Residential | 0.0% |
| Total | 100.0% |

Data collected from the recently completed City of Santa Cruz Water Use Baseline Survey was used for this purpose. Other input parameters include estimates for annual replacement rate and assumed market share for both replacement and new equipment at various points in the planning horizon.

The scope of analysis involved assessing the rate of change of toilets, shower heads, lavatory and non-lavatory/kitchen faucets, and clothes washers in both existing single family and multifamily accounts, and toilets, urinals, and lavatory and non-lavatory/kitchen faucets in commercial accounts. Fixture characteristics are also tracked in new accounts, which are subject to the requirements of the 2015 California Green Building Code and 2015 California Code of Regulations Title 20 Appliance Efficiency Regulations adopted by the California Energy Commission (CEC) on September 1, 2015. This was an update in Phase 2, from the prior work in Phase 1, of preparing the DSS Model.

The controlling law for **toilets** is Assembly Bill (AB) 715. This bill requires high efficiency toilets (1.28 gpf) to be exclusively sold in California beginning January 1, 2014. The controlling law for wall-mounted urinals is the 2015 CEC efficiency regulations requiring that ultra-high efficiency pint **urinals** (0.125 gpf) be exclusively sold in California beginning January 1, 2016. This is an efficiency progression for urinals from AB 715's requirement of high-efficiency (0.5 gpf) urinals starting in 2014 that was modeled during WCMP Phase 1.

Standards for **residential clothes washers** fall under the regulations of the U.S. Department of Energy. Even though both front loading and top loading models will still be available for the foreseeable future, national water efficiency standards for both types are becoming more stringent over time, in steps. In March 2015, the federal standard reduced the maximum water factor for non-Energy Star certified top- and front-loading washing machines to 8.4 and 4.7, respectively. In 2018, the maximum water factor for standard top-loading machines will be further reduced to 6.5. Beginning in 2015, the maximum water factor for Energy Star certified washers was 4.3 for top-loading machines and 3.7 for front-loading.

**Showerhead** flow rates are newly regulated under the 2015 California Code of Regulations Title 20 Appliance Efficiency Regulations adopted by the CEC, which requires the exclusive sale in California of 2.0 gpm showerheads at 80 psi as of July 1, 2016 and 1.8 gpm showerheads at 80 psi as of July 1, 2018. The WaterSense specification applies to showerheads that have a

maximum flow rate of 2.0 gallons per minute (gpm) or less. This represents a 20% reduction in showerhead flow rate over the current federal standard of 2.5 gpm, as specified by the Energy Policy Act of 1992.

**Faucet** flow rates have likewise been recently regulated by the 2015 CEC Title 20 regulations. This standard requires that the residential faucets and aerators manufactured on or after July 1, 2016 be exclusively sold in California at 1.2 gpm at 60 psi; and public lavatory and kitchen faucet/aerators sold or offered for sale on or after January 1, 2016 be 0.5 gpm at 60 psi, and 1.8 gpm at 60 psi (with optional temporary flow of 2.2 gpm), respectively. Previously, all faucets had been regulated by the 2010 California Green Building Code at 2.2 gpm at 60 psi.

Plumbing code related water savings are considered reliable, long-term savings, and can be counted on over time to help reduce the City's overall system water demand. This projection further assumes no active involvement by the City, and that the costs of purchasing and installing replacement equipment (and new equipment in new construction) are borne solely by the customers, occurring at no direct utility expense. The inverse of the Fixture Life is the natural replacement rate, expressed as a percent (i.e., 10 years is a rate of 10% per year).

**Table 4-1. List of Fixtures**

| Fixture Name | End Use | Average Water Use | Units | Fixture Life (yrs.) |
|---|---|---|---|---|
| Efficient Front Loader | Clothes Washers | 13.0 | gal per use | 10 |
| Medium Efficient Front Loader | Clothes Washers | 19.0 | gal per use | 10 |
| Top Loader | Clothes Washers | 34.0 | gal per use | 10 |
| 0.5 gpm Non-Residential Lavatory Faucet | Lavatory Faucets | 0.1 | gal per use | 15 |
| 1.2 gpm Residential Lavatory Faucet | Lavatory Faucets | 0.3 | gal per use | 10 |
| 2.2 gpm Residential Lavatory Faucet | Lavatory Faucets | 0.6 | gal per use | 10 |
| 2.2 gpm Non-Residential Lavatory Faucet | Lavatory Faucets | 0.6 | gal per use | 15 |
| 2.5 gpm Residential Lavatory Faucet | Lavatory Faucets | 0.6 | gal per use | 10 |
| 2.5 gpm Non-Residential Lavatory Faucet | Lavatory Faucets | 0.6 | gal per use | 15 |
| >2.5 gpm Residential Lavatory Faucet | Lavatory Faucets | 0.9 | gal per use | 10 |
| >2.5 gpm Non-Residential Lavatory Faucet | Lavatory Faucets | 0.9 | gal per use | 15 |
| 1.8 gpm Residential Non-Lavatory/Kitchen Faucet | Non-Lavatory/Kitchen Faucets | 1.8 | gal per use | 10 |
| 1.8 gpm Non-Residential Non-Lavatory/Kitchen Faucet | Non-Lavatory/Kitchen Faucets | 1.8 | gal per use | 15 |
| 2.2 gpm Residential Non-Lavatory/Kitchen Faucet | Non-Lavatory/Kitchen Faucets | 2.2 | gal per use | 10 |
| 2.2 gpm Non-Residential Non-Lavatory/Kitchen Faucet | Non-Lavatory/Kitchen Faucets | 2.2 | gal per use | 15 |
| 2.5 gpm Residential Non-Lavatory/Kitchen Faucet | Non-Lavatory/Kitchen Faucets | 2.5 | gal per use | 10 |
| 2.5 gpm Non-Residential Non-Lavatory/Kitchen Faucet | Non-Lavatory/Kitchen Faucets | 2.5 | gal per use | 15 |
| >2.5 gpm Residential Non-Lavatory/Kitchen Faucet | Non-Lavatory/Kitchen Faucets | 3.5 | gal per use | 10 |
| >2.5 gpm Non-Residential Non-Lavatory/Kitchen Faucet | Non-Lavatory/Kitchen Faucets | 3.5 | gal per use | 15 |
| High Efficiency 1.5 gpm | Showers | 10.4 | gal per use | 25 |
| High Efficiency 1.8 gpm | Showers | 12.5 | gal per use | 25 |
| High Efficiency 2 gpm | Showers | 13.9 | gal per use | 25 |
| Low Flow 2.5 gpm | Showers | 18.3 | gal per use | 25 |
| High Flow > 3 gpm | Showers | 23.5 | gal per use | 25 |

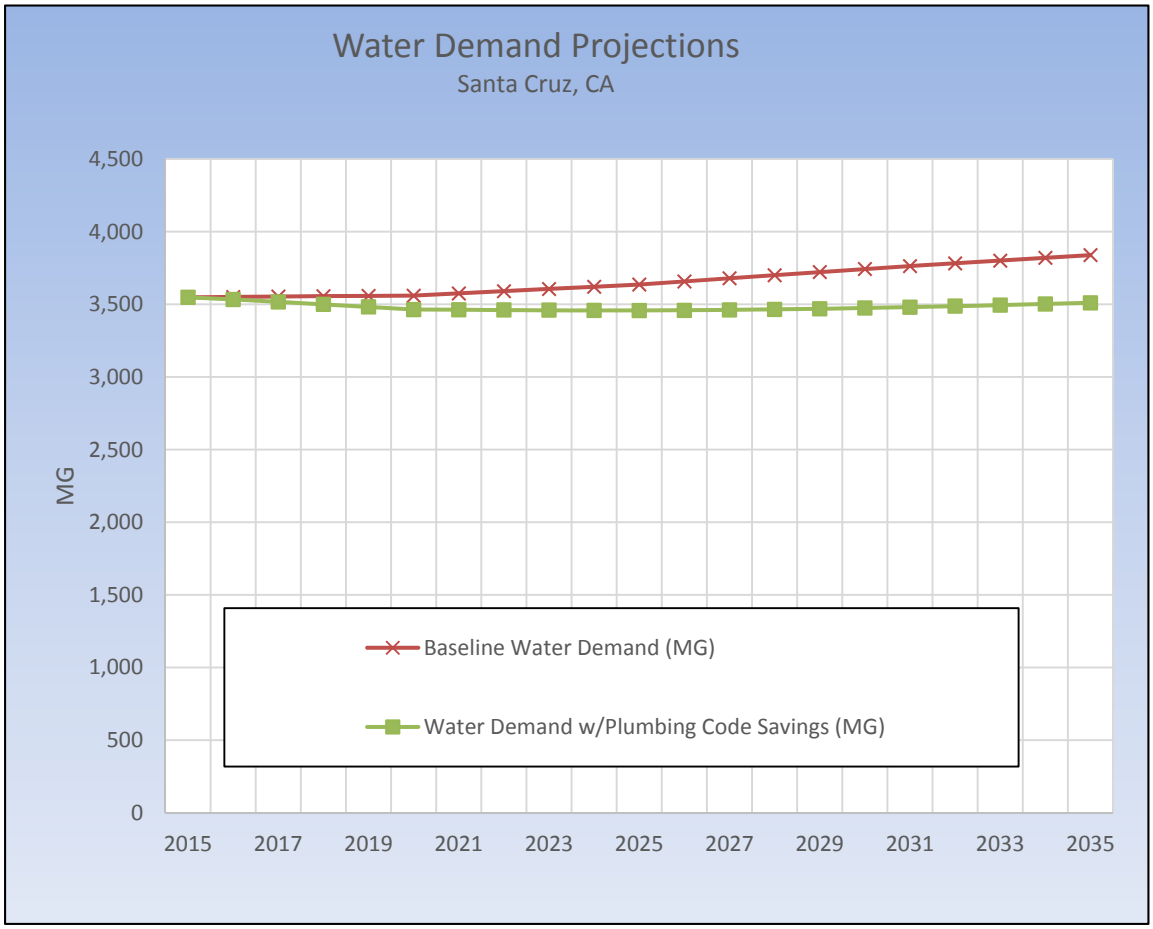
**Table 4-1. List of Fixtures (continued)**

| Fixture Name | End Use | Average Water Use | Units | Fixture Life (yrs.) |
|---|---|---|---|---|
| <1.0 gpf Toilet Non-Residential | Toilets | 1.0 | gpf | 50 |
| 1.28 gpf HET Residential | Toilets | 1.3 | gpf | 50 |
| 1.28 gpf HET Non-Residential | Toilets | 1.3 | gpf | 50 |
| 1.6 gpf ULFT Residential | Toilets | 1.8 | gpf | 33 |
| 1.6 gpf ULFT Non-Residential | Toilets | 1.8 | gpf | 50 |
| High Use Toilet Residential | Toilets | 3.5 | gpf | 25 |
| High Use Toilet Non-Residential | Toilets | 3.5 | gpf | 33 |
| Waterless Urinal | Urinals | 0.0 | gpf | 50 |
| Pint Urinal | Urinals | 0.1 | gpf | 50 |
| Quart Urinals | Urinals | 0.3 | gpf | 50 |

## 4.2 Baseline Demands with Passive Savings 2015-2035

The DSS Model estimates total cumulative plumbing code savings of 329 million gallons/year in 2035. As seen in Figure 4-2 below, water savings from fixture and appliance codes alone is expected to reduce total water demand (without plumbing code) from approximately 3.8 million gallons per year to about 3.5 million gallons by 2035, a reduction of about 8.6% due to plumbing code savings. Table 6-3 in section 6.1 shows the water savings in 5-year increments due to plumbing codes. Table 6-4 in section 6.2 presents projected water demands with plumbing code savings in 5-year increments.

**Figure 4-2. Demand Forecast With and Without Plumbing Code Savings**




Source: City of Santa Cruz. DSS Model, Section: Demand Analysis, Feb 16, 2016.

# 5. RECOMMENDED MEASURES

Maddaus Water Management (MWM) employed its Least Cost Planning Decision Support System Model (DSS Model) for the technical analysis. The following sections describe key elements used in the analysis that were reviewed during past Water Commission Meetings with public input along with both a webinar and two in-person workshops, including interested local community stakeholders, Water Commission members, and Water Supply Advisory Committee members. This section also presents a summary of the proposed measures, including their descriptions and estimated water savings. Background information on MWM's DSS Model can be found in Appendix A.

The initial process to identify and thoroughly evaluate potential conservation measures was iterative. First, an extensive list of more than 90 potential measures was generated based on input from City staff, consultants, Water Commissioners, and the public. This task included a review of the current active water conservation measures and the identification of new measures that may be appropriate for the City's service area. Next, the list of potential measures was screened to set aside measures that may not be appropriate for myriad reasons to seek those that would be included in the future program. The following criteria were used to narrow the list of potential measures:

- Water Saving Potential – emphasize measures that reduce average daily water use the most within the Santa Cruz community
- Sustainable Water Savings – emphasize measures that have long-term reliability
- Quantifiable Water Savings – emphasize measures where water savings can be accurately predicted
- Widespread Community and Social Acceptance – emphasize measures with high participation rates, low out-of-pocket expenses, and are equitable across customer type and social demographics
- Feasibility of Implementation/Secondary Impacts – emphasize measures that can achieve objectives
- Ancillary Benefits – emphasize measures that achieve additional goals, such as reducing energy/greenhouse gases (GHGs), reducing peak-season use, providing valuable customer service, and other non-quantifiable benefits (behavioral change, public awareness, etc.)

Further details about this process as well as a list of all the 90 potential measures are available from City staff. From the screening, the Water Commission added to and approved the recommended list of measures for the technical analysis phase of the project.

During the WSAC Report development, several additional measures were considered and added to the program. The result of the WSAC work on demand management was to shift the focus more toward reducing peak season use to increase supply reliability. It did so by considering measures to reduce outdoor use in residences and large landscapes, but also by enhancing base or indoor measures that lessen overall demand or that target specific uses, including visitor-serving uses, and thereby help reduce the City's peak season water use. The recommended program now matches the recommended measures list published in the October 2015 Water Supply Advisory Committee Final Report on Agreements and Recommendations, Table 14. The following table presents a basic description of each measure and the types of customers each measure targets. More detailed information and assumptions are described in the DSS Model.

**Table 5-1. Basic Measure Descriptions**

| No. | Measure Name | Type of Customer | Description |
|---|---|---|---|
| 1 | System Water Loss Reduction | System | This measure's purpose is to identify and reduce water losses in the City's water system. The City is currently doing a water loss control study to review its annual water audit, look at water losses, and design a cost-effective water loss control program. The City currently loses an average of 7.5% of all treated water due to leaks, meter inaccuracies, and other problems. The goal of this measure is to reduce the City's system water losses on a long-term basis by an average of 1%. A new state law passed in 2015 that will require water suppliers to conduct water system audits, verify, and report water losses every year to the state beginning in 2017. |
| 2 | Advanced Metering Infrastructure (AMI) | Single Family (SF), Multifamily (MF), Commercial (COM) | This measure involves a major investment to upgrade meter reading technology and data management abilities. The City currently uses an Automatic Meter Reading system (AMR) in which water meters are read monthly by radio equipment that then transmits the information back to the City. This system may increase the frequency of meter reading from once a month to once an hour. The main water conservation (savings) benefits are for customer in-home or outdoor leak detection and increased customer awareness of water use. Other benefits include more action in enforcing the drought restrictions and more efficient customer service. Utility billing would continue to be on a monthly basis. |
| 3 | Large Landscape Budget-Based Water Rates | Irrigation (IRR) | This measure includes the development of individual monthly water budgets for irrigation customers. Water budgets are connected to a water rate schedule where water rates increase when a customer goes above their landscape water budget, or decreases if they are below budget. Budgets are typically based on factors like the size of the irrigated area, plant material and changes in weather conditions. |
| 4 | General Public Information | SF | This measure addresses opportunities to use public information programs as an effective tool to inform customers about the need for water conservation and conservation-related benefits. The current campaign is called "*Surf City Saves"* program. This measure includes paid and public service advertising, newsletters, bill inserts, information on the utility bill, a website, flyers and brochures, media campaigns, community meetings, direct mailings, community engagement at local activities, and other techniques. Public information is often carried out and coordinated with other agencies, groups, and schools. |
| 5 | Public Information (Home Water Use Report) | SF | This measure involves contracting with a firm to produce a detailed water billing report for high use customers that is in addition to their normal utility bill. This billing report compares water use in the neighborhood and offers suggestions to customers on ways to reduce water use. |
| 6 | Residential Leak Assistance | SF, MF | Customer leaks can go uncorrected at homes where owners are not able to pay the costs of repair. This measure would involve the City either paying part of the repair or paying the entire cost of the repair with funds that are paid back from customer water bills over time. This measure may also include an option to replace inefficient plumbing fixtures at low-income residences. |
| 7 | Single Family Residential Surveys | SF | This measure provides an outdoor water survey for existing single family residential customers. High water users will be targeted. This measure may include giving away water-efficient showerheads, faucet aerators, and toilet devices. This measure would provide a basic outdoor survey (look for leaks, irrigation problems and scheduling, plant information, etc.) and promote landscape and irrigation programs and improvements to reduce peak season water use. |
| 8 | Plumbing Fixture Giveaway/ Opt | SF, MF | The City would buy large amounts of efficient showerheads, kitchen and lavatory faucet aerators, shower timers and hose timers. Hose nozzles and leak detection tablets would be available for distribution at the Utility office and at community events. |
| 9 | Residential Ultra High Efficiency Toilet Rebates | SF, MF | This measure provides a rebate or voucher for the installation of an ultra-high efficiency toilet (UHET) that uses 1.0 gallons of water or less per flush (gpf). |
| 10 | High Efficiency Clothes Washer Rebates | SF, MF | The City would provide a rebate for high-efficiency clothes washing machines (HECW) to single family homes and in-unit condo/apartment complexes that do NOT have common laundry rooms. This program would be similar to the City's current program, except that higher rebate amounts would be increased for qualifying machines that are listed as Energy Star "Most Efficient" Clothes Washers. |
| 11 | High Efficiency Clothes Washer - New Development | SF, MF, COM | This measure would involve amending the City's building regulations to require building developers to install an efficient clothes washer (meeting certain water efficiency standards, such as gallons per load). Inspections would be coordinated with City and County building departments to make sure that an efficient washer is installed before the new home or building is occupied. |
| 12 | Hot Water On Demand - New Development | SF, MF, COM | The City would work to pass an ordinance requiring developers and major building remodels (for example, 50% of value of improvements) to equip new homes or buildings with efficient hot-water-on-demand systems. These systems use a pump placed under the sink to recycle water sitting in the hot water pipes to the water heater or to move the water heater into the center of the house and/or reduce hot water waiting times by having an on-demand pump on a recirculation line looping back to the hot water heater. |
| 13 | Toilet Retrofit at Time of Sale | SF, MF, COM | This measure involves tracking real estate sales within the City's water service area and working with buyers, sellers, and the real estate industry to retrofit older, inefficient toilets, showerheads, and urinals are upgraded with the most efficient fixtures when real estate is sold. A property inspection by either City staff or a licensed plumbing/general building would be required to verify compliance with the regulation. |

| No. | Measure Name | Type of Customer | Description |
|---|---|---|---|
| 14 | COM MF Common Laundry Room High Efficiency Clothes Washer | MF, COM | This measure provides a rebate for the installation of a high efficiency commercial washer (HEW) in COM laundromats and MF common area laundry rooms. |
| 15 | COM Incentives | MF, COM | After getting a free water use survey (Measure 17), the City will analyze the survey recommendations and determine if the MF or COM site qualifies for a financial incentive (reward). Financial incentives will be provided after analyzing the cost-benefit ratio of each proposed project. Incentives are designed to fit each individual site as each site has varying water savings potentials. Incentives will be given based on the decisions of the City specifically and while the money lasts. |
| 16 | Pre-Rinse Spray Nozzle Installation | COM | The City will provide free 1.3 gpm (or lower) pre-rinse spray nozzles, and possibly free installation of nozzles, in restaurants and other commercial kitchens. |
| 17 | COM Surveys | MF, COM | This measure will offer top MF and COM water customers a professional water survey that would evaluate ways for the site to save water and money. The surveys would be for large accounts (accounts that use more than 5,000 gallons of water per day, or the top 3%), such as hotels, restaurants, stores, and schools. |
| 18 | High Efficiency Urinal Program | COM, Municipal (MUN), Industrial (IND) | The City will provide a rebate or voucher for the replacement of older, high use urinals with high efficiency urinals (HEU) and flush valves using 0.125 gpf (1 pint) or less. |
| 19 | Public Restroom Faucet Retrofit - MUN | MUN | This measure includes the direct installation of high efficiency (0.5 gpm) sensor faucet fixtures in institutional (public) buildings, such as schools, hospitals, etc. High-use municipal building will be focused on first. |
| 20 | Public Restroom Faucet Retrofit - COM | COM | This measure includes the direct installation of high efficiency (0.5 gpm) sensor faucet fixtures in commercial buildings, such as businesses. High-use commercial buildings will be focused on first. |
| 21 | School Retrofit | MUN | This school retrofit program involves a school receiving funding to replace non-efficient fixtures, retrofit mixed use meters to dedicated irrigation meters, and upgrade irrigation systems. |
| 22 | Water Efficient Landscape Ordinance | SF, MF, COM, MUN, IND | This measure accounts for the lower irrigation water use that new accounts have due to their more efficient landscape designs, which are a result of the City's Landscape Code (implementation of Statewide Model Landscape Ordinance). The City is in the process of updating this code to keep up with new state regulations and technology for irrigation controllers and irrigation equipment. |
| 23 | Single Family Residential Turf Removal | SF | This measures provides a per-square-foot incentive to SF customers to remove and replace turf (grass) with low-water-use plants or permeable hardscape (pavers, concrete, etc. that allows water to soak through and into the ground). This is modeled after the City's current program. The rebate is currently $0.50 per square foot and capped at $500 per year for a single family residence. To increase participation, this measure would increase the rebate to $1 per square foot and a $1,000 maximum per year, or more in both cases. |
| 24 | Multifamily Residential/CII Turf Removal | MF, COM, MUN, IRR | This measure provides a per-square-foot incentive to MF, COM, MUN, and IRR customers to remove and replace turf with low-water-use plants or permeable pavers (or other permeable hardscape). The rebate is currently $0.50 per square foot of turf removed and capped at $2,500 per year for multifamily or commercial residences. This measure would increase the rebate to $1 per square foot and a $5,000 maximum per year, or more to increase participation. |
| 25 | Expand Large Landscape Survey/Water Budgets | IRR | This measure expands on the City's existing landscape water budget program to include more dedicated irrigation accounts Outdoor water audits will be offered for existing customers with problems of overwatering or water waste. Normally those with high water use are focused on and provided a customized report telling them how to save water. All multifamily residential, CII, and public irrigators of large landscapes would be eligible for free landscape water audits upon request. This measure is connected to Measure 3 above, Large Landscape Budget-Based Water Rates. |
| 26 | Sprinkler Nozzle Rebates | SF, MF, COM | The City will provide rebates to replace standard spray sprinkler nozzles with more efficient rotating nozzles. Nozzles cost about $6 each. |
| 27 | Gray Water Retrofit | SF | The City will hold a workshop to support a Gray Water Challenge or similar program. A rebate will be offered that will help to cover a portion of the cost to single family homeowners per year who install gray water systems. A gray water kit/package, available from local hardware stores, would be supported by this City rebate. |
| 28 | Residential Rain Barrels | SF | The City will provide an incentive for the installation of rain barrels. This could involve rebates, purchasing rain barrels in high quantities, and giveaways of barrels, as well as workshops on proper installation and use of captured rain water for landscape irrigation. |
| 29 | Climate Appropriate Landscaping | SF, MF, COM, MUN | This measure will provide incentives for the installation of climate-appropriate and rainwater infiltration landscape (soaks up water on-property as opposed to running off-property). This measure will provide rebates to Home Owners Associations (HOAs), businesses, and institutions that increase their outdoor water use efficiency |

| No. | Measure Name | Type of Customer | Description |
|---|---|---|---|
| | and Rainwater Infiltration | | by replacing qualifying high water use landscape and/or upgrading to qualifying high efficiency irrigation equipment or climate appropriate landscape. To qualify, sites must participate in a pre-inspection before beginning their project or purchasing materials. Single family homes, multifamily homes, and business properties with qualifying irrigated landscape (i.e., irrigated turf or a functional swimming pool) can receive rebates for replacing high-water-use landscape (e.g., irrigated turf grass) with a minimum of 50% plant coverage consisting of low-water-use plants from the Approved Plant List.<br><br>Recommendations from the Water Supply Alternatives Committee (WSAC) Report include:<br>• Increase turf conversion rebate<br>• Require conversion of spray to drip for shrub irrigation<br>• Discourage runoff through rainwater infiltration features (i.e., permeable pavers)<br>• Support local actions for climate-appropriate landscaping<br>• Focus on landscape narrower than 10 feet – no spray irrigation and/or next to hardscapes |
| **30 SF** | SF Conservation Pricing - Water and Sewer | SF | This measure is awaiting the results of an ongoing rate study conducted by Rafetlis Financial Consultants, Inc. in 2016. |
| **30 MF** | MF Conservation Pricing - Water and Sewer | MF | This measure is awaiting the results of an ongoing rate study conducted by Rafetlis Financial Consultants, Inc. in 2016. |
| **30 COM** | COM Conservation Pricing - Water and Sewer | COM | This measure is awaiting the results of an ongoing rate study conducted by Rafetlis Financial Consultants, Inc. in 2016. |
| **31** | Single Family Multifamily Dishwasher Rebates | SF, MF | This measure provides incentives for the purchase of water efficient dishwashers (Residential WF of 6.25 or less). |
| **32** | Hot Water Recirculation Systems | SF, MF, COM | This measure provides incentives for the installation of a hot water recirculation system. Having hot water discharge promptly is important for energy and water use efficiency. A hot water recirculating system enables the cold water in the hot water pipes to be continually returned to the water heater and reheated before the hot water faucet is turned on. Rebates would be available to the following water customer groups:<br>- single family dwellings, including townhomes and mobile homes<br>- apartment complexes<br>- commercial institutions<br>- commercially zoned businesses or institutions<br><br>Maximum rebates allowable: (a) $300 per single family account and (b) $3,000 per commercial, industrial, or institutional account (e.g., as laundromats and apartments). |
| **33** | Rewarding Businesses For Adopting Best Practices | COM | This measure offers commercial customers who employ best practices an increased water supply reliability and a lower price. For a business, the difficulty of rationing water during severe drought years can have a negative effect on its profits. This measure proposes that the City's Water Shortage Contingency Plan be changed so that businesses who adopt best practices, such as efficient plumbing fixtures, hotel laundry recycling, and climate-appropriate landscaping, would get a lower level of water usage reduction during a severe drought. For example, in a Stage 4 drought, with a system-wide goal of 35% reduction, the current plan is to have the water allotment of businesses be 87% of their normal year water use. Under this measure, businesses adopting best practices would be expected to cut back to only 95% of normal use, rather than 87%. These businesses could also be rewarded with a lower rate for their water use. |
| **34** | Additional Building Code Requirements for New Development | SF, MF, COM, MUN, IND | New CalGreen Building Codes already included in DSS Model (see Section 4 above) already takes many of the items recommended by WSAC into account.<br>This measure currently cannot be measured with regard to future additional CalGreen updates and water savings.<br>This measure involves the coming together of a working group of planners, builders, conservation groups, and Water Department personnel to evaluate possible additions to current codes and fee structures that would encourage water conservation. Some examples include: (1) requiring high efficiency washers in new development and (2) requiring hot water on demand/structured plumbing in new development. It is also intended that the work group track and incorporate new technologies in future City codes. |
| **35** | Innovation Incubator Program | SF, MF, COM, MUN | This measure would establish an Innovation Incubator Program allowing Santa Cruz to continue its leadership in water management by creating a program that supports new developments in:<br>• New technologies, customer financing programs, and customer outreach programs; and<br>• Pilot projects to promote popular adoption of rainwater for toilets & washers, new technology toilets in institutional buildings, onsite recycling of graywater, rainwater irrigated lawns, and promotion of native plant landscapes. Small grants would be offered to local businesses and/or working with state and national organizations like California Urban Water Conservation Council, California Water Foundation, California Urban |

| No. | Measure Name | Type of Customer | Description |
|---|---|---|---|
| | | | Water Agencies, University of California (Santa Cruz or Davis), Alliance for Water Efficiency, Water Research Foundation, US Bureau of Reclamation, or other coalitions of utilities or research-focused organizations. |

**Notes:**

| | | |
|---|---|---|
| AMI – Advance Metering Infrastructure | HECW – high efficient clothes washing machine | MF – multifamily |
| AMR – Automatic Meter Reading System | HEU – high efficiency urinal | MUN – municipal |
| COM – commercial | HEW – high efficiency commercial washer | SF – single family |
| gpf – gallons per flush | HOA – Home Owners Association | UHET – ultra-high efficiency toilet |
| gpm – gallons per minute | IND – industrial | WF – water factor, gallons per cubic foot |
| | IRR – irrigation | WSAC – Water Supply Alternatives Committee |

A total of 35 individual measures are evaluated in the current Santa Cruz DSS Model. This number counts the three pricing measures as one measure (which is yet to be fully defined until the City's Water Rate Study is complete). For each measure selected to be modeled, a measure description, as well as details on each measure's utility and customer costs, time period, and targets can be found in the DSS Model's measure inputs. More detailed information on model inputs for each measure is available from City staff. Some of the key assumptions used in evaluating the water savings, benefits, and costs include the following:

- Applicable customer class
- Applicable end use
- Estimated annual account participation rates
- Evaluation start and end year
- Measure length, years
- Measure life, years
- Utility unit cost, $
- Customer unit cost, $
- Estimated annual administration and marketing overhead, %

These measures listed in Table 5-1 make-up the City's Recommended Program which consists of both passive and active elements. Plumbing code measures account for 53% of the future conservation potential achieved and are independent of any program – the savings are based on customers following applicable current local, state and federal laws, building codes and ordinances. Recommended Program active measures fall within one of four categories: 1) general measures, 2) residential measures (indoor), 3) commercial measures (indoor), and 4) irrigation measures (outdoor).

# 6. RECOMMENDED PROGRAM RESULTS

This section presents the Recommended Program water savings as well as projected demand and per capita water use with these savings. The Recommended Program's overall cost of water saved and proposed schedule is also shown.

## 6.1 Total Water Savings

Table 6-1 below presents each Recommended Program measure's water savings in million gallons (MG) per year for year 2035 as a result of each measure's design and implementation schedule. Year 2035 savings include ongoing savings still valid since the measure's start. Savings per measure presented in the Table assume the measures are implemented on a stand-alone basis (i.e., without interaction or overlap from other measures that might address the same end use or uses).

It is important to understand that the savings from measures presented in the table, which address the same end use(s) are not simply additive. The DSS Model uses impact factors to avoid double counting in estimating the water savings from programs of measures. For example, if two measures are planned to address the same end use and both save 10% of the prior water use, then the net effect is not the simple sum (20%). Rather it is the cumulative impact of the first measure reducing the use to 90% of what it was without the first measure in place and then reducing the use another 10% to result in the use being 81% of what it was originally. In this example the net savings is 19%, not 20%. Using impact factors, the model computes the reduction as follows, 0.9 x 0.9 = 0.81 or 19% water savings.

Since interaction between measures has not been accounted for in Table 6-1 below, it is not appropriate to include a total in the bottom row. However, the table is useful to give a close approximation of the savings of each individual measure.

**Table 6-1. Recommended Program Individual Measure Cost of Water Saved and 2035 Water Savings (MGY)**

| No. | Measure Name | Cost of Water Saved ($/MG) | 2035 Water Savings (MG) |
|---|---|---|---|
| **1** | System Water Loss Reduction | $3,923 | 34.87 |
| **2** | Advanced Metering Infrastructure | $1,269 | 45.94 |
| **3** | Large Landscape Budget-Based Water Rates | $194 | 12.83 |
| **4** | General Public Information | $8,334 | 5.73 |
| **5** | Public Information (Home Water Use Report) | $2,518 | 11.39 |
| **6** | Residential Leak Assistance | $2,117 | 22.03 |
| **7** | Single Family Residential Surveys | $7,735 | 2.78 |
| **8** | Plumbing Fixture Giveaway/Opt | $1,479 | 2.03 |
| **9** | Residential Ultra High Efficiency Toilet Rebates | $5,316 | 2.91 |
| **10** | High Efficiency Clothes Washer Rebates | $2,794 | 36.20 |
| **11** | High Efficiency Clothes Washer - New Development | $1,368 | 12.53 |
| **12** | Hot Water On Demand - New Development | $7,849 | 4.46 |
| **13** | Toilet Retrofit at Time of Sale | $1,516 | 8.70 |
| **14** | CII MF Common Laundry Room High Efficiency Clothes Washer | $4,258 | 3.07 |
| **15** | CII Incentives | $533 | 18.39 |
| **16** | Pre-Rinse Spray Nozzle Installation | $153 | 9.16 |
| **17** | CII Surveys | $4,056 | 19.24 |
| **18** | High Efficiency Urinal Program | $5,220 | 3.22 |
| **19** | Public Restroom Faucet Retrofit - MUN | $23,467 | 0.29 |
| **20** | Public Restroom Faucet Retrofit - COM | $9,780 | 8.47 |
| **21** | School Retrofit | $1,883 | 2.88 |
| **22** | Water Efficient Landscape Ordinance | $602 | 6.66 |
| **23** | Single Family Residential Turf Removal | $22,157 | 4.18 |
| **24** | Multifamily Residential/CII Turf Removal | $32,186 | 2.39 |
| **25** | Expand Large Landscape Survey/Water Budgets | $20,948 | 1.97 |
| **26** | Sprinkler Nozzle Rebates | $13,643 | 3.35 |
| **27** | Gray Water Retrofit | $15,742 | 0.24 |
| **28** | Residential Rain Barrels | $4,672 | 3.42 |
| **29** | Climate Appropriate Landscaping and Rainwater Infiltration | $33,221 | 8.26 |
| **30SF** | SF Conservation Pricing - Water and Sewer[1] | N/A | N/A |
| **30MF** | MF Conservation Pricing - Water and Sewer[1] | N/A | N/A |
| **30COM** | COM Conservation Pricing - Water and Sewer[1] | N/A | N/A |
| **31** | Single Family Multifamily Dishwasher Rebates | $29,602 | 0.20 |
| **32** | Hot Water Recirculation Systems | $15,650 | 1.38 |
| **33** | Rewarding Businesses For Adopting Best Practices | $6,030 | 3.64 |
| **34** | Additional Building Code Requirements for New Development[2] | N/A | N/A |
| **35** | Innovation Incubator Program | N/A | N/A |

[1]Pricing measure costs and savings are not yet available. These measures are awaiting the results of an ongoing rate study scheduled to be completed in 2016.
[2] New CalGreen Building codes, effective as of January 2016, are already modeled. This measure is awaiting support from a Working Group yet to be formed.

Notes:

1. This table does not contain a total in the bottom row intentionally. It is not applicable since interaction between measures has not been accounted for in this table but is at the program level.
2. Source: City of Santa Cruz. DSS Model, Section: Conservation Analysis, Feb 16, 2016.

Table 6-2 presents the benefit cost analysis summary for the Recommended Program, which includes all the measures listed in the previous Table 6-1.

Cost categories are defined as follows:

- Utility Costs – those costs that the City as a water utility will incur to operate the measure including administrative costs

- Utility Benefits – the avoided cost of producing water

The column headings in Table 6-2 are defined as follows:

- Average Cost of Water Saved ($/MG) = average cost to implement the program divided by the water savings over the life of the conservation measure.
- Water Savings in 2035 (MGY) = water saved in million gallons. The year 2035 is presented as this represents the end of the planning horizon for both the 2015 UWMP and this analysis effort.

**Table 6-2. Recommended Program Costs and Savings**

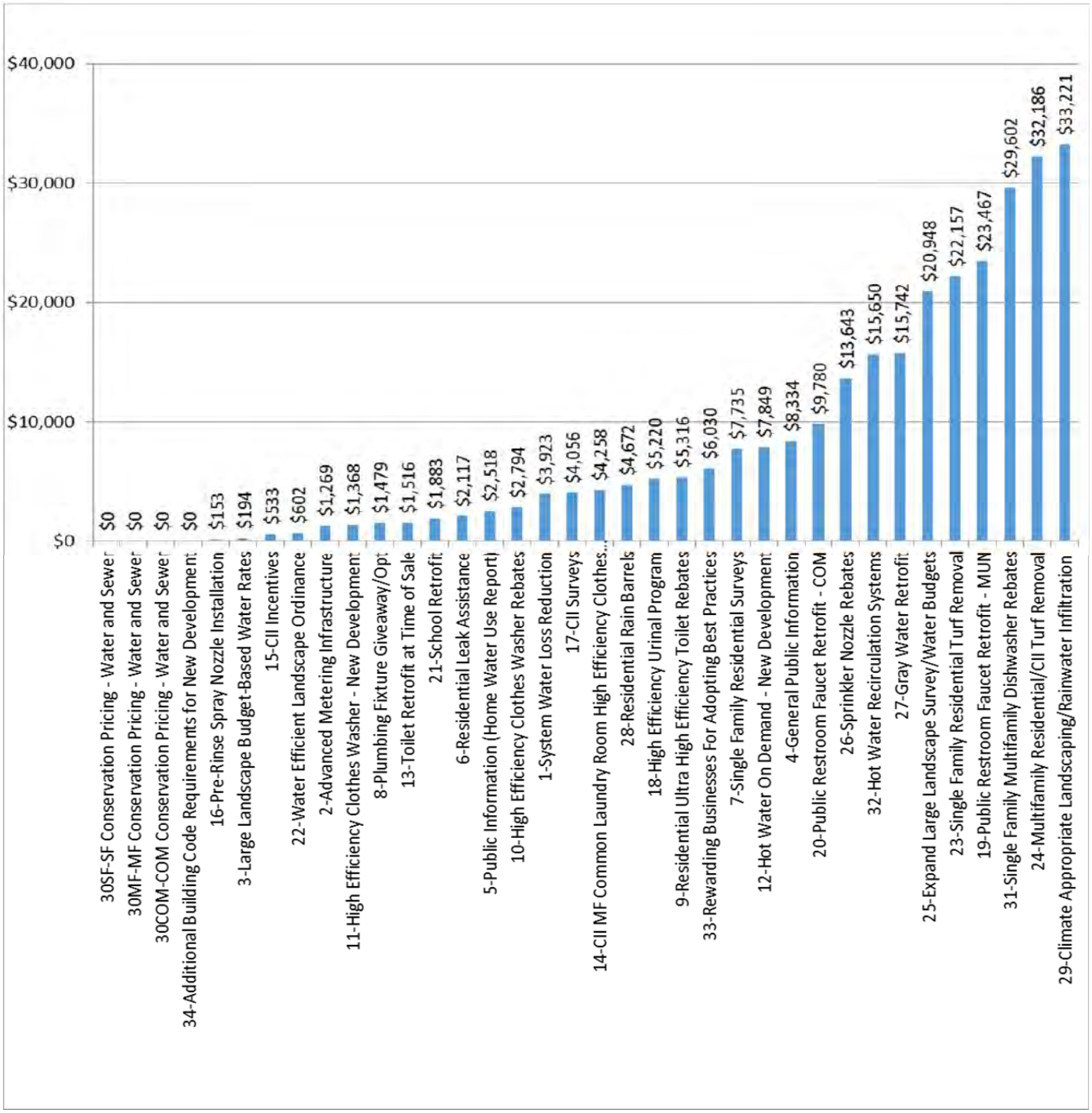
| Conservation Program | Average Cost of Water Saved $/MG | Water Savings over "Baseline" Demand in 2035 (MGY) |
|---|---|---|
| **Recommended Program with Plumbing Code Savings** | $4,572/MG | 619 |

Notes:

1. Across the modeling time period of 2015-2035, administrative costs average approximately 22% of total utility costs annually.
2. Source: City of Santa Cruz. DSS Model, Section: Results, Feb 16, 2016.

Figure 6-1 shows the costs of water saved for individual measures ranked from lowest to highest. The measures to be implemented in the next several years are a mix of some lower cost and some higher cost measures. Several of the measures addressing peak season water use have the highest unit costs, but, together as a package, the Recommended Program is $4,572/MG, well below the $10,000/MG the maximum level established by the WSAC which is lower than the expected unit cost of supply augmentation projects recommended to be pursued as a result of the WSAC's work.

**Figure 6-1. Conservation Measures Unit Cost of Water Saved ($/MG)**




Source: City of Santa Cruz. DSS Model, Section: Results, Feb 16, 2016.

Table 6-3 below shows the savings in 5-year increments for the plumbing codes, Recommended Program, and the Recommended Program with plumbing code savings.

**Table 6-3. Long Term Conservation Program Savings over "Baseline" Demand (MG/Year)**

| Conservation Program | 2020 | 2025 | 2030 | 2035 |
|---|---|---|---|---|
| Plumbing Code | 96 | 179 | 269 | 329 |
| Recommended Program | 137 | 232 | 269 | 291 |
| Recommended Program with Plumbing Code Savings | 233 | 411 | 538 | 619 |

Source: City of Santa Cruz. DSS Model, Section: Results, Feb 16, 2016.

The Recommended Program consists of both passive (plumbing codes which include state and Federal legislation for efficient fixture requirements for customers served by the City) and active elements. Plumbing code measures account for 53% of the future conservation potential achieved and are independent of any active conservation program.

## 6.2 Water Demand with Projected Savings

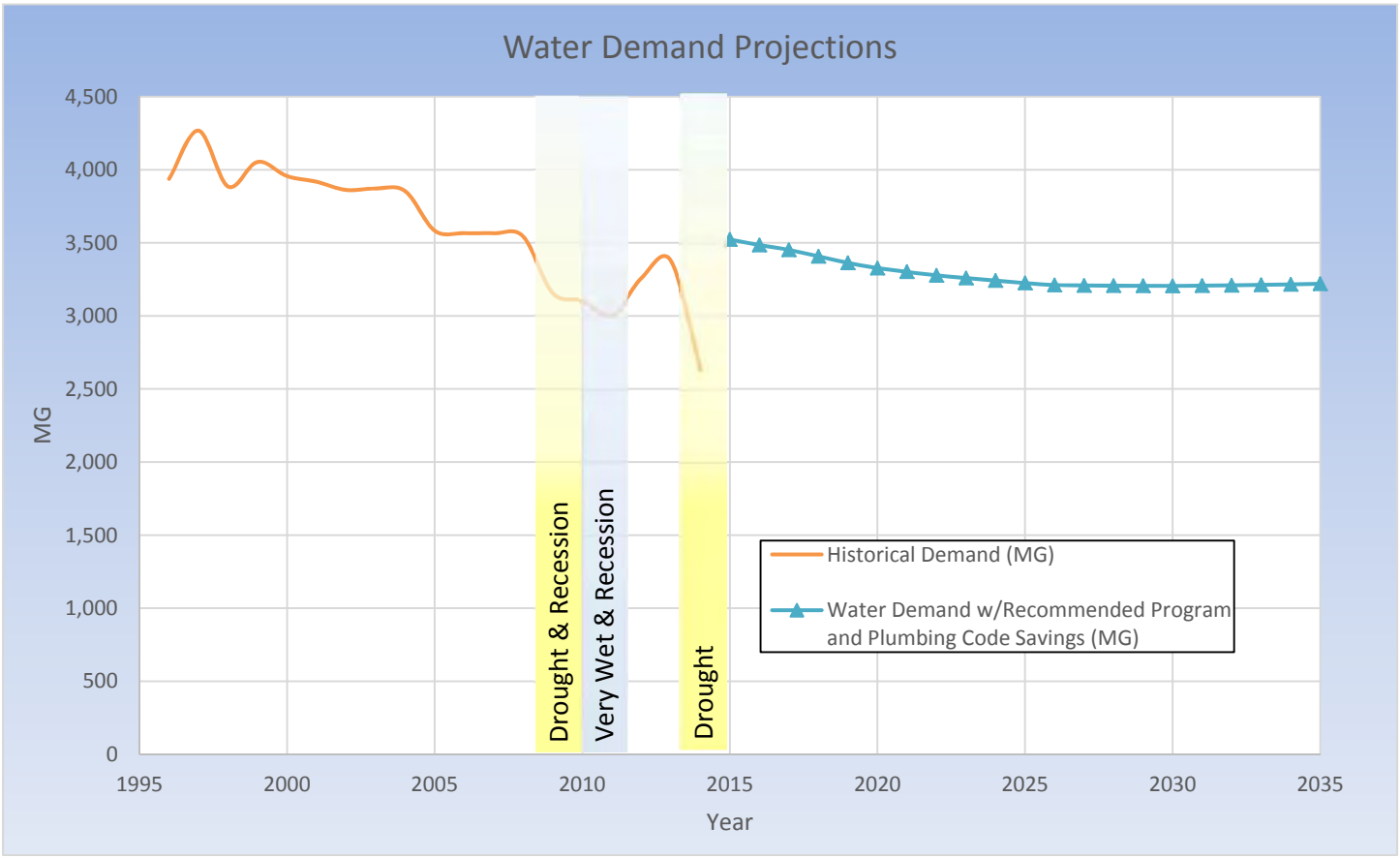
The Recommended Plan is envisioned to include strong customer participation to support additional planned growth while keeping total water use relatively constant for the next 20 years. New development will be built to water efficient standards following the 2015 CalGreen Plumbing Code, 2015 CEC Code, and other local ordinances (e.g., City's landscape ordinance). Water use in new homes should be less and more efficient than existing homes on comparable lot sizes. Table 6-4 and Figure 6-2 below present the Recommended Program projected water demands. Note that the Recommended Program with Plumbing Code is lower than the Demand Forecast by M.Cubed shown in Table 3-1. The Recommended Program forecast is 222 MGY lower (6%) than the M.Cubed forecast in 2035. This is due to increased savings by the new plumbing codes and new conservation programs that would be added over time.

**Table 6-4. Water Use Projections (MG/Year)**

| | 2020 | 2025 | 2030 | 2035 |
|---|---|---|---|---|
| Demand with Plumbing Code (MGY) | 3,464 | 3,456 | 3,474 | 3,510 |
| Demand with Plumbing Code and Recommended Program (MGY) | 3,327 | 3,225 | 3,205 | 3,220 |

Source: City of Santa Cruz. DSS Model, Section: Results, Feb 16, 2016.

**Figure 6-2. Recommended Program Projected Water Demands**




Source: City of Santa Cruz. DSS Model, Section: Results, Feb 16, 2016.

## 6.3 Per Capita Water Use

With two possible conservation target tracks to follow, the City has selected to aim to achieve SB X7-7 Method 3: 95% of State Hydrological Region Target by 2020. The City's baseline and target GPCD are as follows:

- Baseline GPCD = 113 GPCD
- 2015 Interim Target = 111 GPCD
- 2020 target = 110 GPCD
- CUWCC 2018 target = 101 GPCD

Table 6-5 below shows the projected per capita water use in gallons per day per person (GPCD) in 5-year increments for the projected demand with no plumbing code savings, projected demand with plumbing code savings, and projected demand with Recommended Program implementation and plumbing code savings.

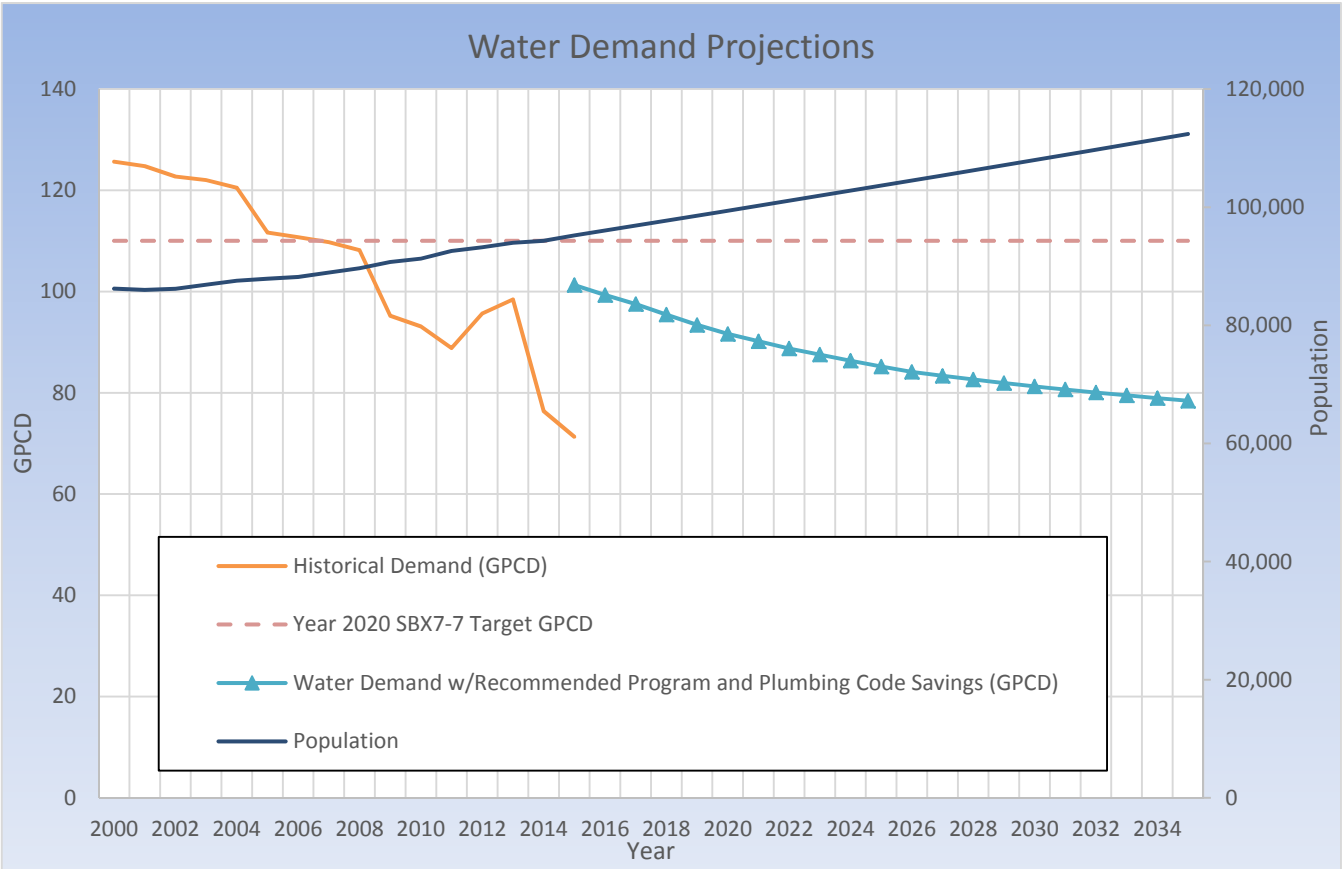
**Table 6-5. Projected Population and Per Capita Water Use (GPCD)[1]**

| | 2020 | 2025 | 2030 | 2035 |
|---|---|---|---|---|
| **Population [2]** | 99,403 | 103,620 | 107,989 | 112,390 |
| **"Baseline" Demand without Plumbing Code (GPCD)** | 98 | 96 | 95 | 94 |
| **Demand with Plumbing Code (GPCD)** | 95 | 91 | 88 | 86 |
| **Demand with Plumbing Code and Recommended Program (GPCD)** | 92 | 85 | 81 | 78 |

[1] City of Santa Cruz. DSS Model, Section: Results, Feb 16, 2016.
[2] WSAC Final Report, October 2015.

The following Figure 6-3 presents the SB X7-7 year 2020 GPCD target and historical and projected GPCD estimates with plumbing codes and Recommended Program savings. As seen below, the City has already met its state-mandated 2020 target and surpassed its voluntary CUWCC 2018 goal. The goal of the City's plan is to press beyond these state targets and instead maximize conservation savings to help meet local resource needs for current and future water demands.

**Figure 6-3. Water Conservation Program Savings Projections – SB X7-7 Target, GPCD**




Source: City of Santa Cruz. DSS Model, Section: Results, Feb 16, 2016.

## 6.4 Overall Cost of Water Saved

The cost of water saved per unit volume ($/MG) for the Recommended Program is $4,572/MG. This is below the Water Supply Alternatives Committee's recommended threshold for overall cost of water saved, which is $10,000/MG.

The cost of water saved for the Recommended Program can be compared to the City's avoided cost of water as one indicator of the cost effectiveness of the conservation program. It should be noted that the cost of water saved value somewhat undervalues the cost of savings because program costs are discounted to present value and the water benefit is not.

## 6.5 Key Findings

As a result of this comprehensive analysis here are some summary observations and conclusions:

1. The additional, incremental water savings from the Recommended Program, compared to the City's recent demand forecast, amount to about 220 million gallons in 2035.
2. The estimated annual demand will decline over time to about 3.2 billion gallons per year (bgy) in 2035, versus about 3.4 bgy estimated in the demand study. That estimate is comparable to the actual level of water production experienced in the late 1960s, when the service area population was around 50,000.
3. The impact on water savings from 2015 changes in the fixture plumbing codes prompted by the emergency conservation regulations (which would not have been factored in but for the delay associated with the Water Supply Advisory Committee's process) is over 100 million gallons more than previously estimated.
4. The overall cost of water saved by the Recommended Program is about half of what the WSAC set as a recommended threshold.
5. Gross per capita water use is expected to gradually decline to a level of less than 80 GPCD in 2035.

## 6.6 Proposed Schedule

The following Figure 6-4 presents the proposed Recommended Program implementation schedule.

**Figure 6-4. Recommended Program Proposed Implementation Schedule**

| No. | Measure | Time Period | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 | 2035 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | System Water Loss Reduction | 2015 - 2035 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 2 | Advanced Metering Infrastructure | 2021 - 2035 | | | | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 3 | Large Landscape Budget-Based Water Rates | 2018 - 2020 | | | | ■ | ■ | ■ | | | | | | | | | | | | | | | |
| 4 | General Public Information | 2015 - 2035 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 5 | Public Information (Home Water Use Report) | 2018 - 2035 | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 6 | Residential Leak Assistance | 2018 - 2035 | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 7 | Single Family Residential Surveys | 2015 - 2035 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 8 | Plumbing Fixture Giveaway/Opt | 2015 - 2017 | ■ | ■ | ■ | | | | | | | | | | | | | | | | | | |
| 9 | Residential Ultra High Efficiency Toilet Rebates | 2015 - 2020 | ■ | ■ | ■ | ■ | ■ | ■ | | | | | | | | | | | | | | | |
| 10 | High Efficiency Clothes Washer Rebates | 2015 - 2026 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | | | | | | | | |
| 11 | High Efficiency Clothes Washer - New Development | 2021 - 2035 | | | | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 12 | Hot Water On Demand - New Development | 2021 - 2035 | | | | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 13 | Toilet Retrofit at Time of Sale | 2015 - 2019 | ■ | ■ | ■ | ■ | ■ | | | | | | | | | | | | | | | | |
| 14 | CII MF Common Laundry Room High Efficiency Clothes Washer | 2015 - 2024 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | | | | | | | | | | |
| 15 | CII Incentives | 2021 - 2026 | | | | | | | ■ | ■ | ■ | ■ | ■ | ■ | | | | | | | | | |
| 16 | Pre-Rinse Spray Nozzle Installation | 2015 - 2016 | ■ | ■ | | | | | | | | | | | | | | | | | | | |
| 17 | CII Surveys | 2021 - 2026 | | | | | | | ■ | ■ | ■ | ■ | ■ | ■ | | | | | | | | | |
| 18 | High Efficiency Urinal Program | 2015 - 2018 | ■ | ■ | ■ | ■ | | | | | | | | | | | | | | | | | |
| 19 | Public Restroom Faucet Retrofit - MUN | 2021 - 2023 | | | | | | | ■ | ■ | ■ | | | | | | | | | | | | |
| 20 | Public Restroom Faucet Retrofit - COM | 2021 - 2030 | | | | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | | | | |
| 21 | School Retrofit | 2021 - 2030 | | | | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | | | | |
| 22 | Water Efficient Landscape Ordinance | 2015 - 2035 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 23 | Single Family Residential Turf Removal | 2015 - 2035 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 24 | Multifamily Residential/CII Turf Removal | 2015 - 2035 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 25 | Expand Large Landscape Survey/Water Budgets | 2018 - 2035 | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 26 | Sprinkler Nozzle Rebates | 2018 - 2035 | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 27 | Gray Water Retrofit | 2015 - 2035 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 28 | Residential Rain Barrels | 2015 - 2035 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 29 | Climate Appropriate Landscaping and Rainwater Infiltration | 2018 - 2035 | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 30SF | SF Conservation Pricing - Water and Sewer | 2018 - 2035 | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 30MF | MF Conservation Pricing - Water and Sewer | 2018 - 2035 | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 30COM | COM Conservation Pricing - Water and Sewer | 2018 - 2035 | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 31 | Single Family Multifamily Dishwasher Rebates | 2018 - 2022 | | | | ■ | ■ | ■ | ■ | ■ | | | | | | | | | | | | | |
| 32 | Hot Water Recirculation Systems | 2018 - 2022 | | | | ■ | ■ | ■ | ■ | ■ | | | | | | | | | | | | | |
| 33 | Rewarding Businesses For Adopting Best Practices | 2020 - 2035 | | | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 34 | Additional Building Code Requirements for New Development | 2018 - 2035 | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 35 | Innovation Incubator Program | 2021 - 2035 | | | | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |

Source: City of Santa Cruz. DSS Model. Section: Conservation Analysis, Feb 16, 2016.

## 6.7 Monitoring

The Plan is intended to be dynamic and changes and adjustments are expected. Monitoring progress on implementing recommended programs should be a priority. Costs, participation rates, and water use should be tracked to ensure that the plan is on target to meet goals. As new promising technologies emerge, they should be tested and possibly replace programs that are underachieving. Summary reports should be issued citing progress and recommending changes in program content. Comprehensive review of the plan every five years will ensure the plan reflects current technology and codes, and will provide an opportunity to check success and progress in meeting conservation goals.

# 7. NEXT STEPS

Obtain Commission approval and support to gain City Council direction to proceed with completion of writing the Water Conservation Master Plan document.

# 8. REFERENCES


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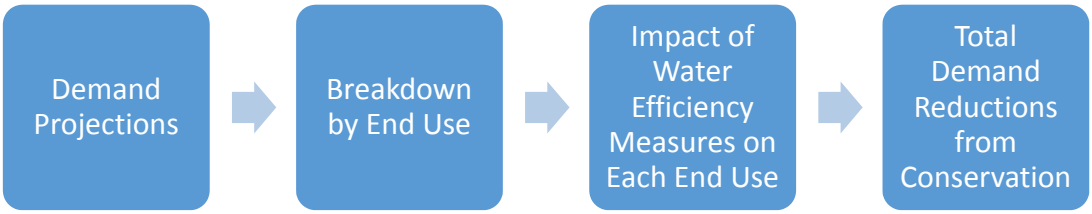
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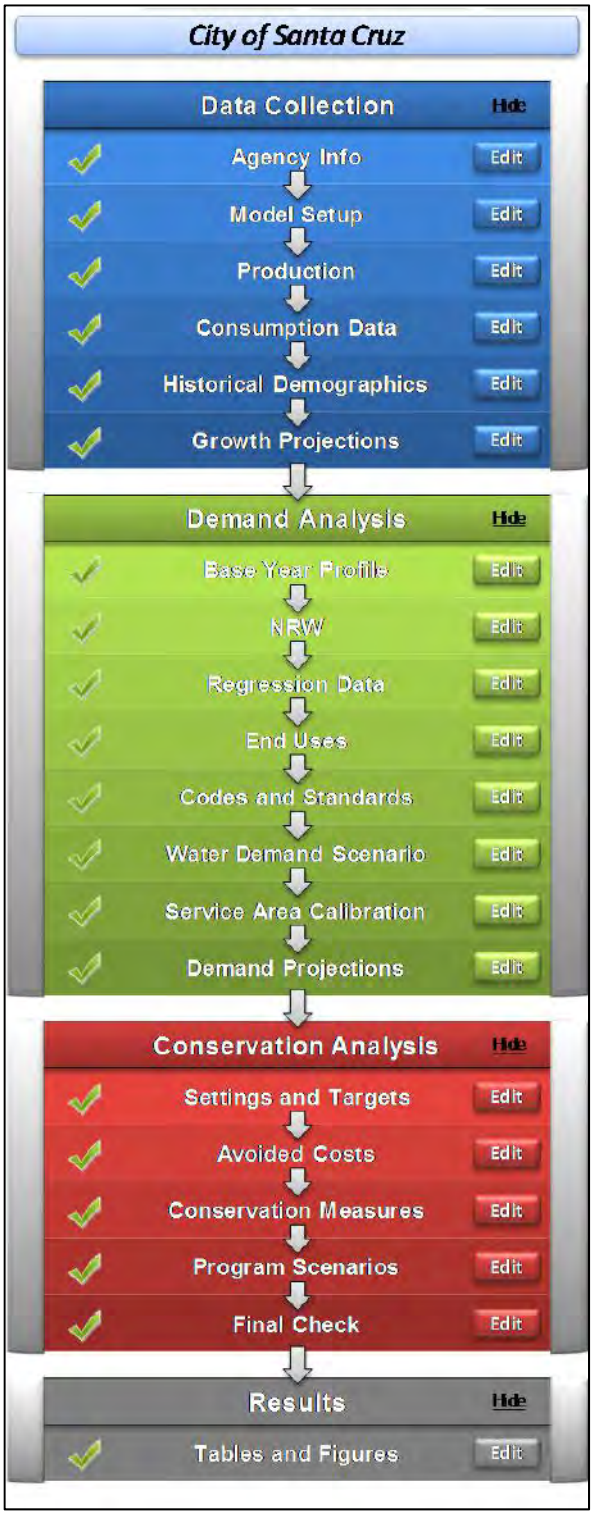
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# APPENDIX A: DESCRIPTION OF THE DSS MODEL




The DSS Model prepares long-range, detailed demand projections. The purpose of the extra detail is to enable a more accurate assessment of the impact of water efficiency programs on demand. A rigorous modeling approach is especially important if the project will be subject to regulatory or environmental review.

The DSS Model is an end-use model that breaks down total water production (water demand in the service area) to specific water end uses. The model uses a bottom-up approach that allows for multiple criteria to be considered when estimating future demands, such as the effects of natural fixture replacement, plumbing codes, and conservation efforts. The DSS Model may also use a top-down approach with a utility prepared water demand forecast.

To forecast urban water demands using the DSS Model, customer demand data is obtained from the water agency being modeled. The demand data is reconciled with available demographic data to characterize the water usage for each customer category in terms of number of users per account and per capita water use. The data is further analyzed to approximate the split of indoor and outdoor water usage in each customer category. The indoor/outdoor water usage is further divided into typical end uses for each customer category. Published data on average per-capita indoor water use and average per-capita end use is combined with the number of water users to calibrate the volume of water allocated to specific end uses in each customer category. In other words, the DSS Model checks that social norms from end studies on water use behavior (e.g., flushes per person per day) are not exceeded.

The DSS Model evaluates conservation measures using benefit cost analysis with the present value of the cost of water saved ($/Acre-Foot). Benefits are based on savings in water and wastewater facility operations and maintenance (O&M). The figures above and to the left illustrate the processes for forecasting conservation water savings, including the impacts of fixture replacement due to plumbing codes and standards already in place.

The DSS Model has been used for practical applications of conservation planning in over 230 service areas representing 20 million people, including extensive efforts nationally in California, Colorado, Hawaii, Utah, Georgia, Florida, North Carolina, Oregon, and Ohio, and internationally in Australia, New Zealand, and Canada.

# CUWCC BMP Retail Coverage Report 2013

*Foundational Best Managemant Practices for Urban Water Efficiency*

## BMP 1.1 Operation Practices

**ON TRACK**

**6270 City of Santa Cruz Water Department**

**1. Conservation Coordinator provided with necessary resources to implement BMPs?**

| | |
|---|---|
| Name: | Toby Goddard |
| Title: | Water Conservation Manager |
| Email: | tgoddard@cityofsantacruz.com |

**2. Water Waste Prevention Documents**

| WW Document Name | WWP File Name | WW Prevention URL | WW Prevention Ordinance Terms Description |
|---|---|---|---|
| Option A Describe the ordinances or terms of service adopted by your agency to meet the water waste prevention requirements of this BMP. | | http://www.codepublishing.com/CA/SantaCruz/html/SantaCruz16/SantaCruz16.html | See Santa Cruz Municipal Code Chapter 16 for the following:<br>a) 16.01 Water Shortage Regulations and Restrictions<br>b) 16.02 Water Conservation/Water Waste Prohibition Ordinance<br>c) 16.16 Water Efficient Landscape Ordinance |
| Option B Describe any water waste prevention ordinances or requirements adopted by your local jurisdiction or regulatory agencies within your service area. | | | |
| Option C Describe any documentation of support for legislation or regulations that prohibit water waste. | | | |
| Option D Describe your agency efforts to cooperate with other entities in the adoption or enforcement of local requirements consistent with this BMP. | | | |
| Option E Describe your agency support positions with respect to adoption of legislation or regulations that are consistent with this BMP. | | | |
| Option F Describe your agency efforts to support local ordinances that establish permits requirements for water efficient design in new development. | | | |

**At Least As effective As** No

CUWCC BMP Retail Coverage Report 2013

*Foundational Best Managemant Practices for Urban Water Efficiency*

## BMP 1.1 Operation Practices

**ON TRACK**

**Exemption** No

**Comments:**

The City of Santa Cruz declared a Stage 1 Water Shortage Alert effective May 1, 2013 and insitituted water restrictions throughout the year. Two temporary staff were hired to patrol the service area leading to 731 water waste enforcement actions.

# CUWCC BMP Coverage Report 2013

*Foundational Best Management Practices For Urban Water Efficiency*

## BMP 1.2 Water Loss Control **NOT ON TRACK**

**6270 City of Santa Cruz Water Department**

| | |
|---|---|
| Completed Standard Water Audit Using AWWA Software? | Yes |
| AWWA File provided to CUWCC? | Yes |
| City of Santa Cruz 2013 Annual Water Audit.xls | |
| AWWA Water Audit Validity Score? | 65 |
| Complete Training in AWWA Audit Method | Yes |
| Complete Training in Component Analysis Process? | No |
| Component Analysis? | No |
| Repaired all leaks and breaks to the extent cost effective? | Yes |
| Locate and Repar unreported leaks to the extent cost effective? | No |
| Maintain a record keeping system for the repair of reported leaks, including time of report, leak location, type of leaking pipe segment or fitting, and leak running time from report to repair. | Yes |

Provided 7 Types of Water Loss Control Info

| Leaks Repairs | Value Real Losses | Value Apparent Losses | Miles Surveyed | Press Reduction | Cost Of Interventions | Water Saved (AF) |
|---|---|---|---|---|---|---|
| 267 | 100884 | 320768 | | False | | |

**At Least As effective As** No

**Exemption** No

Comments:

To CUWCC Staff: Please note that the operational efficiency indicators from the AWWA water audit software did not automatically populate the BMP database after uploading and saving. We tried converting format from .xlsx to .xls. We are using V5.0

CUWCC BMP Coverage Report 2013

*Foundational Best Management Practices For Urban Water Efficiency*

## BMP 1.3 Metering With Commodity

**ON TRACK**

**6270 City of Santa Cruz Water Department**

| | |
|---|---|
| Numbered Unmetered Accounts | No |
| Metered Accounts billed by volume of use | Yes |
| Number of CII Accounts with Mixed Use Meters | 737 |
| Conducted a feasibility study to assess merits of a program to provide incentives to switch mixed-use accounts to dedicated landscape meters? | Yes |
| Feasibility Study provided to CUWCC? | Yes |

Date: 12/16/2013

Uploaded file name:

| | |
|---|---|
| Completed a written plan, policy or program to test, repair and replace meters | Yes |

**At Least As effective As** No

**Exemption** No

Comments:

1) The City bills all inside City and some large outside City customers on a monthly basis; outside City customers are billed bi-monthly. 2) Recent analysis of CII accounts shows 940 accounts with no outdoor water use, and 737 with mixed use.

NOT ON TRACK

CUWCC BMP Coverage Report 2013

*Foundational Best Management Practices For Urban Water Efficiency*

## BMP 1.4 Retail Conservation Pricing

**6270 City of Santa Cruz Water Department**

Implementation (Water Rate Structure) **ON TRACK**

| Customer Class | Water Rate Type | Conserving Rate? | (V) Total Revenue Comodity Charges | (M) Total Revenue Fixed Carges |
|---|---|---|---|---|
| Single-Family | Increasing Block | Yes | 5918548.95 | 4472338.86 |
| Multi-Family | Uniform | Yes | 4107973.04 | 1268495.67 |
| Commercial | Uniform | Yes | 3379123.99 | 1074308.13 |
| Industrial | Uniform | Yes | 1320577.7 | 164488.08 |
| Institutional | Uniform | Yes | 313841.02 | 165728.5 |
| Dedicated Irrigation | Uniform | Yes | 1423156.26 | 325452.27 |
| Agricultural | Uniform | Yes | 39245.11 | 35365.59 |
| Other | Uniform | Yes | 36483.72 | 12810.98 |
| | | | **16538949.79** | **7518988.08** |

**Calculate: V / (V + M)** **69 %**

Implementation Option: Use Canadian Water Wastewater Association Rate Design Model

☐ Use 3 years average instead of most recent year

Canadian Water and Wastewater Association

Upload file:

Agency Provide Sewer Service: Yes **NOT ON TRACK**

| Customer Class | Rate Type | Conserving Rate? |
|---|---|---|
| Single-Family | Non-Volumetric Flat Rate | No |
| Multi-Family | Non-Volumetric Flat Rate | No |
| Commercial | Uniform | Yes |
| Industrial | Uniform | Yes |
| Institutional | Uniform | Yes |
| Dedicated Irrigation | Service Not Provided | No |

**At Least As effective As** No

**Exemption** No

Comments:

Note to CUWCC staff: We are using Option 3 for BMP 1.4. Coverage calculator does not seem to work; the City earned 37 points in our matrix score.

CUWCC BMP Coverage Report 2013

*Foundational Best Management Practices For Urban Water Efficiency*

## BMP 2.1 Public Outreach

**ON TRACK**

**6270 City of Santa Cruz Water Department** **Retail**

Does your agency perform Public Outreach programs? Yes

The list of wholesale agencies performing public outreach which can be counted to help the agency comply with the BMP

The name of agency, contact name and email address if not CUWCC Group 1 members

Did at least one contact take place during each quater of the reporting year? Yes

| Public Outreach Program List | Number |
|---|---|
| Newsletter articles on conservation | 8 |
| Flyers and/or brochures (total copies), bill stuffers, messages printed on bill, information packets | 4 |
| Website | 12 |
| Landscape water conservation media campaigns | 2 |
| General water conservation information | 6 |
| **Total** | **32** |

Did at least one contact take place during each quater of the reporting year? Yes

| Number Media Contacts | Number |
|---|---|
| Articles or stories resulting from outreach | 12 |
| News releases | 12 |
| Newspaper contacts | 24 |
| **Total** | **48** |

Did at least one website update take place during each quater of the reporting year? Yes

Public Information Program Annual Budget

| Annual Budget Category | Annual Budget Amount |
|---|---|
| Public Information and Outreach | 28000 |
| **Total Amount:** | **28000** |

| Public Outreah Additional Programs |
|---|
| Stage 1 Water Shortage Alert and associated water restrictions |

Description of all other Public Outreach programs

Green Gardener program

Comments:

CUWCC BMP Coverage Report 2013

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## BMP 2.1 Public Outreach

**ON TRACK**

In addition to Water Conservation, there was considerable public outreach about future water supply. In late 2013, the City created a citizen's Water Supply Advisory Committee. The Water Department also hired its first Community Relations Specialist

| | |
|---|---|
| **At Least As effective As** | No |

| | | |
|---|---|---|
| **Exemption** | No | 0 |

CUWCC BMP Coverage Report 2013

*Foundational Best Management Practices For Urban Water Efficiency*

## BMP 2.2 School Education Programs

**ON TRACK**

**6270 City of Santa Cruz Water Department** **Retail**

Does your agency implement School Education programs? Yes

The list of wholesale agencies performing public outreach which can be counted to help the agency comply with the BMP

Materials meet state education framework requirements? Yes

15 local 4th and 5th grade classes participated in the Wetlands and Watersheds program. The program includes a teacher workshop and day-long field trip to the City's reservoir and the San Lorenzo River to learn about water supply and water quality.

Materials distributed to K-6? Yes

Each student receives a copy of "Our Water Works in Santa Cruz County" booklet and a journal they complete at the river. Techers receive a county watershed map and background material to support watershed education in the classroom.

Materials distributed to 7-12 students? Yes (Info Only)

As part of the Watershed Academy, described below, materials include scientific literature, news articles, hydrographs, data sheets, etc.

Annual budget for school education program: 27000.00

Description of all other water supplier education programs

Watershed Academy: City staff teaches a small group of 10th grade students in the San Lorenzo Valley about watershed processes, fisheries, land use and drinking water source protection, both in the classroom and through a series of field trips

Comments:

Budget figure above is for the Coastal Watershed Council contract managed by Water Resources section.

**At Least As effective As** No

**Exemption** No 0

# CUWCC BMP Retail Coverage Report 2014

*Foundational Best Managemant Practices for Urban Water Efficiency*

## BMP 1.1 Operation Practices

**ON TRACK**

**6270 City of Santa Cruz Water Department**

**1. Conservation Coordinator provided with necessary resources to implement BMPs?**

| | |
|---|---|
| Name: | Toby Goddard |
| Title: | Administrative Services Manager |
| Email: | tgoddard@cityofsantacruz.com |

**2. Water Waste Prevention Documents**

| WW Document Name | WWP File Name | WW Prevention URL | WW Prevention Ordinance Terms Description |
|---|---|---|---|
| Option A Describe the ordinances or terms of service adopted by your agency to meet the water waste prevention requirements of this BMP. | | http://www.codepublishing.com/CA/SantaCruz/html/SantaCruz16/SantaCruz16.html | See Santa Cruz Municipal Code Chapter 16 for the following:<br>a) 16.01 Water Shortage Regulations and Restrictions<br>b) 16.02 Water Conservation/Water Waste Prohibition Ordinance<br>c) 16.16 Water Efficient Landscape Ordinance |
| Option B Describe any water waste prevention ordinances or requirements adopted by your local jurisdiction or regulatory agencies within your service area. | | | |
| Option C Describe any documentation of support for legislation or regulations that prohibit water waste. | | | |
| Option D Describe your agency efforts to cooperate with other entities in the adoption or enforcement of local requirements consistent with this BMP. | | | |
| Option E Describe your agency support positions with respect to adoption of legislation or regulations that are consistent with this BMP. | | | |
| Option F Describe your agency efforts to support local ordinances that establish permits requirements for water efficient design in new development. | | | |

**At Least As effective As** No

CUWCC BMP Retail Coverage Report 2014

*Foundational Best Managemant Practices for Urban Water Efficiency*

## BMP 1.1 Operation Practices

**ON TRACK**

**Exemption** No

**Comments:**

The City of Santa Cruz declared a Stage 3 Water Shortage Emergency effective May 1, 2014 and instituted water rationing for all residential and irrigation accounts, drought regulations for CII accounts, and outdoor water restrictions for all users.

CUWCC BMP Coverage Report 2014

*Foundational Best Management Practices For Urban Water Efficiency*

## BMP 1.2 Water Loss Control **NOT ON TRACK**

**6270 City of Santa Cruz Water Department**

| | |
|---|---|
| Completed Standard Water Audit Using AWWA Software? | Yes |
| AWWA File provided to CUWCC? | Yes |
| City of Santa Cruz 2014 Annual Water Audit.xls | |
| AWWA Water Audit Validity Score? | 66 |
| Complete Training in AWWA Audit Method | Yes |
| Complete Training in Component Analysis Process? | No |
| Component Analysis? | No |
| Repaired all leaks and breaks to the extent cost effective? | Yes |
| Locate and Repar unreported leaks to the extent cost effective? | No |
| Maintain a record keeping system for the repair of reported leaks, including time of report, leak location, type of leaking pipe segment or fitting, and leak running time from report to repair. | Yes |

Provided 7 Types of Water Loss Control Info

| Leaks Repairs | Value Real Losses | Value Apparent Losses | Miles Surveyed | Press Reduction | Cost Of Interventions | Water Saved (AF) |
|---|---|---|---|---|---|---|
| 227 | 119438.04 | 244565 | | False | | |

**At Least As effective As** No

**Exemption** No

Comments:

The City of Santa Cruz has contracted with Water Systems Optimization, Inc to conduct a water loss control project. The contract is for FY16, but the test period to be validated is 2014. See comment in 2013 re: AWWA OEI data not uploading properly

CUWCC BMP Coverage Report 2014

*Foundational Best Management Practices For Urban Water Efficiency*

## BMP 1.3 Metering With Commodity

**ON TRACK**

**6270 City of Santa Cruz Water Department**

| | |
|---|---|
| Numbered Unmetered Accounts | No |
| Metered Accounts billed by volume of use | Yes |
| Number of CII Accounts with Mixed Use Meters | 737 |
| Conducted a feasibility study to assess merits of a program to provide incentives to switch mixed-use accounts to dedicated landscape meters? | Yes |
| Feasibility Study provided to CUWCC? | Yes |

Date: 12/16/2013

Uploaded file name:

| | |
|---|---|
| Completed a written plan, policy or program to test, repair and replace meters | Yes |

**At Least As effective As** No

**Exemption** No

Comments:

The City instituted water rationing in 2014 in response to a water shortage emergency and migrated all its customers to monthly billing effective April 2014. Previously most outside City accounts were billed bimonthly.

CUWCC BMP Coverage Report 2014

*Foundational Best Management Practices For Urban Water Efficiency*

## BMP 1.4 Retail Conservation Pricing

**6270 City of Santa Cruz Water Department**

Implementation (Water Rate Structure) **ON TRACK**

| Customer Class | Water Rate Type | Conserving Rate? | (V) Total Revenue Comodity Charges | (M) Total Revenue Fixed Carges |
|---|---|---|---|---|
| Single-Family | Increasing Block | Yes | 4097421.24 | 4674757.04 |
| Multi-Family | Uniform | Yes | 3615070.34 | 1333880.79 |
| Commercial | Uniform | Yes | 3178492.82 | 1131061.45 |
| Industrial | Uniform | Yes | 1178030.78 | 168046.78 |
| Institutional | Uniform | Yes | 183173.76 | 168907.53 |
| Dedicated Irrigation | Uniform | Yes | 853359.46 | 338205.43 |
| Agricultural | Uniform | Yes | 35224.07 | 37459.42 |
| Other | Uniform | Yes | 33070.92 | 12069.64 |
| | | | **13173843.39** | **7864388.08** |

**Calculate: V / (V + M)** **63 %**

Implementation Option: Use Canadian Water Wastewater Association Rate Design Model

☐ Use 3 years average instead of most recent year

Canadian Water and Wastewater Association

Upload file:

Agency Provide Sewer Service: Yes **NOT ON TRACK**

| Customer Class | Rate Type | Conserving Rate? |
|---|---|---|
| Single-Family | Non-Volumetric Flat Rate | No |
| Multi-Family | Non-Volumetric Flat Rate | No |
| Commercial | Uniform | Yes |
| Industrial | Uniform | Yes |
| Institutional | Uniform | Yes |
| Dedicated Irrigation | Service Not Provided | No |

**At Least As effective As** No

**Exemption** No

Comments:

Note to CUWCC staff: The City of Santa Cruz is using Option 3 for BMP 1.4. Coverage calculator does not seem to work; City earned 39 points in its matrix score.

CUWCC BMP Coverage Report 2014

*Foundational Best Management Practices For Urban Water Efficiency*

## BMP 2.1 Public Outreach

**ON TRACK**

**6270 City of Santa Cruz Water Department** **Retail**

Does your agency perform Public Outreach programs? Yes

The list of wholesale agencies performing public outreach which can be counted to help the agency comply with the BMP

The name of agency, contact name and email address if not CUWCC Group 1 members

Did at least one contact take place during each quater of the reporting year? Yes

| Public Outreach Program List | Number |
|---|---|
| Newsletter articles on conservation | 8 |
| Flyers and/or brochures (total copies), bill stuffers, messages printed on bill, information packets | 24 |
| Website | 100 |
| Landscape water conservation media campaigns | 2 |
| General water conservation information | 100 |
| **Total** | **234** |

Did at least one contact take place during each quater of the reporting year? Yes

| Number Media Contacts | Number |
|---|---|
| Articles or stories resulting from outreach | 50 |
| News releases | 24 |
| Newspaper contacts | 100 |
| **Total** | **174** |

Did at least one website update take place during each quater of the reporting year? Yes

Public Information Program Annual Budget

| Annual Budget Category | Annual Budget Amount |
|---|---|
| Public Information and Outreach | 28000 |
| **Total Amount:** | **28000** |

| Public Outreah Additional Programs |
|---|
| Stage 3 Water Shortage Emergency and associated water restrictions |
| Water Supply Advisory Committee |

Description of all other Public Outreach programs

Green Gardener program

Comments:

CUWCC BMP Coverage Report 2014

*Foundational Best Management Practices For Urban Water Efficiency*

## BMP 2.1 Public Outreach

**ON TRACK**

In addition to Water Conservation, there was considerable public outreach about future water supply. The City created a citizen's Water Supply Advisory Committee which met twice a month during 2014.

| | |
|---|---|
| **At Least As effective As** | No |

| | | |
|---|---|---|
| **Exemption** | No | 0 |

CUWCC BMP Coverage Report 2014

*Foundational Best Management Practices For Urban Water Efficiency*

## BMP 2.2 School Education Programs

**ON TRACK**

**6270 City of Santa Cruz Water Department** **Retail**

Does your agency implement School Education programs? Yes

The list of wholesale agencies performing public outreach which can be counted to help the agency comply with the BMP

Materials meet state education framework requirements? Yes

12 local 4th and 5th grade classes participated in the Wetlands and Watersheds program. The program includes a teacher workshop and day-long field trip to the City's reservoir and the San Lorenzo River to learn about water supply and water quality.

Materials distributed to K-6? Yes

Each student receives a copy of "Our Water Works in Santa Cruz County" booklet and a journal they complete at the river. Techers receive a county watershed map and background material to support watershed education in the classroom.

Materials distributed to 7-12 students? Yes (Info Only)

As part of Watershed Academy, described below, materials include scientific literature, news articles, hydrographs, data sheets, etc.

Annual budget for school education program: 27000.00

Description of all other water supplier education programs

Watershed Academy: City staff teaches a small group of 10th grade students in the San Lorenzo Valley about watershed processes, fisheries, land use and drinking water source protection, both in the classroom and through a series of field trips

Comments:

Budget figure above is for the Coastal Watershed Council contract managed by Water Resources section.

**At Least As effective As** No

**Exemption** No 0

## CUWCC BMP Coverage Report 2014

6270 City of Santa Cruz Water Department

**Baseline GPCD:** 123.83

GPCD in 2014 75.8

**GPCD Target for 2018:** 101.50

**Biennial GPCD Compliance Table**

**ON TRACK**

| | | Target | | Highest Acceptable Bound | |
|---|---|---|---|---|---|
| Year | Report | % Base | GPCD | % Base | GPCD |
| 2010 | 1 | 96.4% | **119.40** | 100% | **123.80** |
| 2012 | 2 | 92.8% | **114.90** | 96.4% | **119.40** |
| 2014 | 3 | 89.2% | **110.50** | 92.8% | **114.90** |
| 2016 | 4 | 85.6% | **106.00** | 89.2% | **110.50** |
| 2018 | 5 | 82.0% | **101.50** | 82.0% | **101.50** |

CITY OF SANTA CRUZ

WATER DEPARTMENT

212 Locust Street, Santa Cruz, CA 95060 • (831) 420-5200 • Fax (831) 420-5201 • www.cityofsantacruz.com

July 19, 2016

Susan Mauriello, County Administrative Officer
County of Santa Cruz
Santa Cruz County Governmental Center
701 Ocean Street, Room 520
Santa Cruz, CA 95060

SUBJECT: 2015 Urban Water Management Plan Update

Dear Ms. Mauriello,

This letter is to notify you that the City of Santa Cruz has recently completed an update of its 2015 Urban Water Management Plan. The draft plan is available online at the City's website for your review: http://www.cityofsantacruz.com/2015UWMP. We welcome comments and input from you and from applicable County departments on the draft plan.

The Santa Cruz Water Commission will review and discuss the plan at its meeting on Monday, August 1, 2016 at 7:00 p.m. in the City Council Chambers.

A public hearing on the proposed plan has been scheduled for Tuesday, August 9, 2016 at 2:30 p.m. in the City Council Chambers at Santa Cruz City Hall, 809 Center Street, Santa Cruz, California. The plan will be brought back to City Council at its following meeting August 23, 2016 for adoption, barring any substantial modifications.

Written comments on the plan may be received up to the date of the public hearing and should be sent to:

Santa Cruz Water Department
Attn: Mr. Toby Goddard
212 Locust Street, Suite B
Santa Cruz, CA 95060

Please contact Toby Goddard, Water Conservation Manager at 420-5232, or via email tgoddard@cityofsantacruz.com if you have any questions or wish to discuss the information contained in report.

Sincerely,

Rosemary Menard

Rosemary Menard
Water Director

cc: Ms. Kathleen Previsich, Director of Planning
Mr. John Ricker, Water Resources Division Director
Mr. John Presliegh, Director of Public Works

CITY OF SANTA CRUZ

WATER DEPARTMENT

212 Locust Street, Santa Cruz, CA 95060 • (831) 420-5200 • Fax (831) 420-5201 • www.cityofsantacruz.com

July 19, 2016

Jamie Goldstein, City Manager
City of Capitola
420 Capitola Ave.
Capitola, CA 95010

SUBJECT: 2015 Urban Water Management Plan Update

Dear Mr. Goldstein,

This letter is to notify you that the City of Santa Cruz has recently completed an update of its 2015 Urban Water Management Plan. The draft plan is available online at the City's website for your review: http://www.cityofsantacruz.com/2015UWMP. We welcome your comments and input on the draft plan.

The Santa Cruz Water Commission will review and discuss the plan at its meeting on Monday, August 1, 2016 at 7:00 p.m. in the City Council Chambers.

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Santa Cruz, CA 95060

Please contact Toby Goddard, Water Conservation Manager at 420-5232, or via email tgoddard@cityofsantacruz.com if you have any questions or wish to discuss the information contained in report.

Sincerely,

Rosemary Menard
Water Director

cc: Mr. Richard Grunow, Community Development Director

**Santa Cruz Sentinel**
1800 Green Hills Rd., Ste. 210
Scotts Valley, CA 95066
831-429-2415
scslegals@santacruzsentinel.com

3487424

SANTA CRUZ WATER DEPARTMENT
RENEE COLETTA
212 LOCUST ST
STE A
SANTA CRUZ, CA 95060

## Proof of Publication
**(2015.5 C.C.P.)**

**STATE OF CALIFORNIA**

**SS.**

**COUNTY OF SANTA CRUZ**

**Public Notice**

I, the undersigned, declare:

That I am over the age of eighteen and not interested in the herein-referenced matter; that I am now, and at all times embraced in the publication herein mentioned was, a principal employee of the printer of the Santa Cruz Sentinel, a daily newspaper printed, published and circulated in the said county and adjudged a, newspaper of general circulation by the Superior Court of California in and for the County of Santa Cruz, under Proceeding No. 25794; that the advertisement (of which the annexed is a true printed copy) was published in the above-named newspaper on the following dates, to wit:

**07/31/2016, 08/07/2016**

I declare under penalty of perjury that, the foregoing is tru and correct to the best of my knowledge.

This 8th day of August, 2016 at Santa Cruz, California.

Signature

Legal No. **0005767616**

CITY OF SANTA CRUZ

## Notice of Public Hearing

The City Council of the City of Santa Cruz will hold a public hearing on the draft

## 2015 Urban Water Management Plan

on Tuesday, August 9, 2016 at 2:30 p.m.
or soon thereafter
at City Council Chambers
809 Center Street, Santa Cruz

State law requires water suppliers to prepare an Urban Water Management Plan and to update it every five years. The plan describes the City's water supply resources and projected needs through the year 2035 and covers related subjects including conservation, supply reliability, system sources, and water shortage management. The public hearing will also address the integration of the Final Report on Agreements and Recommendations, as developed by the Water Supply Advisory Committee, into the Plan.

The draft plan is available for review at:

- Water Department Office
- Online at www.cityofsantacruz.com/2015UWMP
- Central Library

Interested members of the public and local businesses are encouraged to provide comments to the City of Santa Cruz and participate in the plan review process.

For additional information please contact:
City of Santa Cruz Water Department
212 Locust St, Suite B
Santa Cruz, CA
(831) 420-5200
or email: tgoddard@cityofsantacruz.com

STATE OF CALIFORNIA )
) ss.
County of Santa Cruz )

EXCERPT OF MINUTES

I, Bren Lehr, City Clerk Administrator of the City of Santa Cruz, California, do hereby certify that the following is a true excerpt of the draft minutes showing the action taken at the August 9, 2016 Regular City Council Meeting:

PUBLIC HEARING ITEM:

11. 2015 Urban Water Management Plan Update (WT)

Associate Planner II K. Moore and Water Administrative Services Manager T. Goddard gave a presentation and responded to Councilmember questions.

Director of Water R. Menard briefly discussed this item.

Mayor Mathews opened the public comment period. The following person spoke:

Nate Kennedy

Mayor Mathews closed the public comment period.

**MOTION:** Councilmember Lane moved, seconded by Councilmember Terrazas, to direct staff to bring back to Council the final plans for adoption.

**ACTION:** The motion carried unanimously with the following vote.

| | |
|---|---|
| AYES: | Councilmembers Noroyan, Lane, Terrazas, Posner, Comstock; Vice Mayor Chase; Mayor Mathews. |
| NOES: | None. |
| ABSENT: | None. |
| DISQUALIFIED: | None. |

Bren Lehr
City Clerk Administrator
City of Santa Cruz

# Written Comments Received from the Public

Water Commission Members

**Doug Engfer**

Thanks again for making time for me to discuss the UWMP in advance of Monday's meeting. This is the first time I've been involved in the review cycle, so I'm sure I have much to learn!

I'll say at the outset that I found the document clear and useful. I think that your strategy of "building on" the State's foundational organizational structure, specifically by including many and detailed documents as appendices, makes the package complete. As a recovering member of the WSAC, I will also note that I'm gratified to see that the committee's recommendations are adopted in the whole here. Yay!

As you'd expect, I have a number of questions and comments, as well as suggested copy edits. The attached Word file has all of my questions, comments, and suggestions. It's organized and formatted as follows:

- "State Act Questions"
    - Questions I have relating to our compliance with the State Act.
    - I would expect that we would discuss these during Friday's call. I may bring them up on Monday, depending upon our Friday conversation.
- "UWMP Draft"
    - "Questions, comments, suggestions"
        - I've identified these items by page number (both according to document pagination, and to relative page within the PDF).
        - Where you see ~~strikethrough~~ text, I've found the answer already, elsewhere in the document, or in the Act. You may ignore the strikethrough text.
        - I would expect that we would spend the bulk of our time on Friday on these items.
        - Items in this list would be candidates for me to bring up during the SCWC review of the document on Monday (though I may change my mind about the salience of individual items between now and Monday)
    - "Typos and stylistic suggestions"
        - I've identified these items by page number (both according to document pagination, and to relative page within the PDF).
        - Where you see ~~strikethrough~~ text, I've found the answer already, elsewhere in the document, or in the Act. You may ignore the strikethrough text.
        - I would expect these items to be non-controversial. I offer them here by way of helping you make the document the best it can be. I would not expect that you and I would spend any time on them on Friday's call. However, if something here seems controversial to you and you'd like to talk about it on Friday, that's fine with me.

        - I've highlighted the text in the DRAFT that corresponds to these items. If you'd like, I can upload the document to Dropbox so that you can use that highlighting to find the typos.

Anyway, thanks again for making some time for me. Looking forward to our call tomorrow!

## UWMP

### *State Act Questions*

- [page 4] 10621(a) – UWMP is due by 31 July following years ending in 5 and 0. We appear to be late with our plan. There are consequences outlined in the Act (can't receive certain State funding).
    - Has this been an issue for the Department?
    - Have we or will we suffer any consequences for our (apparently) late filing of the UWMP?
    - The Plan itself does not acknowledge that it's late. Should it?
- The Act directs us specifically to describe our efforts relating to both recycling and desalination. The Draft is pretty thorough on recycling. It is pretty terse on desalination. That may be appropriate, given (1) our history with desal, and (2) the fact that it is the lowest-priority option for a supplemental supply.
    - That said, do you think that the State would want us to "beef up" the desalination discussion?

### *UWMP DRAFT*

- Questions, comments, suggestions
    - [page 2-2 (15)] – units as MG (not AF) – thank you!
    - [page 3-4 (21)] – what is process for updating the GP2030 to reflect the Department's new strategy relating to supply augmentation? There seem to be several items that need to be updated…
    - [page 3-8 (25)] – ~~why are we looking at lower income?~~ [State requirement.]
        - Wouldn't it also be interesting from a water-use perspective to look at SFR v MFR?
    - [page 3-9 (26)] – while past 5 years are interesting, they are likely not representative (Great Recession). What construction is currently in review, permitted and/or under construction?
    - [page 4-2 (30)] – add some per-capita historical data (SFR and MFR) to show trend for the service area
    - [page 4-7 (35)] – Table 4-4 should make clear that the values are MGY
    - [page 4-8 (36)] – please explain "cumulative" (seems to me it's more like "aggregate"). Cumulative would mean to me that we would have saved a *total* of 329MG by 2035, against our *total* demand between now and then.
        - Aren't these **MGY** figures (that is, demand will be reduced by 329MG in 2035, compared to what it would have been without code changes)?
        - 329MG represents 8.6% of what?
    - [page 4-8 (36)] – "these units" refers to the low-income component (414) or the full 1000 units? You should be clearer.

        - Also, what is your estimated consumption for lower-income units? How arrived at? Won't state require some data here? ("Estimate the projected use" section 4-5, page 4-15 of guidelines)
- [page 4-8/9 (36/37)] – this discussion would profit from including the estimated increase in monthly average daily high temperature for our area, so that the reader can determine the magnitude of the impact of climate change (say, by 2100).
- [page 5-4 (41)] should insert "the City's" before "gross per capita", in order to clarify that we are talking about use in our service area, not some other region
- ~~[page 5-4 (41)] the 2015 and 2020 targets are almost the same (111 and 110, respectively). Are these the correct values?~~
- [page 5-8 (45)] Makes sense to choose Method 3. That said, SC would have achieved its target goals irrespective of Method chosen (we were under the Method 3 target already). Should we explain why we chose Method 3? Should we take credit for even beating Method 1?
- [page 6-3 (53)] What is import of "bordered area" in the text? I don't see any part of the image in the Figure that is "bordered".
- [page 6-4 (54)] "annual" suggests that the document is updated annually (each year). If that is not the case, then strike "annual".
- [page 6-7 (57)] Table 6-1 should include an average (164 mgy) showing that our average use over the subject period was within the 170 mgy self-imposed deemed-sustainable limit.
- [page 6-11 (61)] Could add an amplifying sentence making clear that the service area for the wastewater treatment plant is a superset of the service area of the water department (that is, all water department folks are in the wastewater service area, but some folks in the wastewater service area are not served by the water system) – assuming that that is an accurate statement, of course!
    - You actually say this on page 6-14 – perhaps move that statement up here?
- [page 6-15 (65)] What are peak actual wet weather flows that we've seen (capacity is 81 mgd)?
- [page 6-15 (65)] Is the pipeline actually 12250 ft underwater, or does that include run from plant to shoreline?
- [page 6-18,19 (68,69)] Does it make sense to "do the math" to show an "average mgd" value for these two mgy values, and the seasonal ranges, so that we can see just how much could be offset by the tertiary treated volumes?
- [page 6-23 (73)] Table 6-10 has some issues:
    - Purisima is mis-spelled
    - Need to make clear that volumes are in mg
    - The potential transfer volume to Soquel is capped at 100mgy (per the current interim agreement), which is far below what may be possible in the future. Since we don't know the maximum perhaps we should say instead that while current agreement stipulates a cap of 100 mgy, the maximum available for transfer has yet to be determined.
- [page 7-1 (74)] Reference to our Stage 3 determination should include a link to how the City defines its stages of curtailment (since these are our policy standards, not the State's)
    - This could be a pointer to that section of the document that describes our curtailment policies.

- [page 7-2 (75)] Why not just say Soquel, instead of "an adjacent utility"? We've identified them elsewhere as potential collaborators for conjunctive use, and as pumpers from Purisima.
- [page 7-5 (78)] Water rights discussion says that we would not ask for any place-of-use changes. My understanding is that we want place-of-use changes at Newell, Tait, and Felton, to maximize our operational flexibility and to support regional solutions.
- [page 7-12 (85)] Reference to increased storage by 1.2BG. I think that the correct figure is 2.4BG of accessible supply, with up to 1.2BG deliverable in a given year (peak season). See WSAC recommendations and LRFP.
- ~~[page 8-11 (106)] Table doesn't include reference to "Water School" (probably among other things). Should we take credit for this, though, given its novelty and the amount of press coverage we received for it?~~ (addressed on page 8-14)
- [page 9-8 (126)] I believe that folks could attend Water School only once. Assuming that's correct, probably useful to include that fact in your discussion.
- [page 9-9 (127)] In the discussion of water system losses (both real and apparent), the percentage is less interesting than the amount, given that even if the amount stays the same, the percentage will vary up and down based on overall system demand. I suggest that you include both the average volume (~250MG) and the average percentage.
    - Over the past several years, demand has been depressed, and the % loss ratio has gone up at the same level of losses, making it look like we are doing worse. Going forward we expect demand to rebound (barring another drought cycle and concomitant curtailments), so the percentage will go down even if losses don't change, making it look like we're doing better.
- [9-22 (140)] What are City's plans for conservation pricing of sewer services?
- [Appendices in general]
    - Need to have the appendices properly annotated in the document, so that folks know which one is which (perhaps by inserting a "title page" before each one?).
    - Also, would be useful if the document TOC allowed navigation to the individual appendices by clicking on the corresponding TOC item.
    - Does it make sense to include the Soquel/City agreement on transfers as an Appendix?
- [Appendix K– WSAC report]
    - This appendix is incomplete; it must include the WSAC report's appendices, which are important components of the report (in particular, Appendix 8 and its footnotes).

- Typos and stylistic suggestions
    - [page 1-4 (11)] should read "recently designated by the state <u>to be</u>…"
    - [page 2-1 (14)] "an UWMP" should be "<u>a</u> UWMP"
    - [page 2-3 (16)] "representing a diverse" should be "<u>representing diverse</u>"
    - [page 3-5 (22)] "Similarly" should be "<u>Conversely</u>"
    - [page 3-8 (25)] "through 2014" should be "through <u>2023</u>", presumably
    - [page 4-8 (36)] "about almost 1000 now housing" should be "<u>nearly</u> 1000 <u>new</u> housing"
    - [page 4-8 (36)] "per a 1 degree F in" should be "per a 1 degree F <u>increase</u> in"
    - [page 4-9 (37)] "in demand to change" should be "in demand <u>due</u> to change"
    - [page 4-9 (37)] "by about 0.45 percent" should read "by about 0.45 percent <u>per one degree F increase in average daily high temperature</u>"
    - [page 5-1 (38)] "summarized Figure 5-1" should read "summarized <u>in</u> Figure 5-1"
    - [page 5-2 (39)] "water use water use"

- [page 5-5 (42)] "10-baseline" should read "10-year baseline"
- [page 5-8 (45)] "States'" should be "State's"
- [page 5-12 (49)] "target would" should be "targets would"
- [page 6-1 (51)] "in below in" should be "below in"
- [page 6-2 (52)] "underlying entire" should be "underlying the entire"
- [page 6-4 (54)] "Districts'" should be "District's"
- [page 6-4 (54)] "by in 1996" should be "in 1996"
- [page 6-5 (55)] "for entire management" should be "for the entire management"
- [page 6-6 (56)] "Basin shown" should be "Basin, as shown"
- [page 6-6 (56)] "proportion" should be "portion"
- [page 6-8 (58)] "provides an illustration of" could be "illustrates", which would also eliminate the repetitive "provides"
- [page 6-10 (60)] "the city's" should be "the City's" (should confirm appropriate capitalization of the word throughout the document)
- [page 6-11 (61)] "Department maintains" should be "Department, maintains"
- [page 6-12 (62)] "the feasibility recycled water again though" should be "the feasibility of recycled water ~~again~~ through", eliminating redundant "again"
- [page 6-13 (63)] "working the" should be "working with the"
- [page 6-14 (64)] Table 6-2 should make clear that the volumetric units are MGY. Same with table 6-3 on 6-16. Same with 6-5 on 6-19. And with table 7-1 on page 7-7. I'm going to stop mentionining this now; you should just make sure that each table includes volumetric units.
- [page 6-16 (66)] "City of Scotts Valley Water" should be "City of Scotts Valley" (no "Water")
- [page 6-16 (66)] "plant of and" should be "plant and"
- [page 6-16 (66)] "currently…at this time" – pick one or the other; don't need both phrases in the same sentence.
- [page 6-17 (67)] There is an open quote with no closing quote in the first sentence of section 6.5.4.1.
- [page 6-17 (67)] "in included" should be "is included"
- [page 6-21 (71)] "to allow the further study and determine" should be "to further study and determine"
- [page 6-21 (71)] "as to the project(s) to be carried out" should be "which project(s) will be carried out"
- [page 6-21 (71)] The sentence beginning "The Final Report summarized…" should be re-written. It is not at all clear or grammatical.
- [page 6-22 (72)] "source that" should be "source, that"
- [page 6-23 (73)] "recharged by the natural" should be "recharged by natural"
- [page 7-1 (74)] "held in the grips" should be "held in the grip"
- [page 7-3 (76)] "a HCP" should be "an HCP". Make sure to make the change throughout.
- [page 7-6 (79)] section numbering should be 7.1.4.2 (not 7.4.1.2 as currently)
- [page 7-7 (80)] "recent supply" should be amplified to include "WSAC", to make clear that you are referring to the previously-mentioned (and later discussed) WSAC process.
- [page 7-11 (84)] "single dry year, is the" should be "single dry year, the"
- [page 7-11 (84)] "difference" should be "differences"
- [page 7-12 (85)] reference to "Tables 7-4" should be to "Table 7-4"
- [page 7-13 (86)] "regions'" should be "region's"

- [page 7-13 (86)] "to relevance" should be "to the relevance" (or could be "relative importance" instead of "relevance")
- [page 8-2 (97)] The link to the Water Code does not display or retrieve a document on MacOS under Chrome.
- [page 8-7 (102)] "uses)" should be "uses" – eliminate stray trailing close-parenthesis.
- [page 8-7 (102)] Table 8-3 has some issues:
  - It should include the measures taken in response to Stage 1 (even if they are essentially moot), if only for the sake of completeness
  - The table title is "Reduction" but the values in the table communicate the amount of normal supply that is allocated (that is, the amount left *after* reduction). Change title to "Proportion of Normal Allocation" or something like that?
- [page 8-12 (107)] "restrictions and includes" should be "restrictions include"
- [page 8-18 (113)] "of two fiscal years" should be "two fiscal years"
- [page 8-18 (113)] "Stage 5 (however" should be "Stage 5" – looks like you tried to delete a parenthetical comment but didn't get all of it.
- [page 8-18 (113)] "loch Lomond" should be "Loch Lomond".
- [page 8-19 (114)] The link to the 2009 Water Shortage report does not work on MacOS under Chrome. Comes up with an "err-not-found" error.
- [page 8-20 (115)] "City is a within the" should be "City is within the".
- [page 8-20 (115)] "City has it own" should be "City has its own".
- [page 8-20 (115)] "form possible" should be "from possible".
- [page 8-20 (115)] "roles responsibilities" should be "roles and responsibilities".
- [page 8-23 (118)] "Finally, Water Department" should be "Finally, the Water Department"
- [page 9-3 (121)] Utilities" should be Utilities,"
- [page 9-6 (124)] "supply outlook supply" – should be "supply outlook"
- [page 9-7 (125)] "personable" – should be "personal"
- [page 9-8 (126)] "stay at their" – should be "stay within their"
- [page 9-9 (127)] In your brief WSAC discussion here, you may want to reference the previous section where you discussed the committee, its processes, and its findings in more detail.
- [page 9-11 (129)] "The current Water Conservation Manager" – should be "The Water Conservation Manager"; you could add "currently" to that if you expect job-responsibility changes.
- [page 9-12 (130)] The last sentence on the page (ending with "are described below") needs a period at the end.
- [page 9-13 (130)] "Residential water use comprises" – should be "Residential water use constitutes".
- [page 9-14 (132)] "Laundry to Landscape rebate program $150" – should be "Laundry to Landscape rebate of $150".
- [page 9-15 (133)] "replaced like" – should be "replaced, like".
- [page 9-15 (133)] "In the last five year" – should be "In the last five years".
- [page 9-16 (134)] "i.e. low flow spray" – should be "e.g., low flow spray".
- [page 9-16 (134)] "to makes them" – should be "to make them".
- [page 9-17 (135)] "in the future better" – should be "in the future to better".
- [page 9-19 (137)] "saw dramatic increase" – should be "saw a dramatic increase".
- [page 9-19 (137)] "identified as top priority" – should be "identified as a top priority".

- [page 10-3 (143)] “the incorporation of” – should be “that”.

**David Baskin**

I only have a few comments, which are set forth below:

1. Why are we calling this the 2015 UWMP? Shouldn’t it be the 2016 Plan? Plans/ordinances, etc. are usually referred to by the year of their adoption.
2. Page 7-14. Listing of WSAC Members appears to be in alphabetical order, except that it incorrectly reflects that my last name is Green Baskin. Please correct, as Green is my middle name. Baskin is my last name.
3. Page 9-3 Conservation Pricing. Our discussion of the new rate structure should reflect that it has been approved, as it will have been by the time of the final report being adopted.
4. 9.2.4.2 could also state the WSAC made a series of demand management recommendations that are being incorporated into our Master Conservation Plan as appropriate.

My compliments on a very well drafted document, at least to the extent that I am qualified to so state. I am not familiar with the statutory scheme or the guidebook. I am confident that you have made the plan compliant.

**Andy Schiffrin**

- Page 7-9, Table 7-2 – Since it is expected that the ultimate agreement with the regulators will reduce the City’s ability to divert water from the North Coast streams, why does the table project increased diversions after 2020?

- Page 8-18 – There’s a typo in the first full paragraph – “(however.”

- Page 10-1 – Water Commission Changes – Assuming that the Commission does recommend changes, shouldn’t they be summarized after this paragraph.

**COMMENTS ON UWMP CHAPTERS 1 TO 6**

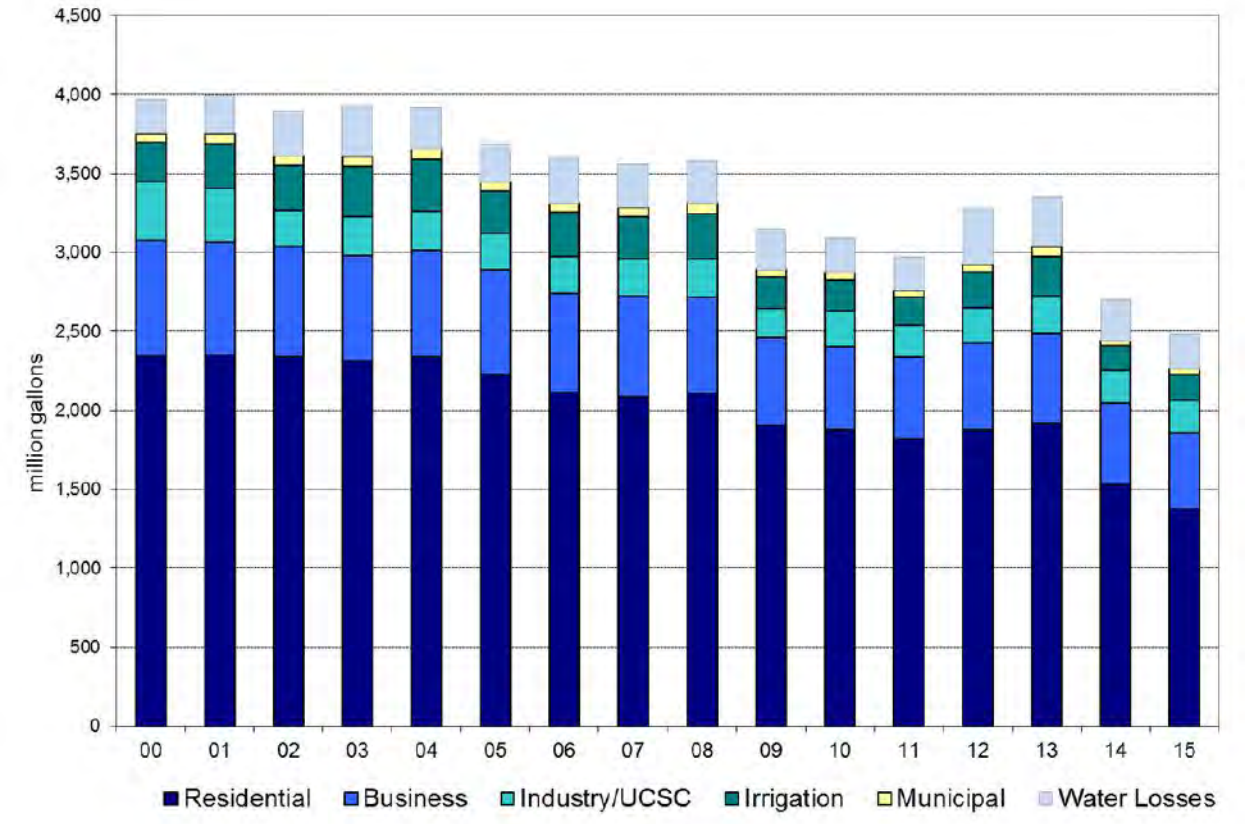
Following are my comments, in **bold**, on the draft Plan:

**1. New Vision for the City’s Water Supply.** The City of Santa Cruz has long faced challenges with the reliability of its water supply and had been actively pursuing ocean desalination as a supplemental water source for more than a decade. In spring 2014, the Santa Cruz City Council changed course and appointed a committee of 14 residents representing diverse viewpoints to take an exhaustive look at the City’s water issues and ways to address them. The Water Supply Advisory Committee (WSAC) worked for 18 months in an open, public, and transparent process to develop recommendations to ensure a more stable and reliable water supply. In addition to more conservation, the WSAC recommended the City embark on a program to enhance regional

groundwater storage using in-lieu water exchanges and/or aquifer storage and recovery with neighboring water districts. Advanced treated recycled water was recommended as a backup plan.

Shouldn't it mentioned that Desal is still an option if other approaches fail, especially since this is discussed later?

**2.**




The decline in Residential consumption is pretty amazing, if I understand it correctly. It was about 2.4 BGY in 2000 and in 2015 it was about 1.4 BGY, a decline of over 40%, and at a time when the service population was increasing, though of course there was the drought.)

**3.**

| Table 4-3. Demands for Potable Water - Projected | | | | | | |
|---|---|---|---|---|---|---|
| Use Type | Additional Description | Projected Water Use (mgy) | | | | |
| | | 2020 | 2025 | 2030 | 2035 | 2040-opt |
| Single Family | Individually meter dwellings | 1,277 | 1,223 | 1,191 | 1,170 | n/a |
| Multi-Family | 2 or more dwelling units | 772 | 714 | 690 | 678 | n/a |
| Commercial | | 574 | 541 | 525 | 519 | n/a |
| Industrial | | 56 | 59 | 60 | 61 | n/a |
| Institutional/ Governmental | Municipal (city) accounts | 46 | 42 | 40 | 40 | n/a |
| Landscape | Dedicated Irrigation | 112 | 119 | 134 | 144 | n/a |
| Landscape | Golf Irrigation | 58 | 52 | 47 | 47 | n/a |
| Other | UC Santa Cruz | 196 | 234 | 271 | 308 | n/a |
| Water Losses | | 236 | 241 | 247 | 253 | n/a |
| **TOTAL** | | 3,327 | 3,225 | 3,205 | 3,220 | n/a |
| NOTES: David Mitchell, M Cubed, October 2015, and by Maddaus Water Management, February 2016 | | | | | | |

From Table 4-1, total residential demand in 2015 was 1.373 BGY. In Table 4-3, it is projected to be 2.049 BGY, an increase of about 50%. Yet beyond 2020, demand is projected to decline. This significant increase to 2020 needs to be explained.

**4.**

| Table 6-10. Water Supplies — Projected | | | | | | |
|---|---|---|---|---|---|---|
| Water Supply | Additional Detail on Water Supply | Projected Water Supply *Report To the Extent Practicable* | | | | |
| | | **2020** | **2025** | **2030** | **2035** | **2040** *(opt)* |
| | | Reasonably Available Volume | Reasonably Available Volume | Reasonably Available Volume | Reasonably Available Volume | Reasonably Available Volume |
| Surface water | North Coast Sources | 637 | 642 | 671 | 671 | n/a |
| Surface water | San Lorenzo River | 1,882 | 1,842 | 1,829 | 1,834 | n/a |
| Surface water | Loch Lomond Reservoir | 595 | 551 | 540 | 547 | n/a |
| Groundwater | Live Oak/Beltz Wells | 138 | 129 | 127 | 128 | n/a |
| Transfers | | Potential transfer to Soquel Creek Water District may be up to 100 mgy to assist with recovery of the western purisma basin and may result in future exchange to the City during peak season | | | | |
| Exchanges | | | | | | |
| Recycled Water | | Recycled water feasibility study investigating options including regional partnership opportunities for a recycled water project to provide drought resistant supply and options for groundwater management strategies due to overdraft conditions of local basins | | | | |
| Desalinated Water | | | | Potential project to expand recycled water supply or investigate desalination | | |
| Other | | | | | | |
| **Total** | | 3,252 | 3,164 | 3,167 | 3,180 | 0 |
| NOTES: | | | | | | |

This may be discussed in later chapters but should there be an explanation here for why the percentage of water from the North Coast Streams is projected to decline, from the 24% cited earlier to the slightly less than 20% indicated in Table 6-10?

**From the General Public**

To: Toby Goddard
Water Conservation Manager
City of Santa Cruz
RE: Draft 2015 Urban Water Management Plan

Dear Toby,

I am interested in submitting comments to the draft 2015 Urban Water Management Plan. Please advise if this email is sufficient and timely or if I need to submit elsewhere.

In section 3.6 Community Growth and Development, no mention or discussion is made about the City of Santa Cruz's application that is currently on file with LAFCO to expand its urban services boundary line to include the upper UCSC campus. If the City of Santa Cruz were to proceed with this application, it could have significant impacts to the 2015 UWMP.

On page 3-10, the draft states: "Any proposed changes to the City's service area boundary that do come forward are subject to approval by both City Council and the Santa Cruz Local Agency Formation Commission (LAFCO)." This sentence is misleading because of the existing proposed change to the service area boundary that is not mentioned. Members of the public should be made aware of this and given the opportunity to consider and comment about it. Therefore, the draft should be changed to

state that the City has applied to LAFCO to change its service area boundary and should include details about the application and what effects it could have upon the 2015 UWMP.

Since the City's LAFCO application was made a number of years ago, I think it would be helpful if the following questions could be answered in the 2015 UWMP:

1. Does the City have any intention of proceeding with its application to LAFCO?

2. If not, might the City decide to proceed with its application at a later date?

3. If the City does decide to consider proceeding with its LAFCO application, either during the time frame of the 2015 UWMP or at a later date, would that be a public process and would the City Council allow comments from the public before making any such decision?

4. Does the City have any intention of withdrawing its application to LAFCO? If not, please provide a detailed explanation of why not.

Of course, if the City decided to withdraw its application to LAFCO in the very near future, it would not be necessary to include all of the needed changes to the draft 2015 UWMP necessitated by the existing LAFCO application.

Thank you so much for your attention to these comments.

Sincerely,
Don Stevens
Habitat And Watershed Caretakers

RESOLUTION NO. NS-29,133

RESOLUTION OF THE CITY COUNCIL OF THE CITY OF SANTA CRUZ ADOPTING THE 2015 URBAN WATER MANAGEMENT PLAN AND AUTHORIZING THE DIRECTOR OF THE WATER DEPARTMENT TO FILE A COPY WITH THE CALIFORNIA DEPARTMENT OF WATER RESOURCES

WHEREAS, the California Legislature enacted Assembly bill 797 (Water Code Section 10610 et seq., known as the Urban Water Management Planning Act) during the 1983-84 Regular session, and as amended subsequently, which mandates that every supplier providing water for municipal purposes to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually, prepare an Urban Water Management Plan; and

WHEREAS, the City of Santa Cruz is an urban water supplier providing service to over 24,000 customers and is required to review and update the Plan every five years; and,

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

WHEREAS, beginning with the 2010 plans, Senate Bill X7-7 of 2009 (California Water Code Section 10608) requires each urban retail water supplier to include information on its baseline daily per capita water use and future water use targets to support the goal of reducing the state's per capita urban water consumption by 20 percent; and,

WHEREAS, the City of Santa Cruz exceeded its interim water use target for 2015 and fully complies with all requirements of Senate Bill X7-7; and,

WHEREAS, a completed Urban Water Management Plan is required in order for a water supplier to be eligible for California Department of Water Resources administered State grants, loans, and drought assistance; and,

WHEREAS, a Plan must be made available for public review and a public hearing held prior to adopting the Plan, and then filed with the California Department of Water Resources within thirty days of adoption; and,

WHEREAS, the City has therefore prepared and circulated for public review a draft 2015 Urban Water Management Plan, and a properly noticed public hearing regarding the subject Plan was held by the City Council on August 9, 2016,

NOW, THEREFORE, BE IT RESOLVED by the City Council of the City of Santa Cruz that it hereby adopts the 2015 Urban Water Management Plan and authorizes the Director of Water to file a copy with the California Department of Water Resources.

BE IT FURTHER RESOLVED that the Water Supply Advisory Committee's Final Report on Agreements and Recommendations as accepted by the City Council of Santa Cruz on November 24, 2015, the City's Water Shortage Contingency Plan, and the Water Conservation Master Plan approved by City Council on April 12, 2016 are hereby adopted by reference in their entirety as part of the City's 2015 Urban Water Management Plan.

PASSED AND ADOPTED this 23rd day of August, 2016, by the following vote:

AYES: Councilmembers Noroyan, Lane, Terrazas, Posner, Comstock; Vice Mayor Chase; Mayor Mathews.

NOES: None.

ABSENT: None.

DISQUALIFIED: None.

APPROVED: _____
Mayor

ATTEST: _____
City Clerk Administrator

**COOPERATIVE WATER TRANSFER PILOT PROJECT FOR GROUNDWATER RECHARGE AND WATER RESOURCE MANAGEMENT BETWEEN CITY OF SANTA CRUZ AND SOQUEL CREEK WATER DISTRICT**

The parties to this Agreement are the CITY OF SANTA CRUZ, hereafter referred to as "CITY", and the SOQUEL CREEK WATER DISTRICT", hereafter referred to as "DISTRICT".

**RECITALS**

A. The CITY of Santa Cruz is a charter city which owns and operates a municipal water system in the City of Santa Cruz and in portions of the County of Santa Cruz adjoining the District water system.
B. The DISTRICT is a special district which operates a water system, adjacent to the eastern service boundary of the CITY, and provides water service to a significant portion of mid-Santa Cruz County.
C. A shared groundwater basin that the DISTRICT relies upon for a significant portion of its water supply, and from which the CITY obtains a small portion of its water supply, has been in a state of overdraft since the 1980s and is at risk of additional seawater intrusion.
D. The DISTRICT and the CITY cooperatively manage groundwater in the over-drafted basin and would benefit from this agreement.
E. The CITY and the DISTRICT have established three metered interties located at the DISTRICT's O'Neill Ranch well site, at Jade Street and at Bain Street.
F. During the winter and spring, the CITY may have available surface water from its pre-1914 North Coast water rights that could be treated and delivered to the DISTRICT for purchase.
G. Purchasing and using this treated surface water to meet some part of the DISTRICT's demand would enable the DISTRICT to reduce its groundwater pumping, reduce the potential for accelerating seawater intrusion, and contribute to the beginnings of a longer term process to ameliorate the overdraft condition of the groundwater basin that impacts both entities and other pumpers of groundwater from the Soquel-Aptos basin.
H. The period during which this agreement operates can be viewed as an opportunity to begin to assess the effects of reduced pumping of the basin by the DISTRICT on the shared groundwater basin. During this pilot project, the CITY and the DISTRICT intend to use this opportunity to collect information related to:
    1) the physical operating system issues;
    2) system water quality;
    3) response of groundwater levels from in-lieu recharge; and
    4) the potential opportunity of developing a longer term agreement in which the groundwater basin would be used for a combined in lieu and aquifer storage and recovery program that would help resolve the basin overdraft that would protect CITY and DISTRICT wells from addition seawater intrusion and provide needed drought storage for the CITY.

I. The CITY and DISTRICT recognize that a fair and appropriate agreement can benefit both parties, the community, and provide better management of locally available water resources.

**NOW, THEREFORE, IT IS HEREBY AGREED:**

**1. AGREEMENT TERM:**

Except as provided in Paragraph 11 hereafter, the term of this Agreement shall be for the period commencing at the completion of the CEQA process or November 1, 2015, whichever date is later and ending approximately five years later on December 31, 2020. This Agreement shall not extend beyond said date unless the governing bodies of both the CITY and the DISTRICT so agree in writing.

**2. TERMS AND CONDITIONS FOR PROVIDING WATER:**

Contingent upon the CITY securing all necessary permits and completion of the environmental review process in accordance with Paragraphs 4 and 5 below, water supplied by the CITY will be made available to the DISTRICT for purchase within the scope of the CITY's valid pre-1914 appropriative water rights and changes thereto in compliance with the law. The quantity and availability of water supplied by the CITY under the terms of this agreement shall be based on the following conditions and at the sole discretion of the Director of the Water Department of the CITY. In determining whether supply can be provided, the CITY may take into account any or all of the following factors:

a. The CITY has not declared, and is not operating under, any mandatory water curtailment stage of its 2009 Water Shortage Contingency Plan, as it may be amended, updated, or replaced by the CITY from time to time.[1]
b. Loch Lomond Reservoir is full and is spilling, or if not spilling is projected to be full by April 1 of the water year during which water will be provided to the DISTRICT. The calculation of the potential for the Loch Lomond Reservoir to fill shall be based on the City's short term streamflow modeling tools used to conduct the City's annual water supply forecast, as those tools or other measures to forecast water supply may be amended, updated, or replaced from time to time by CITY.
c. The CITY is providing flow for aquatic resources that meet regulatory requirements, or other requirements agreed to in writing with the fisheries agencies.
d. The City Beltz Wells are off, and not needed to meet daily demand.
e. The planned operation is in compliance with the project as described in the CEQA documents, including the general provision that the water transfer may occur when water is available as described in these terms and conditions between the months of November to April
f. On a monthly basis, the volume of water delivered to the DISTRICT shall be less than or equal to the amount diverted from the CITY's Liddell Springs and/or Majors Creek supplies as reported to the state of California.

[1] Mandatory curtailments begin with Stage 2 of the 2009 plan.

g. The daily volume of water supplied shall not exceed the hydraulic capacity of the interties between the CITY's system and the DISTRICT's system located at the District's O'Neill Ranch well site and at Jade Street and Bain Street. The hydraulic capacity of these interties is estimated to be 1.5 million gallons per day (mgd) during normal operations and up to 2 mgd on an emergency basis, and is a function of the pressure difference between the CITY and DISTRICT water systems at that point.

h. The CITY has not determined, in its discretion, that the supply of water to DISTRICT must be suspended or discontinued due to unusual or unanticipated circumstances, which suspension or discontinuation shall not be implemented without providing at least 3 days' advance written notice, except in the case of an emergency, in which event the City shall endeavor to provide DISTRICT notice as soon as reasonably possible after the emergency determination has been made.

**3. PRICE**

The CITY agrees to sell to the DISTRICT treated water delivered to the CITY-DISTRICT interties located on the DISTRICT's O'Neill Ranch well site and at Jade Street and Bain Street under the terms and conditions described hereof at a price that is equal to $1,000 per million gallons, or a pro rata amount thereof based on actual volume provided.

The CITY shall bill the DISTRICT on a monthly basis for water delivered to the DISTRICT based on the meter installed at the above specified intertie connections between the CITY and the DISTRICT. The pricing specified above is for this pilot project only. Future water deliveries made outside of this agreement will be subject to a pricing structure developed under any future water transfer or exchange agreement.

**4. REGULATORY COMPLIANCE – CEQA**

The CITY shall be the designated lead agency for the purposes of California Environmental Quality Act (CEQA) compliance. Cost of CEQA compliance, including preparation of an initial study and any negative declaration, mitigated negative declaration or environmental impact report, and implementation of mitigation measures identified therein and agreed to by the CITY will be equally split between the parties, with the DISTRICT's share shall be billed on a quarterly basis for the duration of this agreement.

CEQA compliance shall address the agreement herein to implement pilot testing of the transfer of water under certain conditions from the CITY to the DISTRICT commencing approximately November 1, 2015 and ending approximately five years later on December 31, 2020. Given that the agreement may potentially be extended beyond said date if both the CITY and the DISTRICT so agree in writing, CEQA shall also address the long-term transfer of water that may occur under such an extended agreement.

**5. REGULATORY COMPLIANCE -- PERMITTING**

The CITY shall be responsible for obtaining any other permits or approvals required to support providing water to the DISTRICT under this agreement, and shall be responsible for compliance with all laws, as necessary to make water available for purchase or to transfer pursuant to this Agreement.

## 6. REGULATORY COMPLIANCE – TREATED WATER DELIVERIES

Delivered water shall be in compliance with all drinking water regulatory requirements at the intertie point of delivery. Once the water has been delivered the DISTRICT shall be responsible in all respects for that water, and its delivery and use, including without limitation compliance with any distribution system requirements, and any relevant water quality regulations.

## 7. OPERATIONS PLAN

Prior to initiating the proposed water transfer, the CITY and the DISTRICT agree to jointly prepare and then implement an Operations Plan as the basis for joint operation. The CITY and the DISTRICT may amend the Operations Plan by written joint consent without needing to otherwise amend this agreement.

## 8. NOTICATION OF STARTING AND STOPPING WATER DELIVERIES

The water to be delivered hereunder shall be delivered to the DISTRICT on an interruptible basis, depending upon the availability of water and the terms and conditions described in paragraph 2 of this agreement. A determination that the delivery of water to the DISTRICT must be interrupted shall be at the sole discretion of the CITY Water Director, which determination shall be conclusive upon the DISTRICT. The CITY shall give the DISTRICT notice of interruption or cessation of the transfer of water in accordance with Paragraph 2(g), above.

## 9. DATA COLLECTION, MONITORING, AND ANALYSIS

The CITY and the DISTRICT shall jointly share the cost to develop, and implement, a data collection, monitoring, and analysis program to further characterize the benefits of the proposed water transfer and identify any potential issues. This program shall include, but not be limited to, monitoring and analyzing groundwater levels from existing wells in the vicinity of wells that the DISTRICT takes offline due to the available of water from an alternate water source, and distribution system water quality to assess any impacts from surface water being distributed through pipes that have only been used solely for groundwater distribution in the past. The plan shall be developed and implemented by the CITY and DISTRICT prior to commencing any sale of water.

## 10. NOTIFICATIONS AND RECORD KEEPING

For the purposes of this agreement, the parties shall abide by the record keeping and notification provisions in the Operations Plan.

## 11. NATURE OF AGREEMENT

It is understood and acknowledged by the DISTRICT and the CITY that this Agreement is only for the term specified herein, that no obligations are imposed on the parties beyond the term hereof, that the

water rights of the CITY are not impacted, and that the water during the term hereof is solely dependent on the availability of surplus water as stated in this agreement.

This agreement makes no assumption about the availability or quantity of water to be delivered back to the CITY for use as a drought supply.

**12. EFFECTIVE DATE:**

This Agreement shall become effective only upon its approval by the governing bodies of each party hereto.

**13. TERMINATION ON THIRTY-DAY NOTICE**

This Agreement may be terminated by either party hereto upon the furnishing to the other party by United States Mail, first class, a thirty (30) day notice of intent to terminate or with an email notification that is acknowledged by the receiving party provided, however that DISTRICT'S obligations to pay for water delivered and indemnify, defend and hold CITY harmless pursuant to paragraph 14, below, shall survive termination.

**14. RELEASE AND INDEMNITY**

DISTRICT agrees to indemnify, defend and hold harmless CITY, and any agency or instrumentality thereof, and its elected and appointed officials, officers, employees and agents from and against all liabilities, claims, actions, causes of action, proceedings, suits, damages, judgments, liens, levies, costs and expenses of whatever nature, including reasonable attorneys' fees and disbursements (collectively "Claims") arising out of any actions taken by the City in the implementation of this agreement, or any environmental review conducted under the California Environmental Quality Act (CEQA) in connection with this agreement.

Dated: 8-4-16

CITY OF SANTA CRUZ

By: _____
City Manager of City of Santa Cruz

Dated: July 25, 2016

SOQUEL CREEK WATER DISTRICT

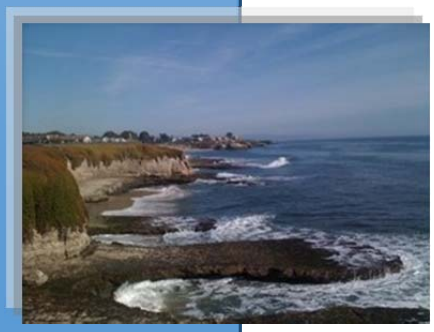
By: _____
President of the Board of Directors

APPROVED AS TO FORM:

_____
CITY Attorney

_____
DISTRICT Counsel

City of Santa Cruz







# Water Conservation Master Plan

January 2017

Prepared by:

MADDAUS WATER MANAGEMENT INC.

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## LIST OF ACRONYMS

| | |
|---|---|
| AB | Assembly Bill |
| AF | acre-feet |
| AFY | acre-feet per year |
| AMI | Advanced Metering Infrastructure |
| AMR | Automatic Meter Reading |
| AWE | Alliance for Water Efficiency |
| AWWA | American Water Works Association |
| BG | billion gallons |
| BGY | billion gallons per year |
| BMP | Best Management Practice |
| CEC | California Energy Commission |
| CII | Commercial, Industrial and Institutional |
| CIS | Customer Information System |
| COM | commercial |
| CP | Cathodic protection |
| CUWCC | California Urban Water Conservation Council |
| CWC | California Water Code |
| DMM | Demand Management Measures |
| DOF | California Department of Finance |
| DSS | Least Cost Planning Decision Support System Model |
| DWR | California Department of Water Resources |
| EPA | Environmental Protection Agency (United States) |
| GHG | Greenhouse Gases |
| GIS | Geographic Information System |
| GPCD | gallons per capita per day |
| gpf | gallons per flush |
| gpm | gallons per minute |
| HECW | High-Efficiency Clothes Washer |
| HET | High-Efficiency Toilet |
| IND | industrial |
| IRR | irrigation |
| IWA | International Water Association |
| MFR | Multifamily Residential |
| MG | million gallons |
| mgd | million gallons per day |
| MGY | million gallons per year |
| MOU | Memorandum of Understanding Regarding Water Conservation in California |
| MUN | municipal |
| MWELO | Model Water Efficient Landscape Ordinance |
| MWM | Maddaus Water Management, Inc. |
| NRW | non-revenue water |
| PG&E | Pacific Gas & Electric |
| psi | pounds per square inch |
| PWSS | Public Water System Statistics |
| SB | Senate Bill |

| | |
|---|---|
| SB X7-7 | Water Conservation Bill of 2009 |
| SCWD | Santa Cruz Water Department |
| SF | Single Family |
| UCSC | University of California Santa Cruz |
| UHET | Ultra-High Efficiency Toilet |
| ULFT | Ultra-Low Flow Toilet |
| USBR | U.S. Bureau of Reclamation |
| UWMP | Urban Water Management Plan |
| WCMP | Water Conservation Master Plan |
| WF | water factor |
| WS | WaterSense (EPA Program) |
| WSAC | Water Supply Advisory Committee |

# 1. EXECUTIVE SUMMARY

The purpose of the Executive Summary is to briefly describe the City of Santa Cruz Water Department (City) Water Conservation Master Plan (WCMP or Plan). The evaluation process and assumptions used to develop this Plan and recommendations for future implementation are included in the full report.

The City of Santa Cruz has had a long-standing commitment to water conservation since the 1980s and offers a variety of programs, informational materials, and incentives to help City water customers become more water-efficient. In 2000, the City adopted a Water Conservation Plan, the goal of which was to reduce water demand system-wide by 282 million gallons per year in 2010. Through plumbing fixture and appliance rebate programs, technical assistance, regulations, and other strategies, residential and commercial customers have saved over 330 million gallons of water per year so far. The City is also a member of the California Urban Water Conservation Council (CUWCC) and is active in promoting water conservation statewide.

In 2011, the City sponsored a survey of its residential and commercial customers called the Residential and Commercial Baseline Water Use Survey Program (Baseline Survey) to develop a picture of the current state of water-using equipment within the service area. This study revealed that indoor water use efficiency opportunities were mostly saturated. The survey findings provided a basis for estimating additional conservation potential and yielded information to help select, target, and design future water conservation initiatives.

In 2013, the City of Santa Cruz contracted with Maddaus Water Management (MWM) to develop an updated Water Conservation Master Plan. Strengthening water conservation efforts had been identified as top priority by the Santa Cruz City Council (City Council), the City's Water Commission, and more recently by the City's Water Supply Alternatives Committee in its effort aimed at delivering a safe, adequate, affordable, and environmentally sustainable water supply. The overall goal of the updated plan was to define the next generation of water conservation activities and serve as a roadmap to help the community achieve maximum, practical water use efficiency. Additional goals established during the planning process included the following:

- Capitalize on opportunities to assist with meeting the future water needs of the Santa Cruz Water Department customers through cost-effective and sustained water conservation and water use efficiency efforts
- Demonstrate environmental stewardship and foster innovative, responsible, and efficient practices
- Commit to and implement a water conservation program that supports the health of rivers, streams, and groundwater integral to the region's quality of life and economy
- Monitor and measure performance to ensure conservation potential is being met as forecasted
- Maintain and exceed the water savings already achieved by the City of Santa Cruz as well as identify the best path to achieve those savings and to monitor commitments to the CUWCC Memorandum of Understanding (MOU) Regarding Urban Water Conservation
- Maintain a long-term plan for compliance with SB X7-7 to meet the gallons per capita per day (GPCD) target by 2020
- Meet the City's integrated water resource management goals to reduce peak season demands

The process used to develop the plan included analyzing individual conservation measures and different sets of measures or "programs" using the Least Cost Planning Water Demand Management Decision Support System Model (DSS Model). The evaluation includes measures directed at existing accounts as well as new development measures to help ensure new residential and business customers are more water efficient. After a significant screening and evaluation process, a Recommended Program consisting of 35 individual measures was selected to evaluate the net

effect of running selective multiple measures together over time. The elements of the Recommended Program are highlighted in Table 1-1, organized by major customer sector. Note that some measures appear twice since they apply to more than one sector.

## 1.1 Long-Term Demand and Conservation Program Analysis Results

The development of this Plan consisted of two main parts: 1) create a demand and conservation analysis for 2015 to 2035 and 2) evaluate conservation savings potential for the years 2015 to 2035 with a variety of different measures and conservation programs.

The first step in the analysis was to review and analyze historical water use production and billing data. The analysis built on previous efforts and was updated using M.Cubed's September 2015 City of Santa Cruz Water Demand Forecast, in which M.Cubed conducted an econometric analysis of water demand and forecasts of class-level customer demands and total system production through 2035. The historical water use, selected population projections, most recent plumbing code information, and discussions with the City were used to create a demand forecast for the years 2015 to 2035, as further described in Sections 3 and 5.

Once the demand forecast was completed, the conservation measures listed in Table 1-1 were analyzed for costs and benefits. A total of 33 out of 35 unique measures were analyzed using the DSS model. Two measures (conservation pricing and additional building code requirements for new development) were not sufficiently developed to be modeled individually at the time. The conservation analysis included all the quantifiable measures selected by the City. The following important factors about the conservation measures were included in this analysis:

1. The measures recommended are listed in Table 1-1 and described in Section 7 in Table 7-1.
2. New California state-wide plumbing standards that were adopted in 2015, the Model Water Efficient Landscape Ordinance (MWELO) and the CALGreen building code (as of December 1, 2015). These can be found in Appendix A.

**Table 1-1. Elements of Recommended Program**

| Utility Measures | Residential Measures | CII Measures | Landscape Measures |
|---|---|---|---|
| System Water Loss Reduction | Residential Leak Assistance | CII Incentives | Large Landscape Budget-Based Water Rates |
| Advanced Metering Infrastructure | Single Family Residential Surveys | Pre-Rinse Spray Nozzle Installation | Water Efficient Landscape Ordinance |
| SF, MF, COM Conservation Pricing - Water and Sewer[1] | Plumbing Fixture Giveaway/Opt | CII Surveys | Single Family Residential Turf Removal |
| General Public Information | Residential Ultra High Efficiency Toilet Rebates | High Efficiency Urinal Program | Multifamily Residential/CII Turf Removal |
| Public Information (Home Water Use Report) | High Efficiency Clothes Washer Rebates | Public Restroom Faucet Retrofit - MUN | Expand Large Landscape Survey/Water Budgets |
| | Gray Water Retrofit | Public Restroom Faucet Retrofit - COM | Sprinkler Nozzle Rebates |
| | | School Retrofit | Residential Rain Barrels |
| | Hot Water On Demand - New Development | Hot Water On Demand - New Development | Climate Appropriate Landscaping and Rainwater Infiltration |
| | Toilet Retrofit at Time of Sale | Toilet Retrofit at Time of Sale | |
| | CII MF Common Laundry Room High Efficiency Clothes Washer[2] | CII MF Common Laundry Room High Efficiency Clothes Washer[2] | |
| | Single Family/Multifamily Dishwasher Rebates[2] | Rewarding Businesses for Adopting Best Practices[2] | |
| | Hot Water Recirculation Systems[2] | Hot Water Recirculation Systems[2] | |
| | Additional Building Code Requirements for New Development[2] | Additional Building Code Requirements for New Development[2] | |
| | Innovation Incubator Program[2] | Innovation Incubator Program[2] | |

[1] This measure was still under development when the technical memorandum was approved in April 2016. A comprehensive cost of service water rate study conducted by Raftelis Financial Consultants, Inc. was completed in August 2016.
[2] These measures target both CII and residential customers.

The Plan presents the water demands and conservation savings determined by this analysis. The Plumbing Code includes the new California State Law (Assembly Bill 715), which requires installation of High Efficiency Toilets and High Efficiency Urinals as of 2014. The Plumbing Code also includes SB 407, which applies to all new construction and replacements as of 2017 for single family and 2019 for multifamily and commercial properties. The increase of projected growth in population will cause baseline water demand to increase slightly. However, overall water use projections with plumbing code and water savings from the recommended program are expected to decline and then level off by 2035, based on current technologies.

Table 1-2 presents the City's water use projections 1) without plumbing code savings; 2) with only plumbing code savings and no active conservation activity; and 3) with plumbing code savings and the Recommended Program active conservation program implementation savings. It is important to note that demand projections are normalized,

without drought or recession conditions, whereas historical demands have been affected by drought and economic influences.

**Table 1-2. Normalized Water Use Projections**

| | 2020 | 2025 | 2030 | 2035 |
|---|---|---|---|---|
| Baseline Demand (MGY) | 3,560 | 3,636 | 3,743 | 3,838 |
| Demand with Plumbing Code (MGY) | 3,464 | 3,456 | 3,474 | 3,510 |
| Demand with Plumbing Code and Recommended Program (MGY) | 3,327 | 3,225 | 3,205 | 3,220 |

Source: City of Santa Cruz. DSS Model, Section: Results, Feb 16, 2016.

The following table shows the savings in 5-year increments for the plumbing codes, Recommended Program, and the Recommended Program with plumbing code savings from a baseline of 2015 normalized water demands without drought or recession conditions.

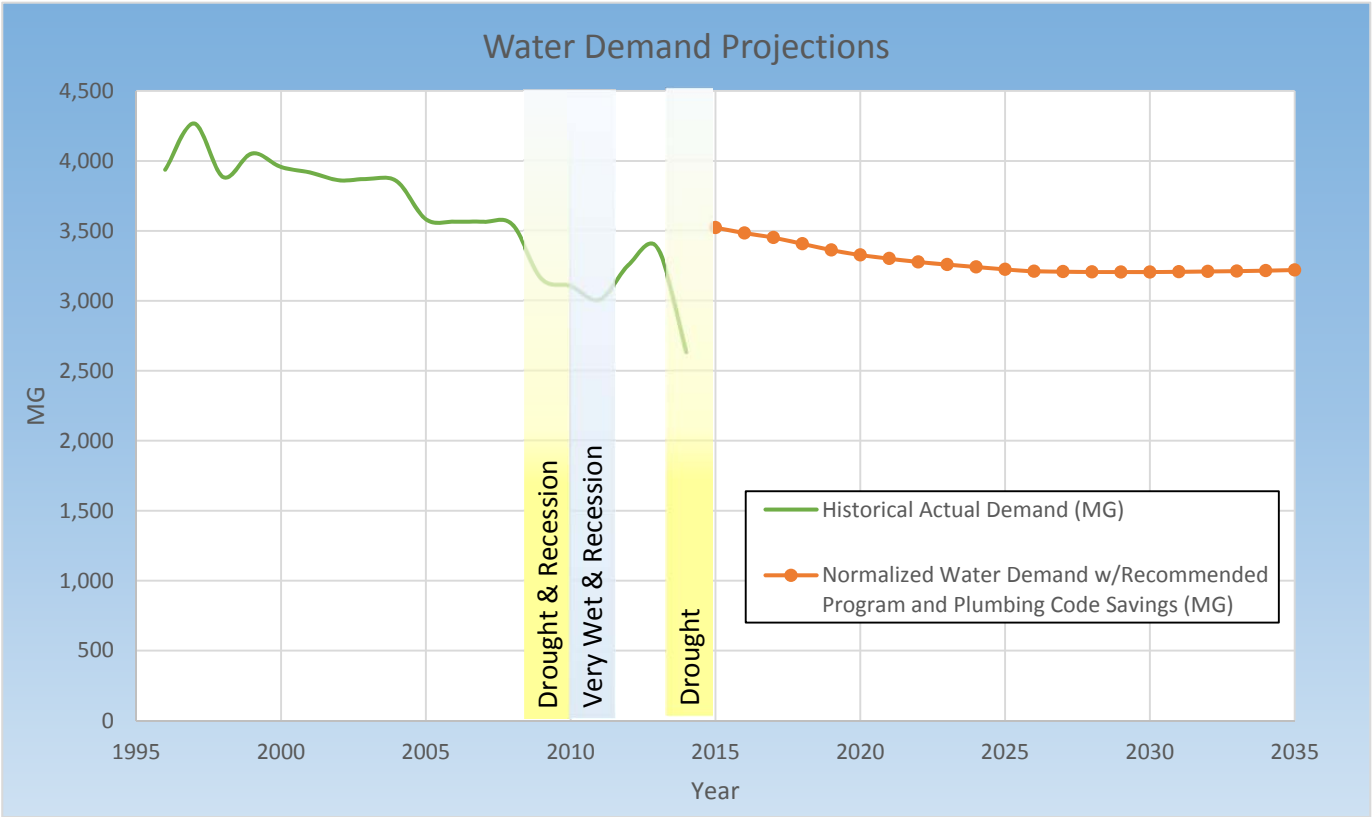
**Table 1-3. Long Term Conservation Program Savings over "Baseline" Demand**

| Conservation Program | 2020 | 2025 | 2030 | 2035 |
|---|---|---|---|---|
| Plumbing Code (MGY) | 96 | 179 | 269 | 329 |
| Recommended Program (MGY) | 137 | 232 | 269 | 291 |
| Recommended Program with Plumbing Code Savings (MGY) | 233 | 411 | 538 | 619 |

Source: City of Santa Cruz. DSS Model, Section: Results, Feb 16, 2016.

Figure 1-1 exhibits the same information as Table 1-2, in graphical form for the Recommended Program only. Demand projections are normalized, beginning in 2015, whereas historical demands are based on actual data, which illustrates how much demands have been affected recently by drought and economic influences. Future water demand is presented without lingering effects of drought, hence the large discontinuity between actual and forecast demand. This rebound to historical demand levels is considered a conservative assumption and repressed demands may persist for several years and beyond 2020. The projections do not reflect this delayed reaction.

**Figure 1-1. Recommended Program Projected Normalized Water Demands**




Notes:

1. Historical values based on actual data and projections are based on normalized future values.
2. Source: City of Santa Cruz. DSS Model, Section: Results, Feb 16, 2016.

The following table shows the projected per capita water use in gallons per day per person (GPCD) in 5-year increments for the projected demand with no plumbing code savings, projected demand with plumbing code savings, and projected demand with Recommended Program implementation and plumbing code savings.

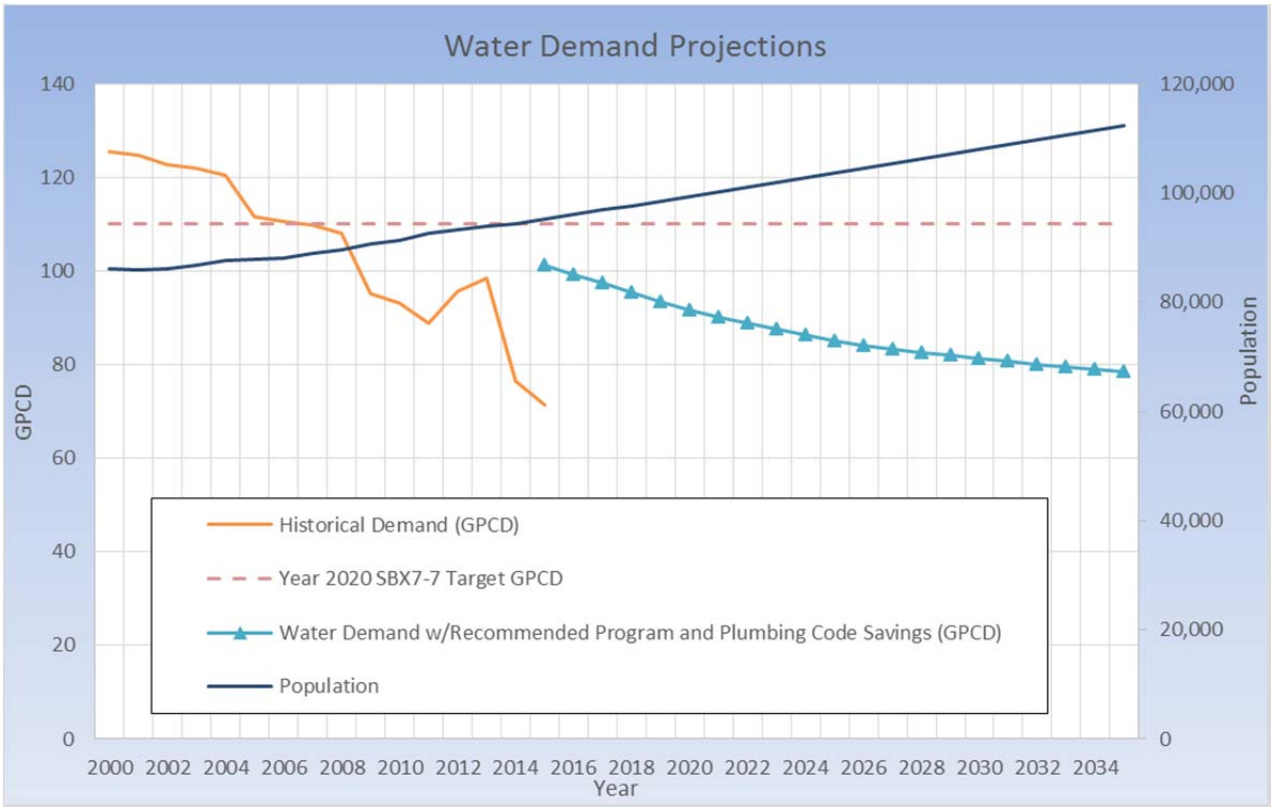
**Table 1-4. Projected Population and Per Capita Water Use[1]**

| | 2020 | 2025 | 2030 | 2035 |
|---|---|---|---|---|
| Population [2] | 99,403 | 103,620 | 107,989 | 112,390 |
| "Baseline" Demand without Plumbing Code (GPCD) | 98 | 96 | 95 | 94 |
| Demand with Plumbing Code (GPCD) | 95 | 91 | 88 | 86 |
| Demand with Plumbing Code and Recommended Program (GPCD) | 92 | 85 | 81 | 78 |

[1] City of Santa Cruz. DSS Model, Section: Results, Feb 16, 2016.
[2] WSAC Final Report, October 2015.

The following figure presents the SB X7-7 year 2020 GPCD target and historical and projected GPCD estimates with plumbing codes and Recommended Program savings. As seen below, the City has already met its state-mandated 2020 target and surpassed its voluntary CUWCC 2018 goal of 101 GPCD. The goal of the City's plan is to press beyond these state targets and instead maximize conservation savings to help meet local resource needs for current and future water demands.

**Figure 1-2. Water Conservation Program Savings Normalized Projections – SB X7-7 Target**




Notes:

1. Historical values based on actual data and projections are based on normalized future values.
2. Source: City of Santa Cruz. DSS Model, Section: Results, Feb 16, 2016.

The following table presents the benefit-cost analysis summary for the Recommended Program, which includes all the measures listed previously.

**Table 1-5. Recommended Program Costs and Savings**

| Conservation Program | Average Cost of Water Saved ($/MG) | Water Savings over "Baseline" Demand in 2035 (MGY) |
|---|---|---|
| **Recommended Program with Plumbing Code Savings** | 4,572 | 619 |

Notes:

1. Across the modeling time period of 2015-2035, administrative costs average approximately 22% of total utility costs annually.
2. Source: City of Santa Cruz. DSS Model, Section: Results, Feb 16, 2016.

## 1.2 Key Findings from the Water Conservation Program Analysis

As a result of this comprehensive analysis, here are some summary observations and conclusions:

1. The additional, incremental water savings from the Recommended Program, compared to the City's recent demand forecast developed by M.Cubed and used by the Water Supply Advisory Committee (WSAC), amount to about 220 million gallons in 2035.
2. The estimated annual demand will decline over time to about 3.2 billion gallons per year (BGY) in 2035, versus about 3.4 BGY estimated in the M.Cubed demand study. That estimate is comparable to the actual

level of water production experienced in the late 1960s, when the service area population was around 50,000. This decrease represents an almost 16% reduction is water use over 20 years.

3. The impact on water savings from 2015 changes in the fixture plumbing codes prompted by the emergency conservation regulations (which would not have been factored in but for the delay associated with the Water Supply Advisory Committee's process) is over 100 million gallons more than previously estimated.
4. The overall cost of water saved by the Recommended Program is about half of what the WSAC set as a recommended threshold.
5. Gross per capita water use is expected to gradually decline to a level of less than 80 GPCD in 2035.

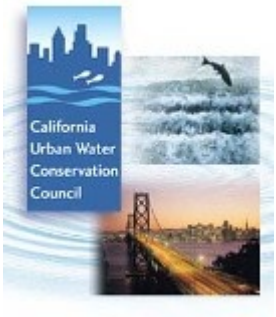
Successful implementation of the Recommended Program will require a significant increase in level of effort on the part of the City. Many new conservation measures will be employed and high participation rates are needed to achieve selected Program goals. Recommendations to assist with implementation include the following next steps:

- Budget an average of $1.1 million per year to cover the estimated cost of implementing this Program.
- Prioritize measures for implementation giving highest priority for implementation to those that contribute the most to meeting peak water saving targets in order to best optimize supply sources.
- Consider working with the largest water using customers in an attempt to reduce water use as described in Section 3.
- Develop a Measure Implementation Plan that describes exactly how each program measure will be implemented.
- Prepare an annual work plan for each plan year as soon as budget is adopted (or in concert with budget planning process).
- Update codes and ordinances, as necessary.
- Form partnerships and apply for grants, where appropriate.
- Contract services, if needed, to gain enough staff support to administer or accelerate implementation of the new program.
- Maintain the City Water Commission and Staff Conservation Working Group to guide the implementation.
- Review and use tools to track water use by customer class and overall water use reductions adjusted for the weather and other external factors.
- Set up a database to store and manage measure participation, cost, and other data to gauge successes and failures and adjust measures as needed.
- Use the tools annually to help decide on priorities for the next plan year.
- Use the DSS Model to annually update the Program, including actual measure participation, projected water savings, and expected per capita water use reductions. This will help to ensure the Program is on track to meet savings goals, including per capita water use targets.

Use the input from the City Water Commission as the forum for ongoing feedback and public input. In addition, utilize the Staff Working Group to update the annual work planning process to amend the plan, budgets, staffing, contracting, schedule, and so forth so as to stay on track.

# 2. INTRODUCTION

Water is a precious natural resource that is vital to the health and welfare and to the economy of the Central Coast region. The City of Santa Cruz relies entirely on local sources for the community's drinking water supply. Because water supplies are limited, it is important that everyone uses water efficiently. The City of Santa Cruz has had a long-standing commitment to water conservation and offers a variety of programs, informational materials, and incentives to help City water customers become more water-efficient.




In 2000, the City adopted a Water Conservation Plan in order to reduce water demand system-wide by 282 million gallons per year by the year 2010. Residential and commercial customers have saved over 330 million gallons of water per year so far with the help of plumbing fixture and appliance rebate programs, technical assistance, regulations, and other strategies. The City is active in promoting water conservation statewide.

The City of Santa Cruz contracted with MWM in 2013 to develop an updated Water Conservation Master Plan in order to define the next generation of water conservation activities and serve as a roadmap to help the community achieve maximum, practical water use efficiency. The City Council, the City's Water Commission, and the City's Water Supply Alternatives Committee, in its effort aimed at delivering safe, adequate, affordable, and environmentally sustainable water, has identified strengthening water conservation efforts as a top priority.

## 2.1 Overview of City of Santa Cruz Water System and Need for Conservation

The City faces a projected worst year gap between peak season available supply and demand during an extended drought of about 1.2 billion gallons (WSAC, October 2015). This shortfall is due to the following factors:

- 95% of the City's water supplies are collected from surface water sources.
- The City is physically and geographically isolated from other public water systems.
- The City is currently vulnerable to water shortage in extended dry and critically dry years.
- Expected requirements for fish flow releases to protect threatened and endangered species and anticipated impacts of climate change will further reduce available water supply.
- There is a decline in available groundwater supply.

This WCMP is part of the City's integrated water management approach where the City recognizes water conservation as a responsible management strategy for meeting existing and future water needs. Some of the numerous key potential benefits include:

- Protecting natural resources;
- Stretching existing supply
- Maximizing peak season water savings; and
- Helping downsize or delay costly supply, treatment, and distribution system upgrades.

## 2.2 Purpose and Scope of Plan

The City of Santa Cruz's Water Conservation Master Plan strives to maximize the community's efficient use of water in the most equitable and cost-effective manner to the extent practical for implementation by City staff.

Key priorities of the WCMP include the following:

- Capitalize on opportunities to meet the future water needs of the Santa Cruz Water Department customers through cost-effective and sustained water conservation and water use efficiency efforts
- Demonstrate environmental stewardship and foster innovative, responsible and efficient practices
- Commit to and implement a water conservation program that supports the health of rivers, streams, and groundwater integral to the region's quality of life and economy
- Monitor and measure performance to ensure conservation potential is being met as forecasted

Achieving these goals will allow the Water Department to:

- Maintain and exceed the water savings already achieved by the City of Santa Cruz as well as identify the best path to achieve those savings and to monitor commitments to the CUWCC Memorandum of Understanding (MOU) Regarding Urban Water Conservation;
- Maintain a long-term plan for compliance with SB X7-7 to meet the gallons per capita per day (GPCD) target by 2020; and
- Meet the City's integrated water resource management goals to reduce peak season demands.

## 2.3 Plan Development

In preparation for this project, the City completed a Residential and Commercial Baseline Water Use Survey in May 2013 to assess the current status of plumbing fixtures, appliances, and landscape characteristics present in the City's water service area. The results of this baseline study are summarized in Section 3.4. The full baseline study can be found at the following links:

http://www.cityofsantacruz.com/departments/water/conservation/more-information/water-use-baseline-survey

http://www.cityofsantacruz.com/home/showdocument?id=32326

Work on the Water Conservation Master Plan began with a kick-off meeting in January 2013 and was overseen by the City's Water Commission. Since that time, the Water Commission has developed the goals of the planning effort; identified and selected a suite of potential quantifiable conservation measures for technical analysis; and evaluated system-wide conservation potential through selection of a Recommended Program scenario.

There have been two (2) main phases in the City's planning process, separated by an intervening year that included an in-depth review of the work by the Water Supply Advisory Committee (WSAC). The process followed in preparing the Plan is summarized as follows:

**Phase 1: January 2013-October 2014**

- Analyzed water use and review City's Baseline Survey for remaining conservation potential
- Identified, screened, and prioritized measures, with significant public input via Water Commission Meetings and workshops

- Least Cost Decision Support System Model (DSS Model) was used to analyze the water savings, benefits, costs for each modeled measure that was selected during the screening process
- Formulated programs, leading to a recommended Program "C" to maximize total annual water savings based on conservation potential
- Presented outcomes to Water Commission on October 6, 2014

**WSAC Review: October 2014-September 2015**

- At City Council direction, staff and MWM worked with WSAC on integrated planning review. This included the WSAC review of prior Phase 1 analytical results from the DSS Model and seeking to answer additional questions with City and MWM technical assistance.
- Shifted conservation program emphasis to peak season (April-October) water savings rather than maximizing overall higher annual volume and/or more cost-effective water efficiency savings to better address the City's supply-demand gap.
- Prepared and adopted a new econometric-based demand forecast
- Produced recommendations for additional conservation measures to be included in the Final Water Conservation Master Plan

**Phase 2: October 2015-December 2016**

- Recalibrated model to updated econometric demand forecast and reset planning horizon to 2015-2035
- Incorporated new plumbing code changes based on the State's Emergency Drought Regulations, effective December 1, 2015
- Incorporated input (reviewed existing modeled measures for any adjustments and for additions of new measures) from WSAC process, with focus on peak season demand reduction, completed in workshop format on January 14, 2016 with City Staff
- Formulated the "Recommended Program" into the DSS Model and evaluated results.
- Prepared Technical Memorandum for Water Commission review and approval on April 4, 2016.
- City Council approved the TM on April 12, 2016.
- Final report prepared and posted online January 2017.

## 2.4 Plan Adoption

The Water Conservation Master Plan, in the Technical Memorandum form approved by City Council in April 2016, was formally adopted as a part of the City's 2015 Urban Water Management Plan on August 23, 2016.

# 3. ANALYSIS OF HISTORICAL WATER DEMAND

The WCMP process was comprised of four distinct steps: 1) input/analysis of system-wide demand projections to establish demand planning baseline with and without plumbing and building codes; 2) evaluation of system-wide conservation potential; 3) identification and study of potential conservation measures; and 4) deliberation and adoption of preferred long-term conservation program. Each of these steps is described in more detail in the following sections. This section presents a summary of the City's historical demand trends as well as the basis for the demand forecast.

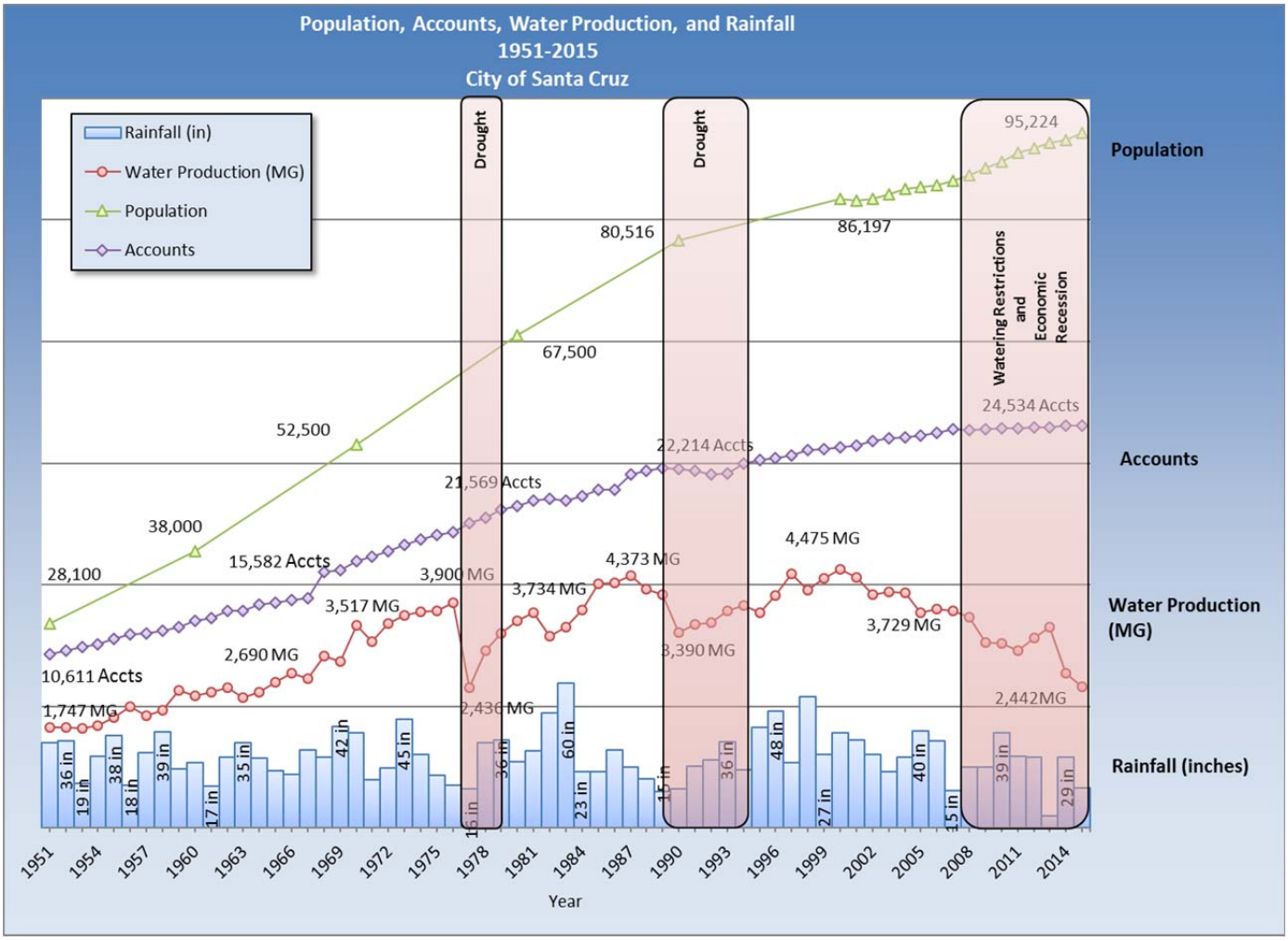
The City's water use patterns were analyzed based on water production and consumption data from City staff; water loss was examined as well. Historical monthly water use data was analyzed. Based on the City's water billing system, residential water use was broken down into single family and multifamily categories. Historical data was segregated into indoor and outdoor water use by customer type using the monthly billing data.

From the billing data, residential per capita water use values were calculated for water use inside the home and outside the home. These values were compared with other sources of municipal water use data applicable to the area. Other nonresidential categories of use were analyzed separately. Average daily commercial/industrial and public water use was expressed on a gallons-per-account or gallons-per-employee basis.

## 3.1 Historical Trends

As seen in Figure 3-1, the historic trend in system water use from 1950 to 2000 increased over time, consistent with account growth and population growth, except during two major drought periods. Around 2000, the pattern changed and system demand began a long period of decline, accelerated in 2009 by drought, economic downturn, and other influencing factors. The City has not seen a full demand recovery since the recent economic recession due to the ongoing drought. In 2013, system-wide demand was 3,364 million gallons per year, about one billion gallons per year less than the decade before with Stage 1 water shortage regulations and restrictions in effect. In 2014, the City instituted water rationing due to severe drought conditions. In 2015, with the same rationing scheme in place, production declined to 2,442 million gallons, a level not seen since the drought in the 1970s. Water demands are projected to remain depressed after the year 2015 long-term behavioral changes related to water use. While it is prudent to assume that future demands will eventually recover when rainfall patterns/drought conditions and the economy normalize, it might not be to the same level as before due to widespread, long-term conservation measures taken in response to drought and ongoing adjustments in water rates. Nonetheless, system-wide demand has recovered to near pre-drought levels after each of the three droughts of record since 1951. Given the pattern of consistent recovery, it is prudent to assume that future demands will follow suit when rainfall patterns, drought conditions, and the economy normalize.

**Figure 3-1. Historical Trends for City of Santa Cruz**




Source: City of Santa Cruz, 1951-2015.

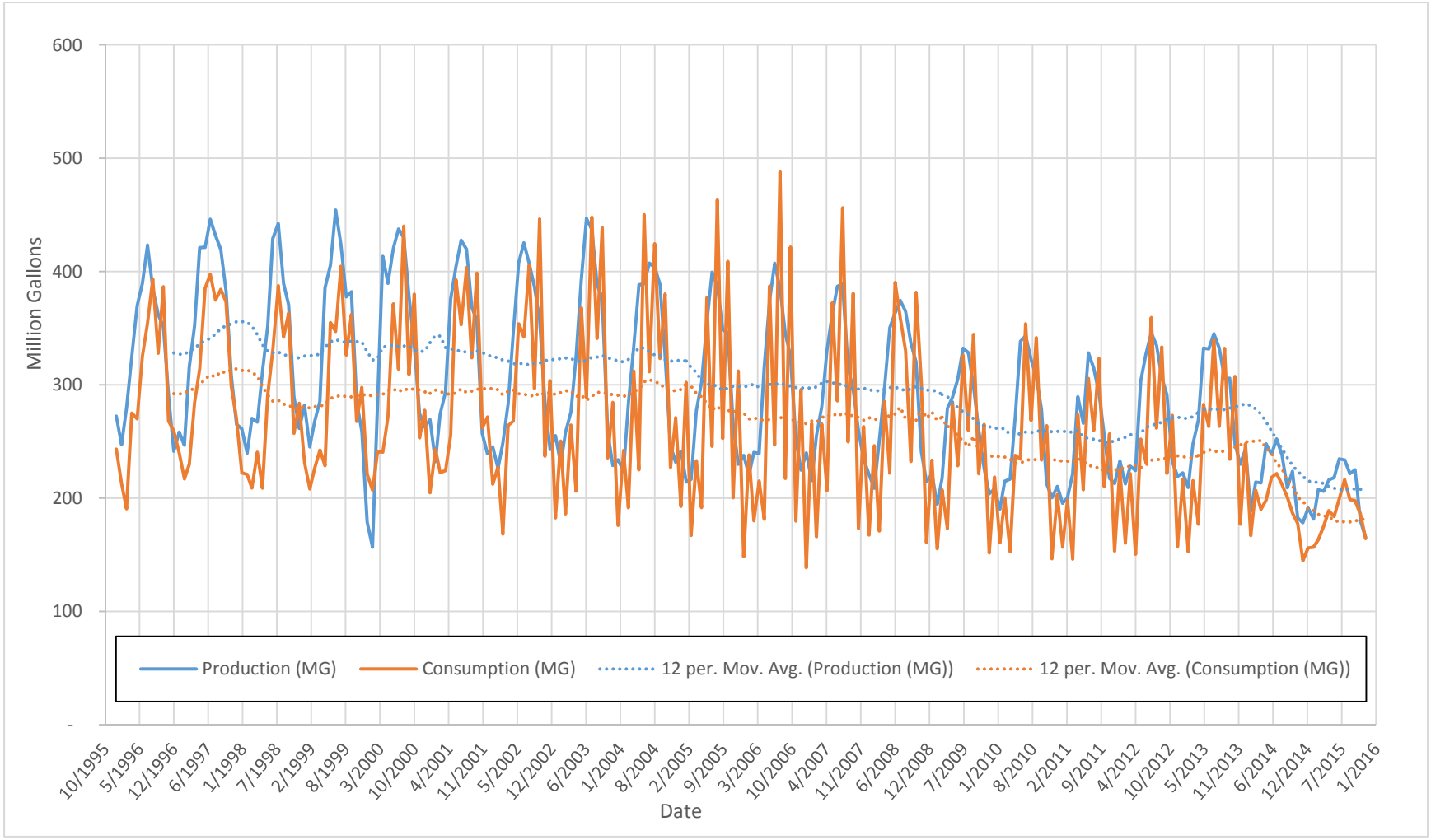
## 3.2 Production versus Consumption

Historical water production data for the City was analyzed on a monthly basis and shown in Figure 3-2, which illustrates the total production versus total consumption for the City. Water production data was measured at the City's water treatment plants. Water consumption data was measured at the customer meters. As can be seen from the figure, the City does not experience significant losses of water in its system between the sources and the customer.

The difference between the amount of water produced and the amount of water billed is termed the non-revenue water (NRW). The City has elected to use an estimated NRW value of 7.5% in their NRW projection estimates based on past AWWA Water System Audit Reports as presented in Section 4.4.2.

The City is currently preparing a Water Loss Control Program Report completed in 2016. The recommendations produced from this year-long project will be used to guide development of a robust water loss control strategy and will serve as a foundation for completing and reporting future annual water audits to the state beginning in 2017 under the requirements of SB 555 of 2015.

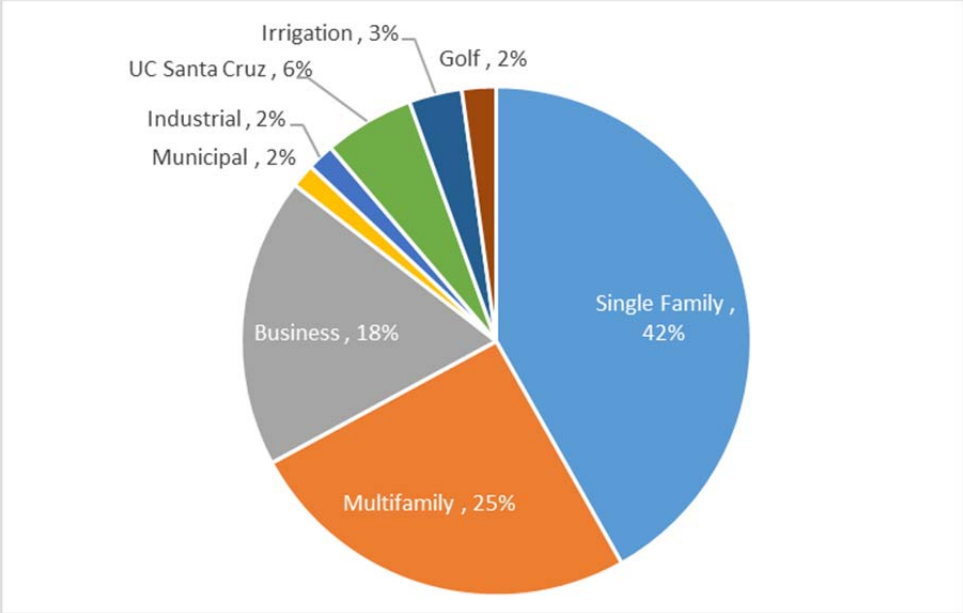
**Figure 3-2. Historical Water Production and Consumption**



## 3.3 Consumption by User Category

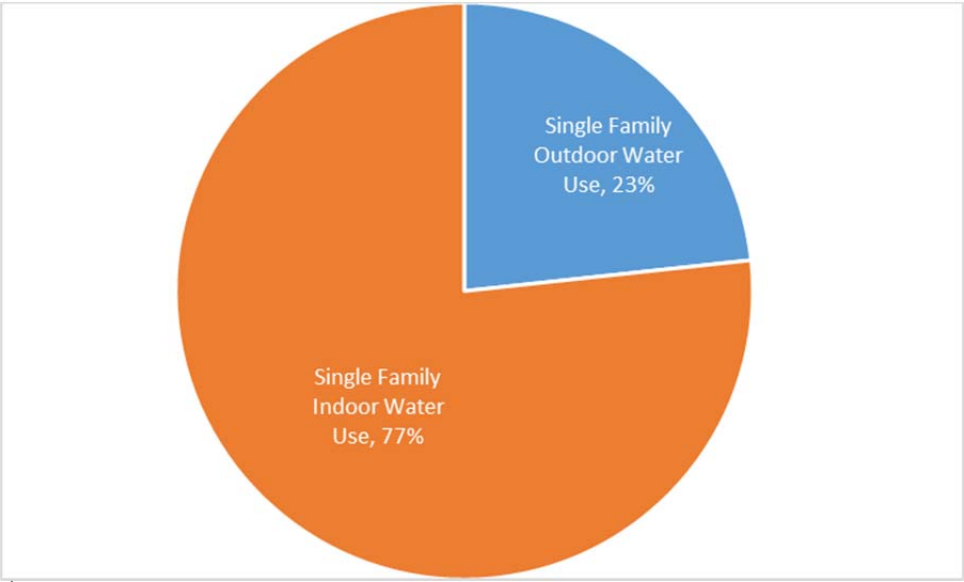
The City has several different types of water users. The current and projected user categories in the City are classified as Single Family, Multifamily, Business, Municipal, Industrial, UC Santa Cruz, Irrigation (including north coast agricultural irrigation), and Golf. The City is a mostly residential community, with some light commercial and industrial. The City is predominately a local services-based economy focused on tourism. The largest category of users of water in the City is the single family residential users who consume about 42% of the water sold. Shown in the following Figure 3-3 is the average annual consumption of the various user categories, based on year 2015 water use and account data for all customer categories.

**Figure 3-3. Annual Consumption by User Category**




Residential use is approximately 67% of the total annual consumption, typical of a city without significant commercial industrial uses. Since the single family residential use category formed the major portion of the City's water use (42%), it was analyzed further. Figure 3-4 shows the breakdown of single family residential use as indoor and outdoor based on the assumption that indoor use is approximately equal to the minimum use in the winter. Recent rainfall has been below normal, so an average of pre-recession and pre-drought years 2007-2008 as a baseline was selected for this profile as it was evident that there was little, if any, winter watering of landscape in these years. The goal of the analysis by customer sector, shown in the previous Figure 3-3, and the breakdown of indoor and outdoor water use, shown in the following Figure 3-4 were provided to help the water conservation planning staff to design conservation programs and marketing messages to obtain the highest water savings. As seen in Figure 3-4 below, 77% of the average single family water use is indoors.

**Figure 3-4. Single Family Residential Water Use: Indoor vs. Outdoor***



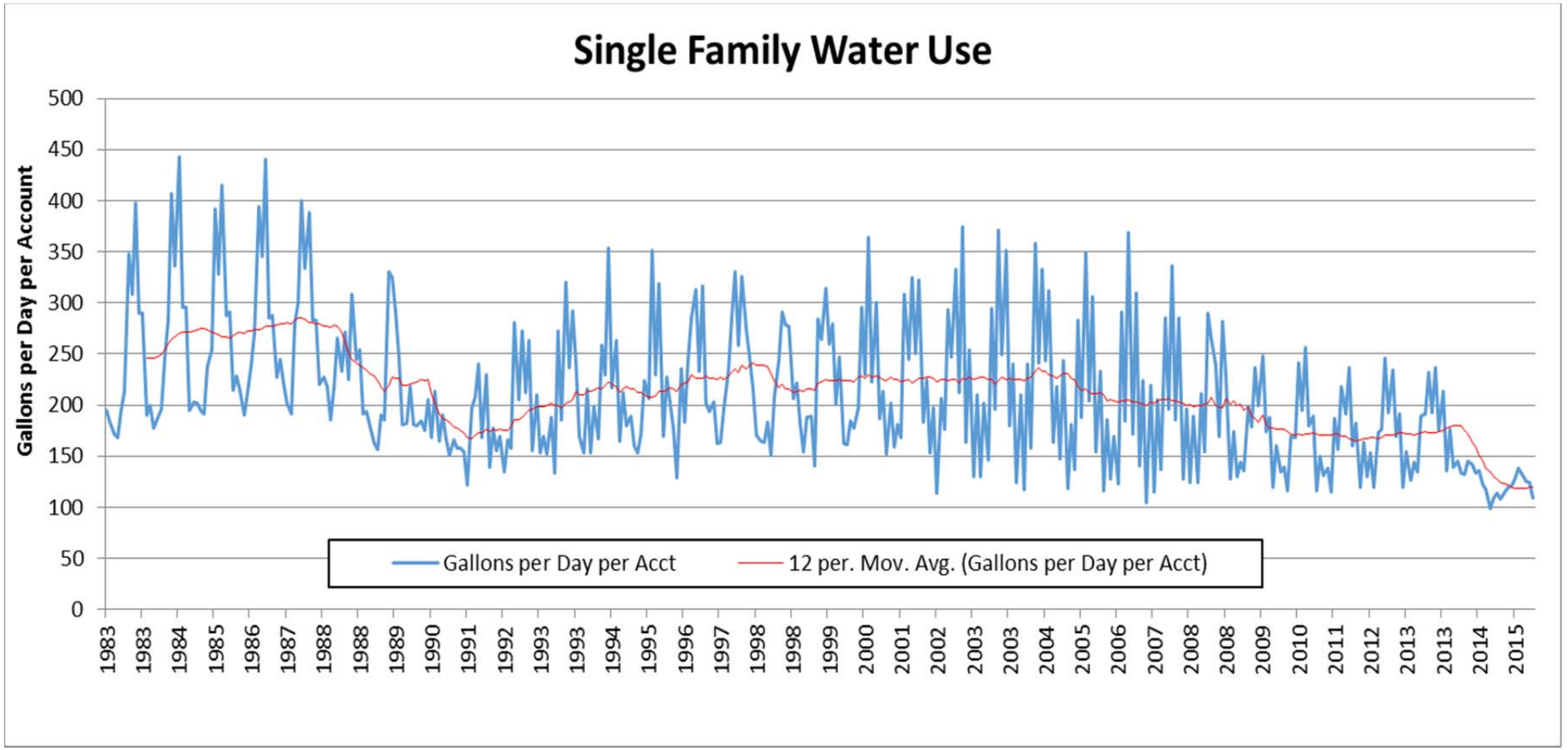

* Average 2007-2008 single family indoor and outdoor water use.

The average monthly usage per account per day for the primary water-user types of customers in the City, including Single Family, Multifamily, Business, and UC Santa Cruz are presented in the following Table 3-1 and Figures 3-5, 3-6, 3-7, and 3-8 along with more information in Appendix B.

**Table 3-1. Average Monthly Usage Per Account Per Day**

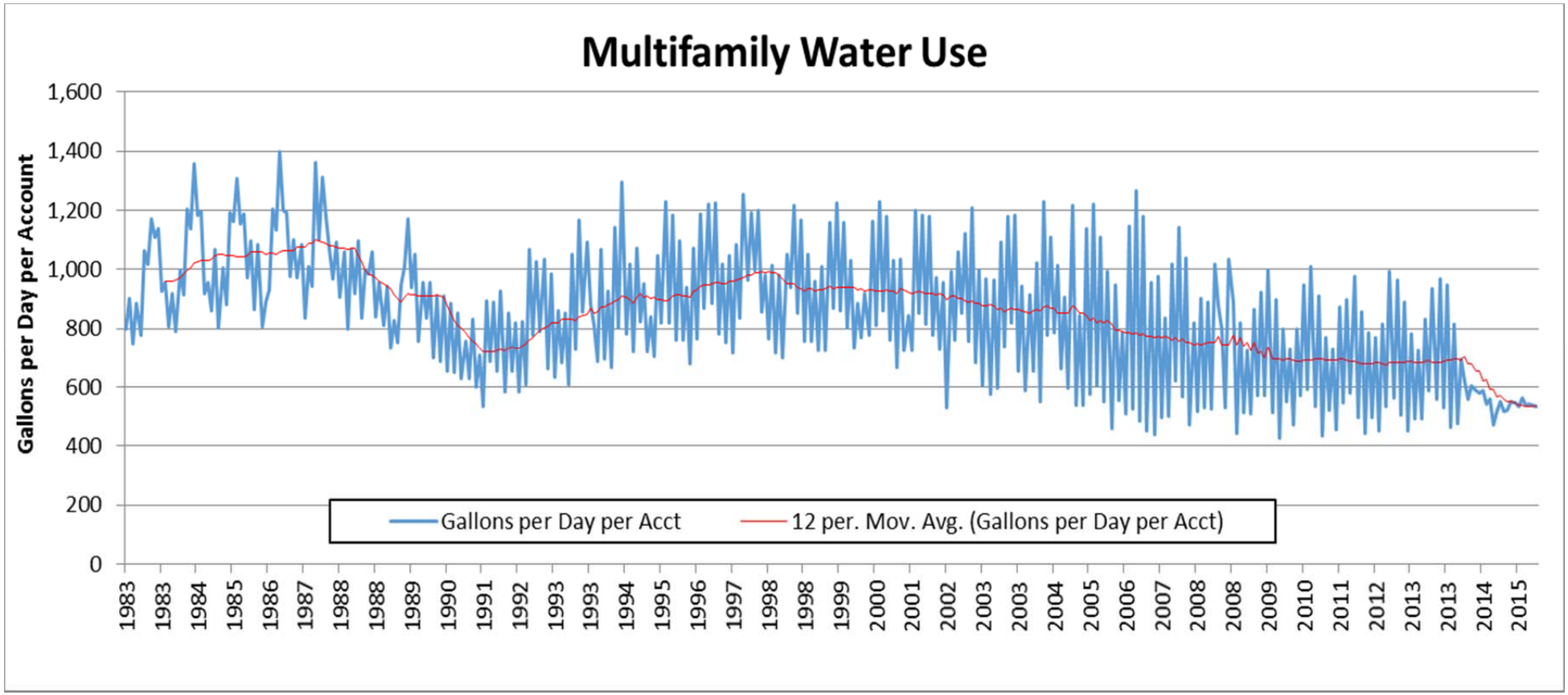
| Customer Categories | Indoor Use Percentage | Outdoor Use Percentage |
|---|---|---|
| **Single Family** | 77% | 23% |
| **Multifamily** | 88% | 22% |
| **Business** | 83% | 17% |
| **Municipal** | 32% | 68% |
| **Industrial** | 81% | 19% |
| **UC Santa Cruz** | 73% | 27% |
| **Irrigation** | 0% | 100% |
| **Golf** | 0% | 100% |

**Figure 3-5. Single Family Consumption per Account per Day***



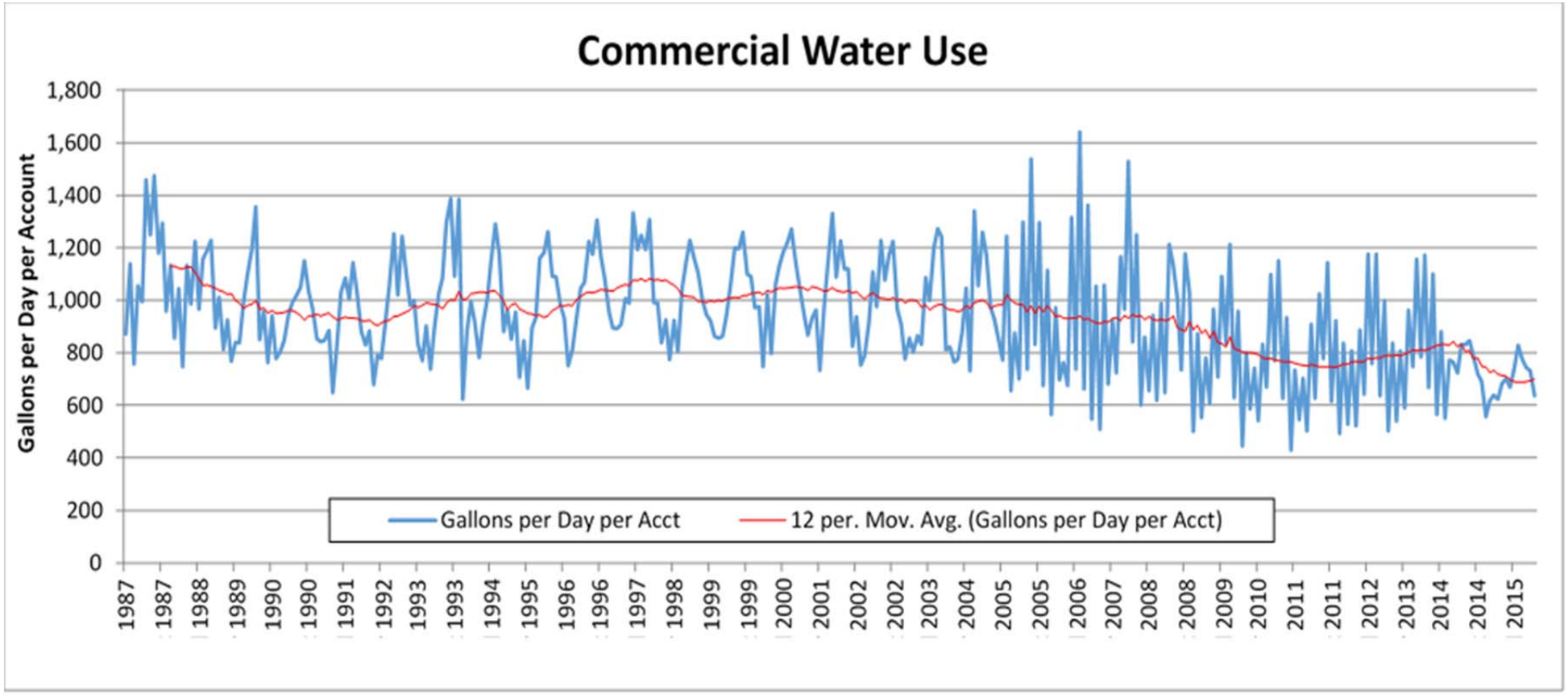

* The City experienced drought years in 1976-77, 1988-1992, and 2009-2015 and economic recession in years 2008-2012.

**Figure 3-6. Multifamily Consumption per Account per Day***



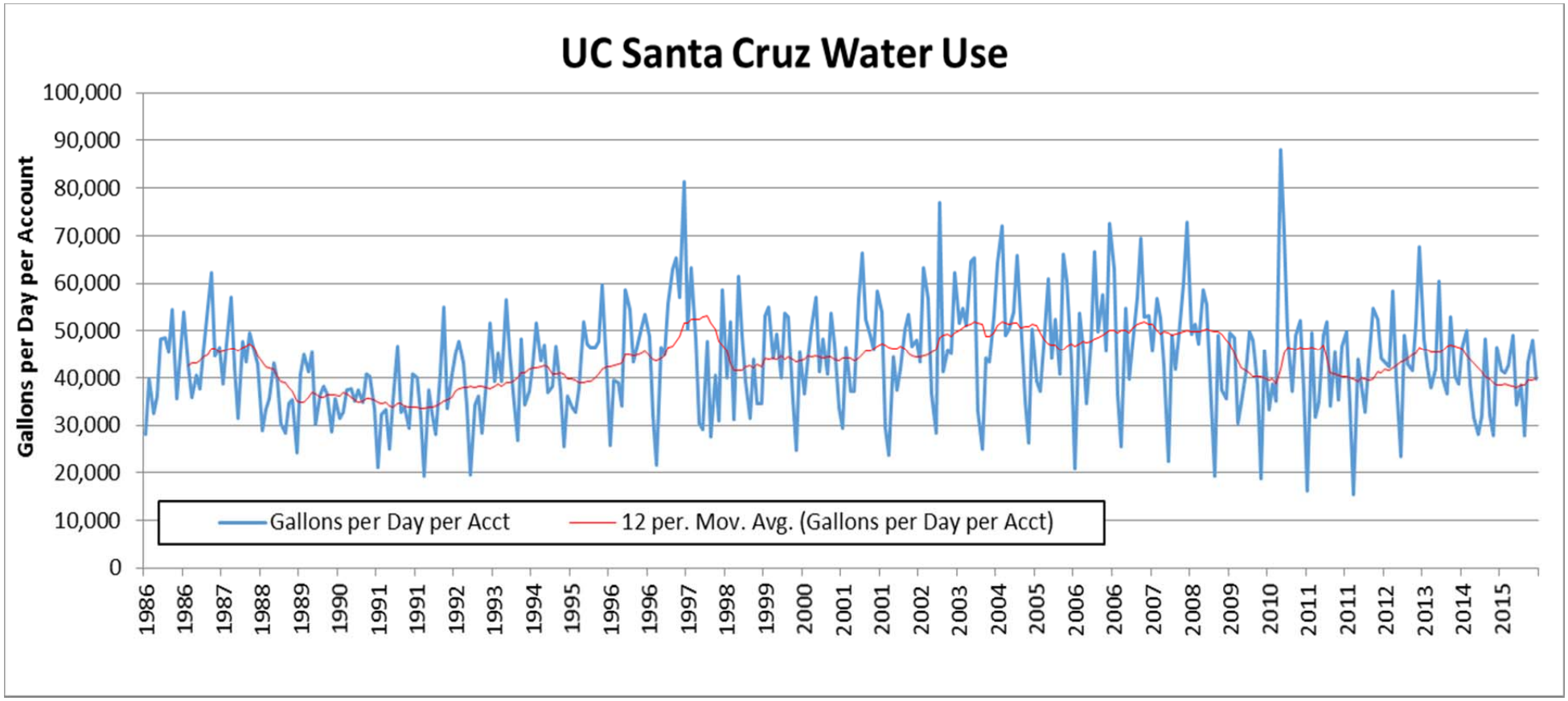

* The City experienced drought years in 1976-77, 1988-1992, and 2009-2015 and economic recession in years 2008-2012.

**Figure 3-7. Commercial Consumption per Account per Day***




* The City experienced drought years in 1976-77, 1988-1992, and 2009-2015 and economic recession in years 2008-2012.

**Figure 3-8. UC Santa Cruz Consumption per Account per Day***




* The City experienced drought years in 1976-77, 1988-1992, and 2009-2015 and economic recession in years 2008-2012.

Average monthly usage per account per day for the remaining lower water-using four primary types of customers in the City, Industrial, Municipal, Golf, and Irrigation is presented in Appendix B. Several observations can be made when looking at the historical record:

- The City experienced drought years in 1976-77, 1988-1992, and 2009-2015.
- The City experienced a recession in years 2008-2012.
- On January 17, 2014, Governor Edmund G. Brown, Jr. declared a drought state of emergency and directed state officials to take all necessary actions in response. Statewide mandated drought restrictions began in 2014 and are still in effect in the year 2016 at the time this Master Plan update is being written. Therefore, some of the decrease in water use is not actually a true long-term reduction in water use, but only a reflection of the drought restrictions.
- Most of the account growth over time has been in the single family category. Single family accounts have modestly grown 0.2% per year over the last five years. Commercial accounts are also growing slowly at 0.1% per year since 2010. Single family per account water use has decreased over the past five years, most likely due to a combination of the drought, economic recession, and conservation activities. Overall, the community is building out on existing parcels.
- Multifamily water use also has a downward trend, suggesting that newer accounts have been of the smaller size units or have separate irrigation meters and/or conservation programs, which are driving lower per account use.
- Commercial water use also has a gradual downward trend, suggesting shifts in types of commercial uses, smaller new accounts are being added, or commercial accounts are conserving, replacing turf, etc.
- Though the number of irrigation accounts has increased 0.8% per year over the past five years, as shown in Appendix B, irrigation account water use exhibits a significant downward trend due to the current restrictions on outdoor irrigation.

## 3.4 Baseline Survey Results

In 2011, the City sponsored a survey of its residential and commercial customers called the Residential and Commercial Baseline Water Use Survey Program (Baseline Survey) to develop a picture of the current state of water-using equipment within the service area. The Baseline Survey was designed to cover the City's three largest customer categories and excludes the large University of California Santa Cruz (UCSC) campus located within the service area as well as large landscape customers. Because of its non-comparability to other customers, including the UCSC campus in a random customer survey would have made little sense. Although UCSC is not a part of this study, Santa Cruz Water Department (SCWD) has a close relationship with UCSC and the campus has a water conservation plan in place that was developed specifically for the university, based on the results of a comprehensive campus-wide water audit in 2006/07[1] from which UCSC completed all identified high priority projects in the study. Large landscape customers are also excluded from this study because SCWD already has detailed information and conservation strategies in place for such customers.

[1] University of California Santa Cruz. College Water Efficiency Group, Water Conservation in Student Housing Report, 2012. Online: http://www.allianceforwaterefficiency.org/WorkArea/DownloadAsset.aspx?id=9027

The Baseline Survey was a random survey, statistically valid and designed to meet the following two goals: 1) to estimate the stock of indoor plumbing fixtures and appliances and to determine what percentage of this stock is compliant with the latest efficiency standards; and 2) to determine the prevalence, size, and characteristics of landscapes, irrigation systems, and other outdoor water using features, such as pools and spas. Additional information about the Baseline Survey can be found on the City's website at the following link: http://www.cityofsantacruz.com/home/showdocument?id=32326.

The Baseline Survey was very detailed and rigorous in order to sufficiently benchmark how much fixture replacement had been achieved in various sectors of the community. Some of the Baseline Survey findings are summarized in the following table. The percentage of indoor water using fixtures were used as a starting point (initial proportions) of these fixtures within the City in the determination of the indoor water use profile and the fixture water use plumbing code and standard potential savings. Any retrofit in the drought may shift savings earlier than planned but does not estimate any change in the overall anticipated volume of water savings.

**Table 3-2. Baseline Survey Findings**

| Indoor Water Use Characteristics by Sector - Percentage of Water-Efficient Devices | | | | |
|---|---|---|---|---|
| | **Efficiency Standard** | **Single Family** | **Multifamily** | **Commercial** |
| Toilets | ≤1.6 gallons/flush | 90% | 89% | 96% |
| Showerheads | ≤2.5 gallons/min | 92% | 95% | 95% |
| Bathroom Faucets | ≤2.2 gallons/min | 90% | 89% | Varies |
| Kitchen Faucets | ≤1.8 gallons/min | 71% | 92% | 63% |
| Clothes Washers | Front loading type | 63% | 46% | 52% |

Source: WaterWise Consulting, Inc. (2013), Residential and Commercial Baseline Water Use Survey City of Santa Cruz Water Department.

The landscape surveys provided detailed information about outdoor water uses. Lawn, a high water use plant, was found in only about half of residential properties and just 15% of the business sites (which included schools). For single family homes, less than 1/3 of the total landscape was typically devoted to lawn. Multi-family complexes were found to have about an even mix of lawn and other landscape plants. Other than schools, most commercial properties did not have lawn. Water-efficient drip irrigation was found in 44% of single family homes, 22% of multifamily, and 25% of businesses. These averages provided an overview of typical landscapes. However, survey results showed that landscapes varied a lot between properties in size, planting palette, and irrigation equipment used. This diversity adds an extra challenge when designing outdoor conservation programs and estimating the associated water savings.

## 3.5 Analysis of Large Users

An analysis was conducted of the City's top-100 water users. These users may be from any customer category. The UCSC campus is the largest user, with various golf courses, businesses, and institutional customers following in terms of annual demand. The businesses include hotels, supermarkets, dialysis centers, and laundromats; the institutional customers include several elementary schools. There are also several large multifamily complexes that are top water users in the City, including many mobile home parks. In addition to their customer account numbers and property addresses, the top users are tracked by customer category and the common name of the property. On average, top-100 users use approximately 20,000 gallons per day per account.

Those users with higher use per day may indicate increased opportunities to save water. One use of this data would be to set a goal of water use reduction through targeted conservation efforts. If the City sets a goal to save 10% of water use, this goal could be achieved by working with these top-100 high water customers and attempting to reduce each account accordingly. Identifying these additional opportunities for conservation may require a more detailed analysis to determine customer-specific opportunities for water savings. The following table presents the percentage of total demand that is used by the top-100 water users.

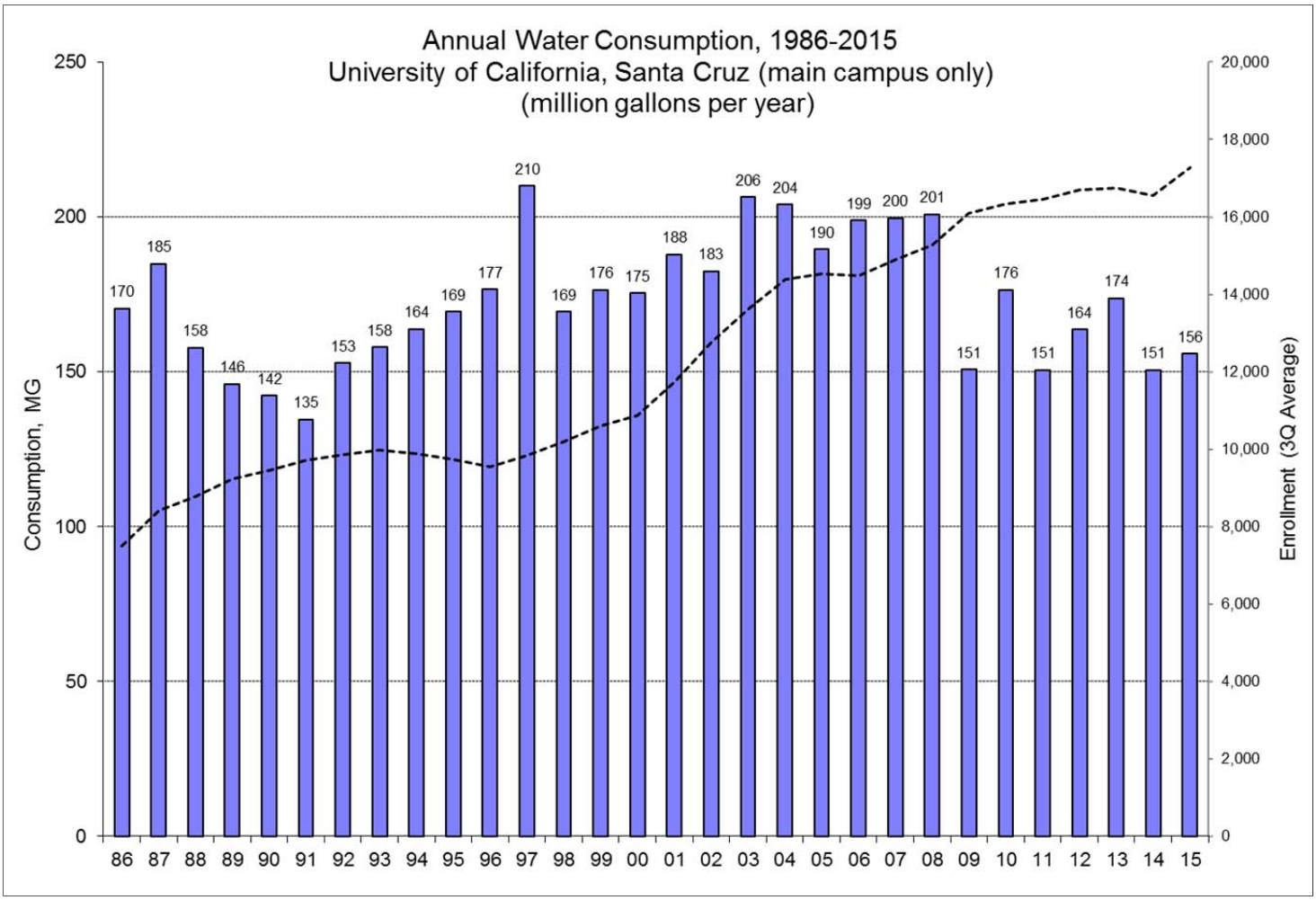
**Table 3-3. Top User Demand**

| Top-100 Large User Demand, MGY[1] | Total CII Demand, MGY[2] | Total Demand, MGY[3] | % Top-100 Large User Use of Total CII Demand | % Top-100 Large User Use of Total Demand |
|---|---|---|---|---|
| 743 | 853 | 2,481 | 87% | 30% |

[1] Top-100 large user demand for year 2012.
[2] Total CII demand represents year 2015 demand for business, industrial, municipal, UCSC, irrigation, and golf accounts.
[3] Total demand represents year 2015 total City water use (or production) including non-revenue water. The 2015 annual customer category consumption was approximately 2,229 MG.

The following chart presents the UCSC water use and enrollment. Note that despite a doubling in enrollment, annual water use remains relatively steady between 1986 and 2015. In fact, UCSC implemented 19 water saving projects, which reduced water use 15% from 2007 to 2011, based on the above-mentioned Water Conservation in Student Housing Report findings (UCSC, 2012).

**Figure 3-9. UCSC Main Campus Annual Water Consumption and Enrollment, 1986-2015**




## 3.5.1 Peak Demand Analysis

The composition of the peak water use was analyzed and methods were further brainstormed to reduce peak water use by all customer types and redesign measures or develop new measures to address this issue.

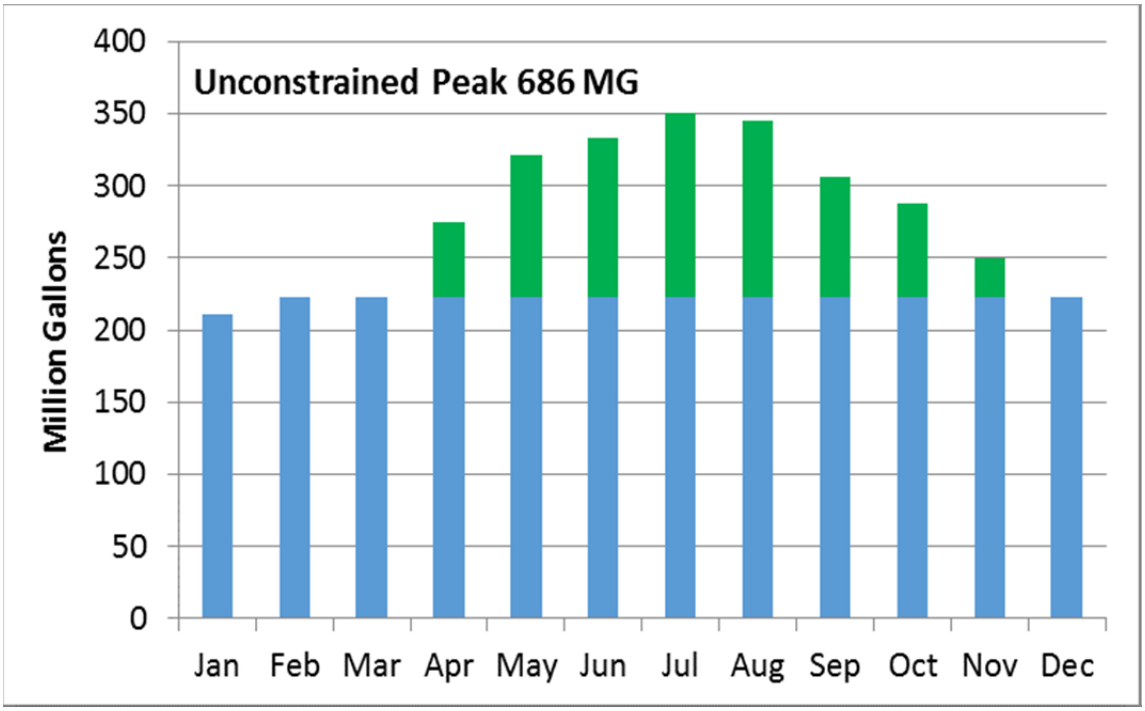
In Santa Cruz, having a pleasant coastal climate, only about 20-25% of the total water use is used for outdoor purposes. Seasonal use is also influenced by tourism, which is primarily in the summer months when visitors enjoy the City's beach lifestyle. In that context, there could be many definitions of what is peak water use, such as:

- Is it the highest water use day of the year? Is it the highest water use month of the year?
- Is it the total water use in the summer?
- Or is it the water use above a baseline of indoor use?

For purposes of this analysis, it was decided to focus on the latter, the total water used for peak use assuming that it is predominately driven by outdoor water demand, principally landscape and turf irrigation. In Santa Cruz, there is measureable outdoor use in the (eight) months of April through November. The highest use month is July, followed closely by August. Most of the nonresidential irrigation water use is separately metered making its quantification easier.

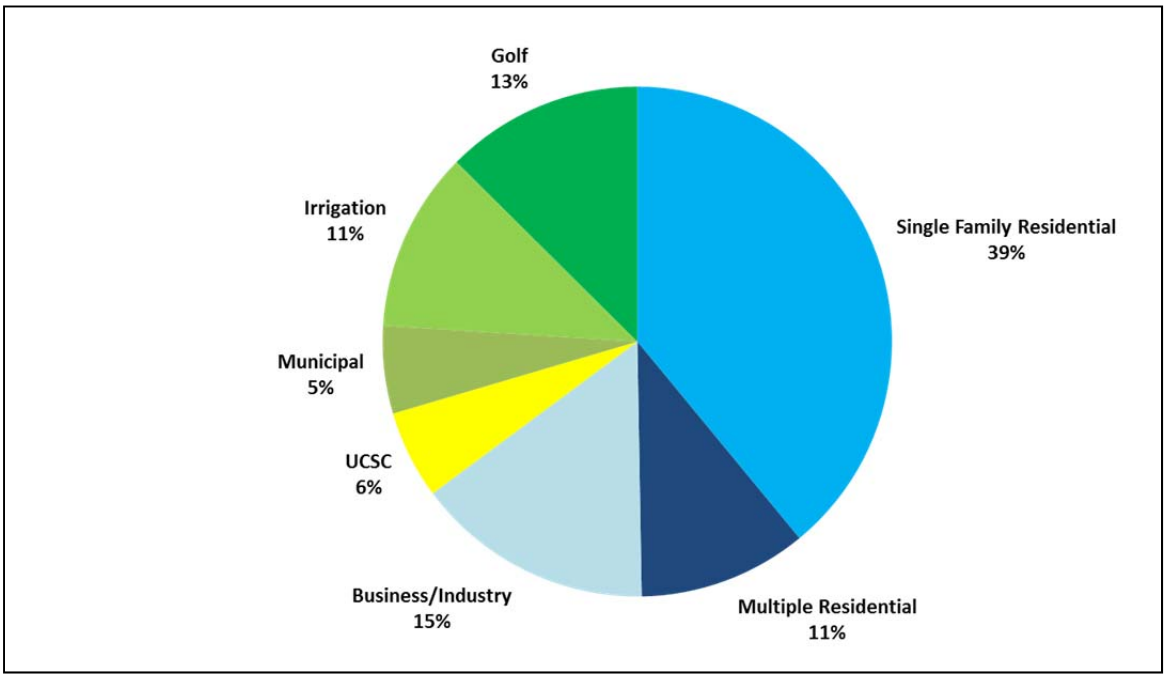
The City's interest is to maximize water savings regardless of whether it is focused on indoor or outdoor use. Due to the nature of how the City uses water, most components of the plan focus on indoor use. Nevertheless, there are some outdoor use reduction components that are useful to the intent of this current assignment of evaluating how best to reduce peak water use. The goal of the peak demand reduction analysis was to define the peak and assess what could be done to reduce it. The following figure presents the City's average monthly consumption for years 2012 and 2013. It is estimated that a total annual non-drought year, post-recession year total annual production would be approximately 3.3 billion gallons (BGY), of which peak water use represents nearly 700 MGY. As this volume is higher than occurred in 2012 or 2013, the monthly volumes shown below were adjusted upwards (about 6%) to reflect the higher annual volume. The green tips on the summer month columns represent the peak.

**Figure 3-10. Monthly Consumption**




The following figure presents the composition of peak season consumption by customer category for years 2012 and 2013. This is the breakdown of peak water use among the City's customer category who are contributors to peak consumption. Residential use accounts for half of the peak demand.

**Figure 3-11. Composition of Peak Season Demand by Customer Category, 2012 & 2013**



# 4. HISTORICAL AND CURRENT WATER CONSERVATION PROGRAMS

The City's past and current conservation efforts can be characterized into the following categories: utility operations programs; public information and education programs; residential; commercial, industrial, and institutional (CII); and landscape. It also includes a category for periodic water shortage management. This section presents a summary of the City's historical and current water conservation efforts.

## 4.1 Summary of Historical and Current Programs

The City of Santa Cruz has had a long-standing commitment to water conservation and offers a variety of programs, informational materials, and incentives to help City water customers become more water-efficient. Figure 4-1 on the following page presents the Water Conservation Program Timeline as a summary of historical water conservation program activities.

## 4.2 Overview of Current Program

The City of Santa Cruz has long recognized the importance of conserving water as a responsible water management strategy to help protect the area's natural resources; to stretch existing water supplies; to help downsize and/or delay the need for costly additional water supply, treatment, and distribution upgrades; and to fulfill the City's overall goal of ensuring a safe, reliable, and adequate water supply. In essence, water conservation involves making or inducing changes to many small end uses that individually have minimal effect on overall water use, but that collectively can constitute significant reductions in system demand. The City's Water Conservation section is responsible for promoting efficient water use and implementing management practices that reduce customer demand for water. Its responsibilities and major activities fall into the following four general categories:

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

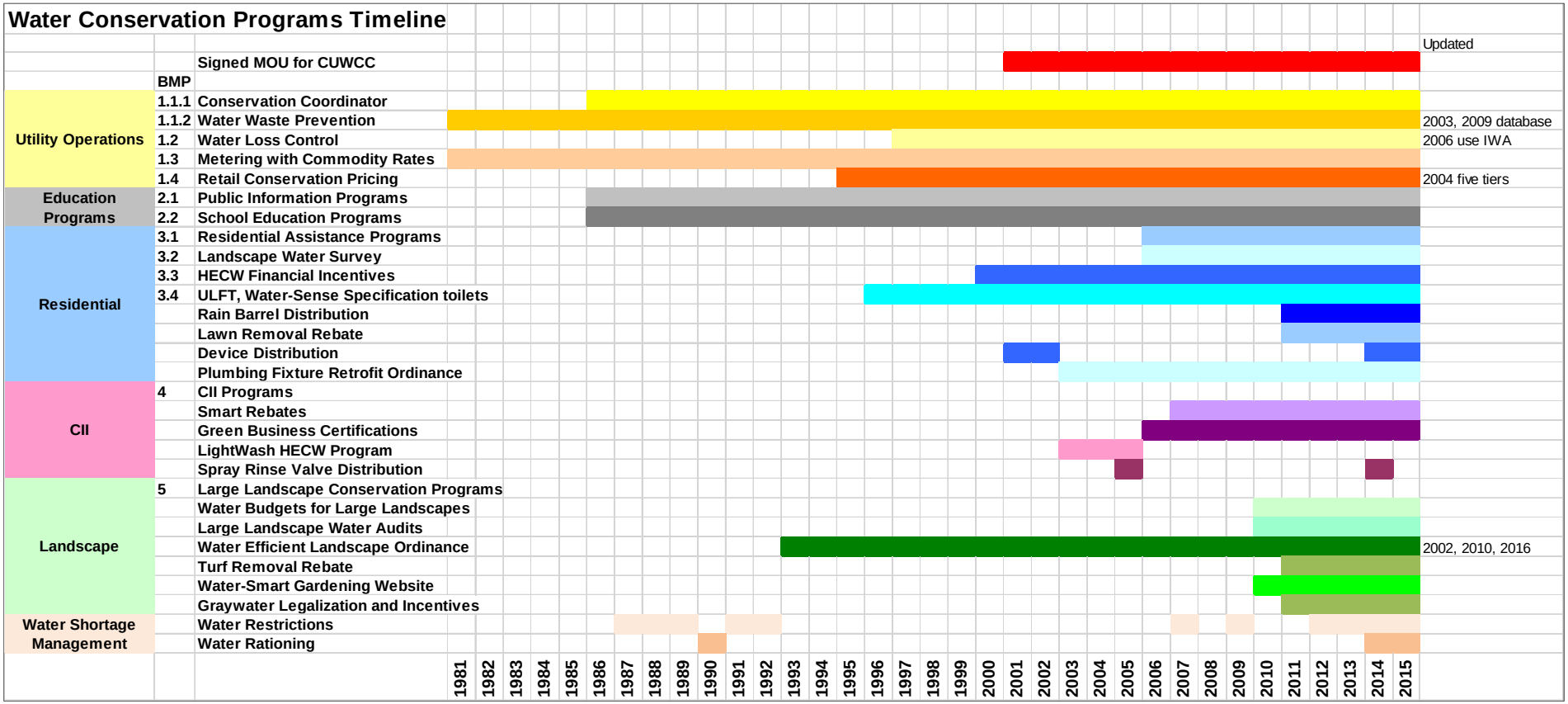
Water Demand Monitoring: to monitor water production, consumption and system water losses; to track weather and population data; to evaluate trends in per capita water use; to track demand associated with new service connections; to compare actual water demand with projected use by customer category;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

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

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

Since 2000, the Water Conservation section's priorities and work plan have been guided by two principal documents: 1) MOU Regarding Urban Water Conservation in California; and 2) the Department's previous Long-Term Water Conservation Plan.

**Figure 4-1. Water Conservation Program Timeline**



In June 2001, the City of Santa Cruz became a signatory to the MOU and joined the CUWCC in promoting water conservation locally and statewide. By becoming a signatory, the City committed to implementing all 14 urban water conservation Best Management Practices (BMPs) contained in the MOU deemed to be locally cost-effective and to periodically report progress made to the CUWCC. Subsequently, the CUWCC MOU was updated in 2008 at which time the 14 BMPs were consolidated down to 5 BMPs.

Effectively, the City's water conservation program addresses every significant end use of water in every major customer sector (residential, commercial, and landscape), with emphasis on measures that: 1) are quantifiable; 2) make a lasting reduction in average daily water use; 3) provide the greatest water savings; 4) are socially acceptable; and 5), have widespread appeal to the City's water customers. The City's water conservation program is funded by a combination of water rates, system development charges, and miscellaneous service fees. Customers also incur expenses in installing various devices and following suggested changes in water use patterns.

The City has created maps to illustrate its efforts for its water use efficiency measures. These maps can be found in Appendix D. The measures are presented in the following sections.

## 4.3 Recent Accomplishments

Much of the City's recent conservation activity is presented in the 2013 and 2014 CUWCC coverage reports found in Appendix E.

## 4.4 Utility Operations Programs

This section presents the City's water utility operations programs including the operations practices of a water conservation coordinator and water waste prevention ordinance as well as water loss control, metering, and retail conservation pricing.

### 4.4.1 Operations Practices

This measure encompasses two elements that the City takes to facilitate conservation program implementation and prevent water waste.

#### Water Conservation Coordinator

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

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

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

#### Water Waste Prevention

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

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

- Unauthorized use of water from a fire hydrant,

- Watering of landscaping in a manner, or to an extent, that allows excess water running off the property,
- Once notified, allowing plumbing leaks to go unrepaired,
- Outdoor washing of structures, vehicles, or surfaces without the use of an automatic shut-off nozzle, and
- Operation of a fountain, unless water is recycled.
- Provisions of the ordinance regulating **new development** include prohibitions on the following:
    - The use of water in new ice-making machines and any other new mechanical equipment that utilizes a single pass cooling system to remove and discharge heat to the sanitary sewer
    - Washing of vehicles at a commercial car wash unless the facility utilizes water recycling equipment
    - The use of water for new non-recirculating industrial clothes wash systems
    - The use of potable water for dust control or soil compaction purposes in construction activities where there is a reasonably available source of reclaimed water appropriate for such use

The ordinance is in effect at all times. However, during mandatory water restrictions, violating the water waste ordinance is punishable by a fine levied on the offender's utility bill ranging from $100 up to $500. Under a declared water shortage, field staff actively patrols the water service area to enforce restrictions, including water waste violations, seven days per week.

The Water Conservation Office also encourages the community to report water waste by calling the "leak line", 831-420-LEAK, or sending an email through the City website. Customers may also submit an online form found on the City's website. Staff respond to water waste complaints in a combination of ways including site visits, in-person customer contact, phone, and/or mail correspondence is used to resolve the issue. New software was acquired in 2009 to help document, track, and manage water waste complaints, including the photo evidence of water waste incidents. Since then, the City documented and addressed over 6,000 cases with this software.

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

### 4.4.2 Water Loss Control

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

Water audit results provide average system water losses as a percent of total water production. Of this amount, included is an estimated amount lost due to physical leakage in the distribution system and another separate portion that is not physically lost but goes uncaptured on the billing system due to sales meter inaccuracies. Results from water audits from 1997 to 2014 showed that on average the City's water loss is approximately 7.5% of total treated water production or 266 mgy. Of this amount, it is estimated that 5-6% (198 mgy) is lost due to physical leakage in the distribution system, also referred to as "real" losses, including leaking service lines, valves, fittings, and water mains. It is estimated that another 1-2% (68 mgy) is not physically lost but goes unreported on the billing system primarily due to sales meter inaccuracies, billing and accounting errors, and other factors. In 2010, the Water Department adopted a new

Meter Testing, Repair, and Replacement Policy that accelerates large meter replacement and should help improve overall meter accuracy.

To address physical leakage, service line repairs, leak repairs, and line replacements occur on an ongoing basis, the City has a multi-year service line replacement program to eliminate all polybutylene service lines, which was a widely used material between the early 1970s and the late 1980s until it was found to be defective. To date, over 6,000 polybutylene service lines on the system have been replaced with copper lines. Although a formal leak detection program is currently not in place, the Water Department uses sonic leak detection equipment to locate and repair leaks in the water system. In addition, the Water Department monitors for leaks on the customer's side of the meter by reviewing exception reports for high meter readings. Customers are notified so they can take appropriate action to repair leaks, even before they receive their water bills. Starting in year 2010, the City's top irrigation customers began receiving Water Use Reports in which customers, property managers, and landscapers can see their irrigation usage, including unexpected spikes due to leaks. Because these reports are sent to vested multiple parties for each property, there is an increased opportunity and incentive to notice and repair outdoor leaks in a timely manner.

In 2015, the City contracted with Water Systems Optimization, Inc. (WSO) to examine the City's water system and operations practices, validate where losses are occurring, evaluate options, and set forth a formal strategy to improve water accountability and reduce lost water. WSO's proposed scope of work is organized into three tasks, involving the following elements:

- Water audit validation, to assess the accuracy of the system input meters and data transfer systems, and to perform a business process review of meter testing, reading, and billing activities;
- Component analysis of real losses, to quantify the volume of different types of leaks and determine the economic level of leakage – the balance between the value of the water that is lost through leakage and the cost of finding and fixing leakage or reducing leakage through pressure management; and
- Water loss control program design, to outline the most cost-effective strategies for reducing both real and apparent losses over time.

The recommendations produced from this year-long study will be used to guide development of a robust water loss control strategy and will serve as a foundation for completing and reporting future annual water audits to the state beginning in 2017 under the requirements of SB 555 of 2015.

### 4.4.3 Metering with Commodity Rates

All of the City's 24,534 water connections are fully metered with Automated Meter Reading (AMR) technology. Water meters are required for all new service connections. Approximately 15% of all City water meters are now connected with Advanced Metering Infrastructure (AMI) technology, allowing access to hourly meter reads. In addition, a separate, dedicated irrigation meter is required for all new and renovated multifamily and commercial landscape projects with over 5,000 square feet of landscaped area.

All meters are read and billed monthly according to the volume of water consumed. Monthly billing was first instituted inside the City in 2005 mainly to facilitate rising rates for all City utilities, but it also served in aiding in leak detection and allowing for more accurate monitoring of individual account usage and categorical water consumption. Outside City customers were later transitioned to monthly billing in April 2014 to facilitate water rationing.

#### Water Conservation-Oriented Pricing

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

volumetric charge; and 3) for customers residing in elevated pressure zones, an elevation charge. The readiness-to-serve charge varies by meter size and location.

For the volumetric charges, the City has had a multi-block, inclining rate structure in place for single family residential customers since 1995. In 2004, following a comprehensive water rate study, a new, five-tier rate structure was adopted that applies to residential accounts with either one or two dwelling units. This new rate structure was intended to encourage more efficient use by single family residential and two-unit customers during the peak summer season, when the system relies more heavily on reservoir storage to meet daily demands. For all other customers, including multifamily (3 or more dwelling units), business, industrial, municipal, and irrigation customers, water was billed at a uniform rate up until the October 2016 rate changes.

In August 2014, the Santa Cruz City Council adopted an annual 10% water rate increase over the next five years to complete several critical infrastructure projects. These projects included: Phase 3 of the North Coast System pipeline ($10 mil), rehabilitating and replacing six filter basins at the Graham Hill Treatment Plant ($6 mil), converting the Bay Street Reservoir to two modern, 6-million gallon tanks ($25 mil), annually replacing 2-4 miles of aging main, and rehabilitated storage tanks, pumps, and completing the Beltz 12 well project. All utility rates and rate change proposals are established by resolution of the City Council.

The City of Santa Cruz recently developed long-range, 10-year financial plan completed in June 2016 and undertook a 5-year rate study completed in August 2016 to support the Department's ongoing operations and planned capital improvement programs. Capital projects during the first five years will be focused on system rehabilitation and replacement projects. Major investments to implement the Water Supply Augmentation Strategy are anticipated to occur in the second five years of the financial planning horizon. The new rate study was completed in Fall 2016**.** Table 4-1 shows the rate design that was implemented October 2016 in order to meet both conservation pricing and other pricing objectives.

**Table 4-1. Recommended Basic Rate Structures for Customer Classes**

| Customer Category | Basic Rate Structure |
|---|---|
| **Single Family Residential** | Keep inclining rates but reduce both tier width and number of tiers |
| **Multi-Family Residential** | Change from uniform to tiered rates based on number of dwelling units |
| **Commercial/Municipal/UCSC** | Maintain uniform rate structure |
| **Landscape Irrigation** | Transition all irrigation accounts to a simple water budget-based rate, as proposed in Section 7 of this plan |
| **North Coast Agriculture** | Maintain uniform rate structure |

The new, recommended rate structure has changed to a structure that collects about 90% of revenues from volume charges (based on the amount of water used). The prior rate structure in 2015 collected only 65% of revenues from volume charges. Other new changes include:

- Establishing an Infrastructure Reinvestment Fee that will collect the funding needed to support pay-as-you-go capital and debt service costs. The fee would be collected as a separate charge based on water use.
- Establishing a $1.00/CCF surcharge on water use beginning in July 2017 to increase the Department's Rate Stabilization Fund. This fund would be used to mitigate the potential revenue instability associated with the recommended rate structure, and augment revenues in normal years should consumption fall below a level of 2.5 billion gallons per year.

- Retaining the existing Drought Cost Recovery Fees that are triggered by a City Council declared water shortage and would be collected as a fixed charge for the full fiscal year.

The financial plan and new rates are needed to ensure the long-term financial health of the utility, and enable the Water Department to support ongoing operations and maintenance of the water system and make the capital investments required to comply with regulations, rehabilitate and replace aging infrastructure.

## 4.5 Public Information and School Education Programs

This section presents the City's public information and school education programs.

### 4.5.1 Public Information

The City of Santa Cruz Water Department actively values and promotes public awareness and education about the City's water resources and the importance of water conservation. The City of Santa Cruz disseminates information to the general public in different forms including: media, workshops and community events, billing and customer service, and school education programs.

The City uses media coverage in order to broadly share information and updates on events, programs, and news to the public in the following ways:

- "SCMU Review", utility newsletter which includes news and information on water conservation topics;
- City of Santa Cruz Water Conservation website/ Water Supply Advisory Committee website;
- Formal water supply outlook published three times a year sharing the water conditions/ supply availability;
- Weekly water conditions webpage;
- Paid advertising in local newspapers;
- Opinion page coverage;
- Marketing and advertising of EPA's "Fix a Leak Week"; and
- Television and radio news interviews and community television programs.

In addition, the City uses workshops and community events to engage and interact with the public by the following:

- Public meetings and speaking events to community organizations, industry and homeowners' associations, and service groups;
- Tabling at local fairs, farmers' markets, and events;
- Participation in regional water forums;
- Participation with other local water agencies in local events and sponsorships of water conservation-related activities;
- Free workshops on irrigation efficiency, new irrigation technologies, and water conservation strategies for the landscape; and
- Financial support to the Green Gardener Program, California Water Awareness Campaign, Water-Smart Gardening Faire, Green Business Program, and the Water Education Foundation.

The City of Santa Cruz also uses a personable approach to public education and outreach through billing and customer service, which includes the following:

- Marketing and distribution of free water conservation devices and literature;
- Marketing of rebates and distribution of rebate applications;
- Bill inserts;
- Field representatives showing customers how to read their meter and check for leaks at their properties;
- Partnership with the Monterey Bay Area Green Business Program;
- Messages and information on customer's bills showing daily consumption and a graph charting monthly consumption for the entire year;
- Water supply tours; and
- Water school (offered to residential and irrigation customers who went over their allotment during rationing).

### 4.5.2 School Education Programs

The City offers school education activities for students ranging from upper elementary age children up to the University level. Education materials and classes are designed to meet current state education framework requirements and are available to local schools free of charge. The program gives students an opportunity to learn about the City's water supply system, watershed and water conservation. School educational activities include:

- Field trips and ranger presentations at Loch Lomond Reservoir and San Lorenzo River;
- Loch Lomond Trout in the Classroom fish release field trip;
- Distribution of age and grade level appropriate curriculum and educational materials, including a water education booklet specially developed for Santa Cruz County students;
- Classroom presentations; and
- High School Watershed Academy program.

## 4.6 Residential Programs

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

### 4.6.1 Residential Assistance Programs – Home Indoor and Landscape Water Surveys

The City has been conducting residential home water audits or "surveys" for customers since 2006 with a focus on high water-usage customers. This free service is designed to help residents control their utility costs and reduce water use. A conservation representative sets up the appointment for a specific date and time and spends about an hour and a half at the home. This service is geared toward households with above average water use, whose water use exceeds 14 hundred cubic feet (units) per month or more than 10,000 gallons per month.

The Home Water Survey program is a free service offered to single and multi- family residences and consists of reviewing billing and consumption information, showing how to read a meter and detect leaks, inspecting home plumbing fixtures and offering free showerheads, faucet aerators, and rebate forms. The survey also assesses outdoor water use and needs by checking the irrigation system and timer, and evaluating the landscape area, design, and plants. The City has provided 504 home water surveys since its inception in 2006. The City anticipates that with the new rate increases, participation will increase as customers will need more support in learning how to read their meter, detect leaks, and find ways to conserve at home.

### 4.6.2 High Efficiency Clothes Washers

Clothes washing is one of the major end uses of water in the residential sector. It is also one with very significant water conservation potential in terms of the opportunity to reduce per capita water use on a long-term basis. Starting in 2000, the City offered a $100 rebate when a resident purchased an Energy Star® labeled high efficiency clothes washer (HECW). In July 2016, the City modified its high efficiency clothes washer rebate as mentioned in the water conservation master plan, by offering a two tiered rebate. The new rebate program offers $100 for any Energy Star® certified clothes washer, and offers an additional $100 for any current Most Efficient Energy Star® clothes washer. Energy Star® clothes washers have water factors of 4.3, whereas the Most Efficient of Energy Star® have an even lower water factor of 3.2 (lower is better). On average, Energy Star® washers use only around 15 gallons per load and about half the total gas and electric energy compared to a standard clothes washer. Since 2000, the City has rebated over 9,000 Energy Star® high efficiency clothes washers.

### 4.6.3 WaterSense Specification Toilets

Toilets are another area where there is potential for long-term reduction in per capita water use in the residential sector. The City's residential toilet replacement program has two components: 1) a rebate program; and 2) a plumbing fixture retrofit regulation. The City has operated a rebate program to promote the installation of ultra-low-flush or high efficiency toilets in residential accounts since 1995. The program originally featured a $75 rebate as a financial incentive for customers to remove their higher-volume toilets and replace them with 1.6 gallon ultra-low-flush toilets. This $75 rebate was discontinued in 2010. The City's current toilet rebate program offers $150 rebate for toilets meeting Water Sense criteria of 1.28 gallon per flush maximum. Eligibility requirements depend on the flush volume of the toilet that customer is replacing. Older, higher usage toilets of 3.5+ gallons per flush are eligible with the replacement of a high efficiency toilet of 1.28 gpf or lower. Customers who have toilets less than 3.5 gallons per flush must install ultra-high efficiency toilets of 1.0 gallons per flush or less to be eligible. Nearly 14,000 fixtures have been replaced under this program, saving approximately 100 million gallons of water annually.

Additionally, the DWR started a program in 2015 that provides rebates for replacing toilets in single family residences to support California's drought response. The $6 million program budget is expected to support the replacement of 60,000 toilets throughout the state. Up to $100 will be rebated for purchase and installation of one qualified HET (1.28 gallons per flush or less) per household that replaces a less efficient toilet (using more than 1.6 gallons per flush).

### 4.6.4 Plumbing Retrofit Ordinance – Residential

In 2003, the City adopted a plumbing fixture retrofit ordinance. This regulation requires that all residential, commercial, and industrial properties be retrofitted with low consumption showerheads, toilets, and urinals when real estate is sold. As part of the initial program implementation, the City worked closely with the County of Santa Cruz and the City of Capitola to have similar ordinances passed in these other jurisdictions.

As a result, the retrofit regulation applies uniformly throughout the entire water service area, regardless of jurisdiction. This ordinance implements the City's Long-Term Water Conservation Plan and fulfills the City's obligation under the MOU to carry out a toilet replacement program that is "at least as effective as requiring toilet replacement at time of resale" (CUWCC, 2014).

Under the law, the seller of the property is responsible for retrofitting any older toilets, urinals, and showerheads on the property with low consumption fixtures, and for obtaining a water conservation certificate from the Water Department. There is an option in the ordinance that allows the responsibility for retrofitting to be transferred from the seller to the buyer, if both parties agree. In either case, the City tracks real estate sales and requires every property to be inspected to verify that the plumbing fixtures on the property meet the low consumption standards; toilets flushing no more than 1.28 gallons per flush (1.6 gpf toilets are exempt), showerheads at 2.0 gallons per minute, and urinals flushing at 0.5 gallons per flush. A custom database program was developed by a consultant to manage property sales data on local properties and retrofitting records as well as follow-up enforcement of the ordinance.

Since 2003, the City has processed, inspected, and/or certified 9,523 properties through the plumbing retrofit ordinance. Because the City has had a Plumbing Fixture Retrofit (PFR) Ordinance in place since 2003, it is in compliance with the requirements of SB 407 of 2009.

## 4.7 Commercial, Industrial, and Institutional (CII) Programs

The City of Santa Cruz Water Department provides water to over 1,900 commercial and industrial accounts within the service area, accounting for 26% of total system water use. Commercial customers are billed for water and sewer service based on the volume of water consumed. Conserving water can lower the cost of doing business by reducing water, sewer, and energy expenses.

### 4.7.1 Smart Business Rebate Program

The Smart Business Rebate Program was offered as a result of the conclusion of the statewide Smart Rebate program in 2013. The City's Smart Business Rebate Program mirrors the old statewide program by offering businesses rebates for installing water efficient fixtures including:

- High-Efficiency Clothes Washer (Energy Star certified): up to $400
- High-Efficiency Toilet (1.28 gpf or less): up to $200
- High-Efficiency Urinal (.125 gpf or waterless): up to $300

In the Smart Business Rebate Program, 46 businesses have participated and received a total of 97 rebates, saving an estimated 10.2 million gallons per year.

### 4.7.2 Green Business Certification

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

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

The Water Conservation Office has conducted 150 commercial water audits as part of the program, including a diverse list of businesses like auto repair establishments, office buildings, hotels, restaurants, hospitality services, medical facilities, retail outlets, construction companies, churches, landscape contractors, and laundromats.

### 4.7.3 Plumbing Fixture Retrofit Regulations – Non-Residential

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

### 4.7.4 Other CII Conservation Programs

The City has operated other commercial water conservation programs in the past which have been completed and are no longer active. Some of these activities include:

- Smart Rinse (2005): kitchen spray valve replacement in restaurants and dining service facilities, coordinated by the City and Ecology Action;
- LightWash (2003-2005): high efficiency clothes washer statewide rebate program for institutional and multifamily customers;
- Distribution of bed linen reuse, towel reuse, drinking water upon request cards to hotels and restaurants;
- CII facility water audits (2006-present); and
- Partnering with UC Santa Cruz to improve the university's water use efficiency.

## 4.8 Landscape Programs

This section presents the landscape water use efficiency measures available in the City.

### 4.8.1 Water Efficient Landscape Ordinance

The City of Santa Cruz first adopted an ordinance establishing landscape water conservation regulations for major development projects situated in the City's service area in 1993 (Santa Cruz Municipal Code Chapter 16.16). The ordinance was rewritten in 2001, and revised again in 2010 in response to AB 1881, the Water Conservation in Landscaping Act of 2006. It was adopted to promote efficient water use in landscapes and to help manage water demand when water needs are the highest. Its overall purpose is to ensure that the City's limited water supply is used efficiently and effectively in new landscapes within the City's water service area and to avoid certain landscape and irrigation design aspects that have the potential to result in water waste. The ordinance is currently in the process of a new update in response to April 2015 California Governor's Executive Order B-29-15.

The City's ordinance applies throughout the entire water service area as a condition of receiving water service. Landscape and irrigation plans meeting specific water conservation standards are required as part of the building plan application process for the following projects:

- New commercial, industrial, and public development projects requiring a building permit, land use approval, or new/modified water service
- Existing developments required to re-landscape as part of approval
- Developer-installed residential landscaping equal to or greater than 2,500 square feet
- New single-family and two-unit residential developments (requirements dependent upon parcel size)
- New recreation areas

The ordinance contains provisions for:

- Dedicated irrigation meters for new landscapes or expansion of existing landscapes over 5,000 square feet, except single and two-unit properties;
- Landscape water budget based on 55% (residential) and 45% (non-residential) of reference evapotranspiration;
- Turf, high water use plants and water features are limited to 25% on residential projects (turf not permitted for non-residential);
- Requiring very low to moderate water using plant materials, grouping plants with similar water needs;
- Irrigation design to avoid conditions that lead to runoff and overspray;

- Appropriate irrigation equipment, including requiring weather-based irrigation controllers and flow sensors to maximize water efficiency and detect leaks;
- Soil preparation and mulching;
- Storm water management; and
- Alternative water sources.

Per City Code, a complete landscape plan must be submitted and found to satisfy the standards where applicable before a building permit can be issued. Water Conservation staff reviews the landscape plans for compliance with the ordinance, coordinates plan review with Water Engineering and other City Departments and jurisdictions, and once installed, performs final inspections of the completed landscape. Large projects that underwent the City's landscape plan review process were the Highway 1/17 interchange landscaping, live-work development at 2120 Delaware Avenue, Safeway renovation on Mission Street, and Tannery Arts complex on River Street.

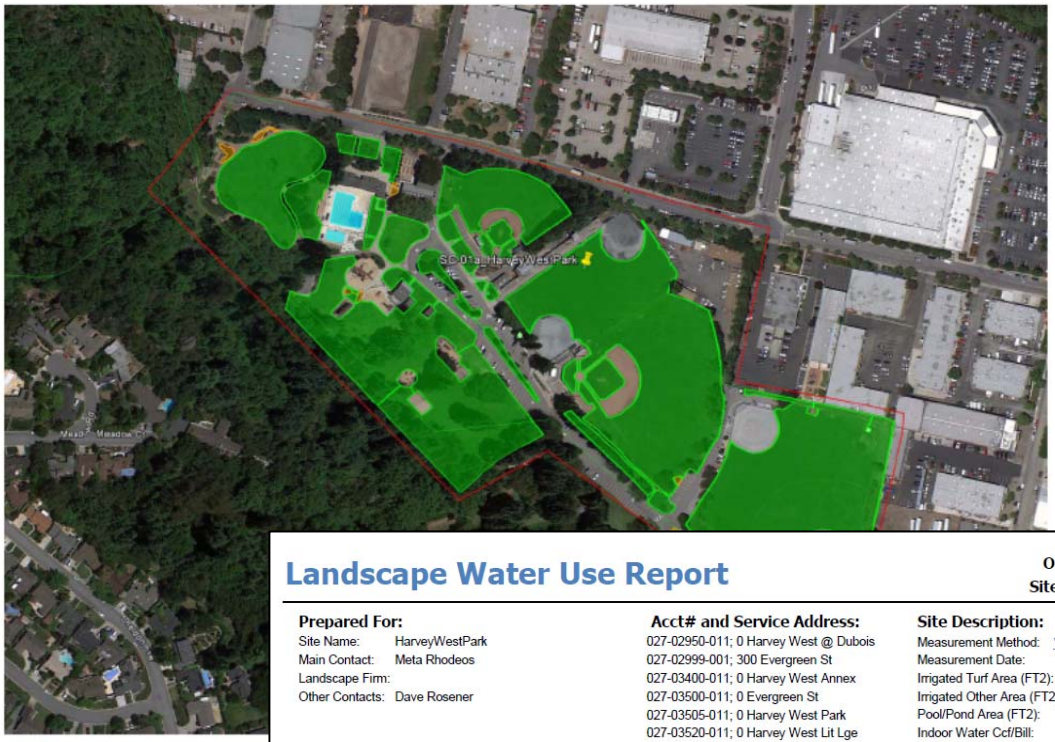
### 4.8.2 Large Landscape Water Budgets

In July, 2010, the City launched a new program for customers with large landscapes and dedicated irrigation accounts. After converting all dedicated irrigation accounts to monthly meter reading, the City contracted with a consultant, Waterfluence LLC, to map landscape areas using aerial imagery, to develop irrigation budgets for the City's 110 largest irrigation customers, and to distribute the information through monthly Landscape Water Use Reports. Since then the program has expanded its participation to 230 sites representing 426 acres or 18.5 million square feet of irrigated area and over 250 million gallons per year of water. For each site, Waterfluence provides a site-specific irrigation budget based on landscape size and plantings, type of irrigation, and real-time local weather conditions that is obtained from the CIMIS station located at the DeLaveaga golf course. Customers receive monthly reports via mail or email comparing their actual consumption to the irrigation budget over a 1-3-year long period. A 2013 program assessment showed annual savings equal to about 15 million gallons per year. With these accounts being rationed the last two years, however, water use at large landscape sites was temporarily reduced by more than 130 million gallons in 2015. Further evaluation is needed in the future to better quantify long-term program impact.

In addition to receiving monthly reports, participants in the program are also eligible for a professional irrigation audit performed by Waterfluence. The audits include an assessment of irrigation efficiency, notation of irrigation issues (scheduling, tilted nozzles, leaks, breaks, pressure, overspray etc.), and a confirmation of the landscape area measurements. Customers receive a detailed report with site photos noting irrigation problems, a sprinkler condition analysis, cost-effective recommendations, scheduling suggestions, and a list of water management essentials (see Figure 4-2 below for example).

In preparation for the new rate changes in October 2016, Waterfluence mapped all irrigation sites that used above 10 CCF during 2015 and enrolled customers that used over 100 CCF into the Waterfluence program. These included city and county parks, schools, commercial properties, homeowner association golf courses, churches, and cemeteries. For customers using 10 CCF or below for 2015, the City assigned a generic budget for those accounts. Together, outdoor water use at these properties adds up to 265 million gallons per year, almost 10% of the City's total water consumption. In the future, the City anticipates that more of these mapped or noted sites will be enrolled in the Waterfluence program if water usage increases.

**Figure 4-2. Landscape Irrigation Surveys and Water Budget Program Success**






## Landscape Water Use Report

October 2012
SiteID: SC-01a

**Prepared For:**
Site Name: HarveyWestPark
Main Contact: Meta Rhodeos
Landscape Firm:
Other Contacts: Dave Rosener

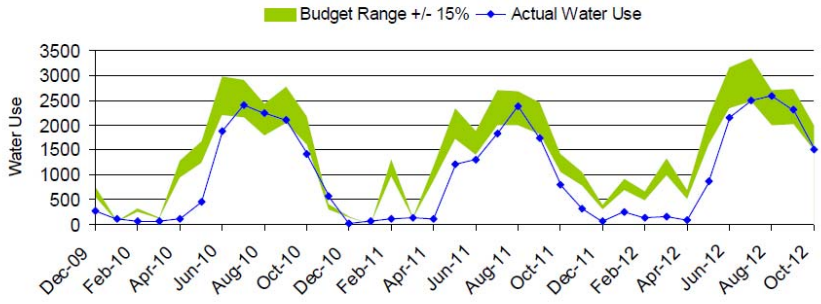
**Acct# and Service Address:**
027-02950-011; 0 Harvey West @ Dubois
027-02999-001; 300 Evergreen St
027-03400-011; 0 Harvey West Annex
027-03500-011; 0 Evergreen St
027-03505-011; 0 Harvey West Park
027-03520-011; 0 Harvey West Lit Lge

**Site Description:**
Measurement Method: View Site Map
Measurement Date: 7/10/2012
Irrigated Turf Area (FT2): 576,180
Irrigated Other Area (FT2): 2,889
Pool/Pond Area (FT2): 5,180
Indoor Water Ccf/Bill: 0

CITY OF SANTA CRUZ
HARVEY WEST PARK
809 CENTER ST RM 101
SANTA CRUZ CA 95060-3826

**Site Percentile**
88
100=top score

**Water Use History**




| Savings Potential | Last Month | Last 12 Months | Last 24 Months | Last 36 Months |
|---|---|---|---|---|
| Over Water Ccf | 0 | 244 | 614 | 805 |
| Over Water % | 0% | 2% | 3% | 2% |
| Dollars Lost $ | $0 | $975 | $2,458 | $3,219 |

| Read Date | Actual Water Ccf | Budget Water Ccf | Over Water Ccf | Over Water % | Weather ETo-Rain Inches |
|---|---|---|---|---|---|
| 10/9/2012 | 1,502 | 1,739 | 0 | 0% | 3.48 |
| 9/10/2012 | 2,317 | 2,373 | 0 | 0% | 4.75 |
| 8/10/2012 | 2,592 | 2,348 | 244 | 9% | 4.70 |
| 7/11/2012 | 2,486 | 2,898 | 0 | 0% | 5.80 |
| 6/11/2012 | 2,158 | 2,743 | 0 | 0% | 5.49 |
| 5/11/2012 | 865 | 1,881 | 0 | 0% | 3.77 |
| 4/11/2012 | 96 | 591 | 0 | 0% | 1.19 |
| 3/13/2012 | 161 | 1,153 | 0 | 0% | 2.31 |
| 2/10/2012 | 135 | 572 | 0 | 0% | 1.15 |
| 1/11/2012 | 253 | 799 | 0 | 0% | 1.60 |
| 12/12/2011 | 74 | 347 | 0 | 0% | 0.70 |
| 11/10/2011 | 324 | 908 | 0 | 0% | 1.82 |

**Messages**

Source: Waterfluence, 2012: http://www.waterfluence.com (last accessed May 31, 2013.

### 4.8.3 Rain Barrel Program

In winter 2010, the City began offering a subsidized rain barrel distribution program. This program served to educate the community about water conservation for landscapes and stormwater management. In addition, the pilot allowed the City to assess consumer interest and satisfaction with rain water harvesting systems. Initially, the Water Conservation Office purchased two shipments of 65-gallon MOBY rain barrels and made them available at a reduced cost to City water customers. Water Distribution personnel delivered the barrels. Due to popularity, the rain barrel program has been modified. Currently, the Water Conservation Office offers the 50-gallon, 100% recycled plastic Ivy rain barrel at a discounted price of $50.00 that is available for pick up at distribution events located at the City corporation yard. More than 4,000 rain barrels have been sold since then saving about 0.8 mgy.

### 4.8.4 Turf Removal Rebate

In 2010 the Water Conservation Office began offering a rebate program to promote turf removal to encourage and expand landscape water conservation opportunities for customers and to provide an option for customers seeking to mitigate high utility bills. The rebate offer was originally $0.50 per square foot of lawn removed, up to $500 or 1,000 sq. ft. for single family and $2,500 or 5,000 sq. ft. for multifamily. Prior to the drought, customers must have met the following requirements to qualify:

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

These requirements were later modified due to drought conditions in 2014. In response to rationing, customers allowed their lawns to brown and were more reluctant to planting. Due to these changes, the following eligibility requirements have been modified:

- Lawns do not have to be green to receive the rebate.
- The project does not need to be completed within 180 days or by a deadline. Customers are asked to wait and plant when water conditions return to normal.

In July 2016, the rebate was increased to $1 in order to provide more incentive for customers to convert their lawns. Since 2010, the City has processed 507 lawn rebates for the removal of 496,712 square feet with an estimated water savings of 9.5 mgy.

In 2015, the DWR also implemented turf removal rebate program for single family customers who remove their turf and replace it with low water use landscapes to support California's drought response. Santa Cruz Municipal Utility customers may apply for both the City and State rebate to receive up to $2 per square foot removed. In addition, customers who did not qualify for the City rebate due to lack of pre-site inspection are also encouraged to participate in this program.

### 4.8.5 Graywater Workshops and Rebate

In 2011, the City amended its Sewer System Ordinance (Santa Cruz Municipal Code Chapter 16.08) to enable graywater systems to be constructed and operated in agreement with the California Plumbing Code. The amended ordinance now

allows residents to legally build a "Laundry-to-Landscape" type graywater system without a permit, and for other types of graywater systems to be developed, consistent with the Plumbing Code, with appropriate permits and oversight. In 2013, the City started offering a Laundry to Landscape rebate of $150 to customers who install a laundry to landscape greywater system and attend a workshop offered by Central Coast Grey Water Alliance. The requirement to attend a workshop is intended to ensure systems are installed in accordance with guidelines listed in the CA plumbing code. Customers also have the option of hiring a licensed greywater laundry to landscape contractor listed by Central Coast Grey Water Alliance. Applicants who reside in the City must also sign and agree to an Installation and Maintenance Agreement through Public Works to qualify for the rebate. Since 2013, the City has rebated 17 Laundry to Landscape graywater systems.

## 4.9 Other Water Conservation Initiatives

The City has been active in implementing other water conservation measures beyond the BMPs listed in the MOU. These include the previously presented rain barrel and gray water programs. This section presents additional water conservation initiatives conducted by the City.

The Conservation office has been providing free water-saving items to customers in the City of Santa Cruz Water Department service area since 2001. Items that may save water in the home or workplace can be picked up at the Water Conservation Office. Items include the following:

**Showerheads.** Low-flow, 2.0 gallon per minute showerheads with adjustable flow pattern.

**Kitchen Faucet Aerators.** Low-flow, 2.2 gallon per minute kitchen aerators with an easy-to-use lever to adjust the flow of water without changing the hot/cold mix. Made of chrome-plated brass.

**Bathroom Faucet Aerators.** Low-flow, 1.5 gallon per minute aerators made of chrome-plated brass.

**Toilet Tank Leak Detection Dye Tablets.** Toilets are the most common source of indoor leaks. These non-toxic dye tablets help check toilets for leaks. Drop a tablet into the toilet tank, and wait a few minutes. If blue color appears in toilet bowl, there is a leak.

**Garden Hose Shut-Off Nozzles.** Multiple spray patterns. Saves water by cutting off hose water that would run if left unattended.

**Garden Hose Timer.** Manual spring timer has settings from 15 to 120 minutes. Ideal for timing use of hose end sprinklers.

**Water-Smart Gardening in Santa Cruz County CD.** CD-ROM database featuring information regarding local gardens, plants, and resources to help save water in the garden.

**Practical Plumbing Handbook.** This booklet gives an overview of preventive maintenance and explains some of the ways residents can conserve water while keeping the home in good condition.

**Shower Timer.** Five-minute timer, works like an egg-timer. Helps change shower habit, encouraging shorter showers. A suction cup holds plastic timer to shower wall.

**Showerhead Control Valve.** Control valve used to retrofit existing showerhead to have an adjustable flow pattern.

**Water Wise Gardening Literature.** Several illustrated booklets on a variety of water saving garden topics.

# 5. PROJECTED FUTURE WATER DEMANDS WITH AND WITHOUT PLUMBING CODE

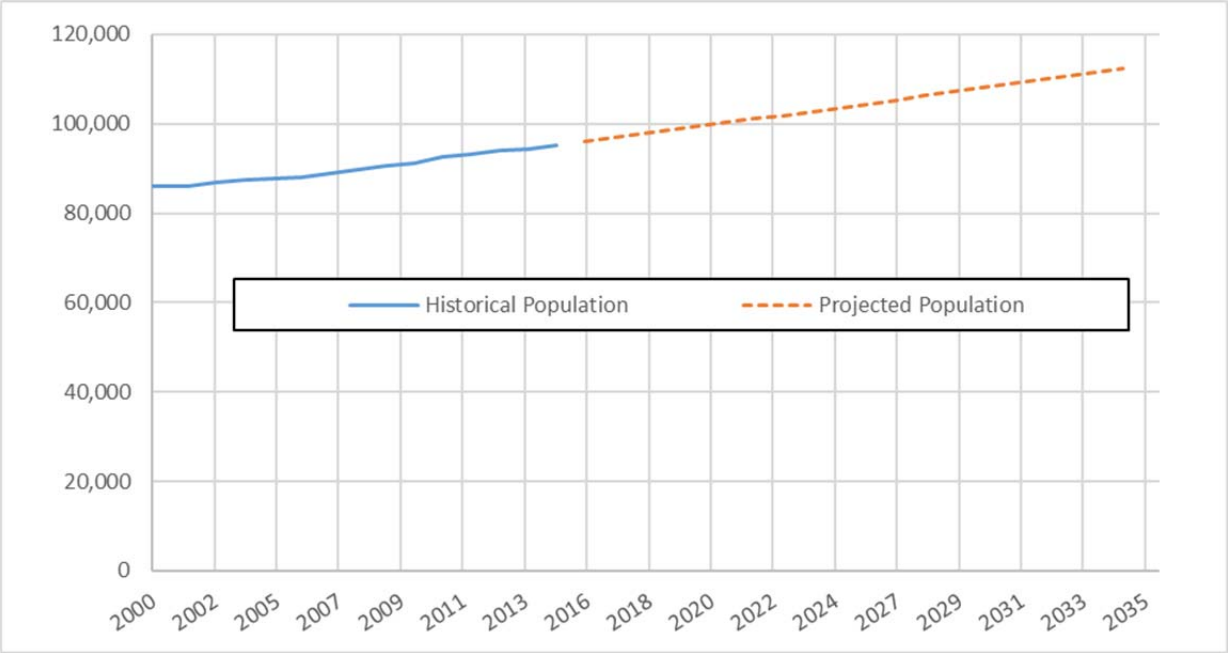
The purpose of this section is to document the demand projections developed for the Program. This section presents:

- Population and account projections;
- Demand methodology overview;
- Basis for Demand Forecast;
- Water use data analysis inputs and key assumptions for the DSS Model; and
- Water demand projections with and without the plumbing code savings through 2035 (this is the demand before incorporating planned water savings from future active conservation efforts).

## 5.1 Population and Water Account Projections

The main source of population projections used to generate future water demands for the Conservation Master Plan are summarized in the City of Santa Cruz Water Demand Forecast (M.Cubed, 2015). The forecast of service area population is divided into its inside-city and outside-city components. The inside-city component comes directly from the Association of Monterey Bay Area Governments (AMBAG) 2014 Regional Growth Forecast (AMBAG, 2014) and is inclusive of the UCSC population. The outside-city component is derived by Water Department staff using data from the 2014 Regional Growth Forecast. The following figure presents the City's historical and projected population. Historical population values through year 2015 are based on the Department of Finance (DOF) estimates for the City and relevant outside city jurisdictions. Specific year 2000 and 2010 population values are based on the 2010 U.S. Census and Geographic Information System (GIS) analysis. All other things being equal, higher service area population would normally translate to higher water demand over time.

**Figure 5-1. Historical and Projected Population**




Note: Population projections for the City of Santa Cruz are based on AMBAG projections.

The following table presents the City's projected population.

**Table 5-1. Current and Projected Population**

| Year | Population |
|---|---|
| **2010** | 91,291 |
| **2015** | 95,251 |
| **2020** | 99,403 |
| **2025** | 103,620 |
| **2030** | 107,989 |
| **2035** | 112,390 |

Note: Population projections for the City of Santa Cruz are based on AMBAG projections.

The following table presents the City's projected growth in accounts by customer category in five-year increments.

**Table 5-2. Current and Projected Accounts by Customer Category**

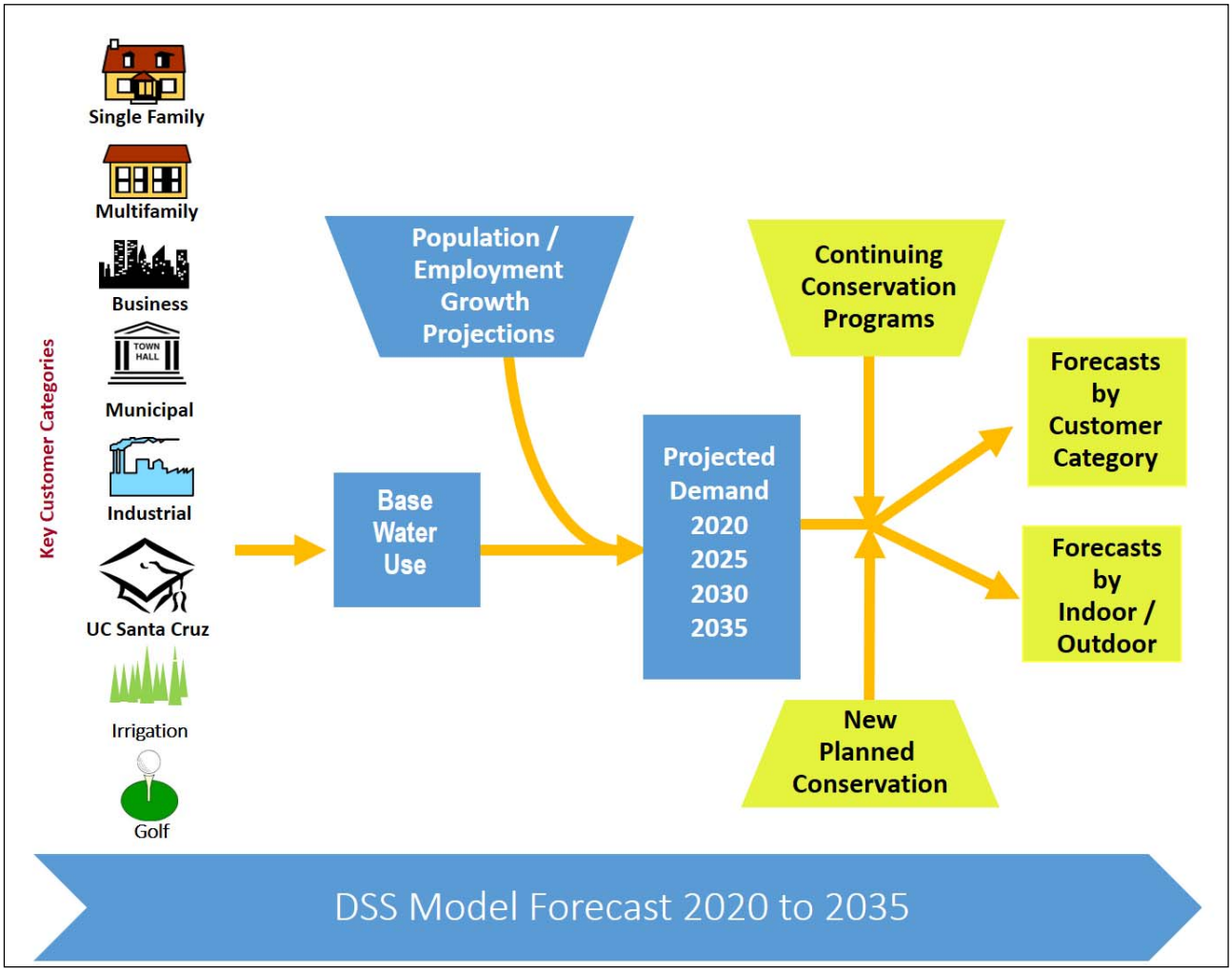
| Year | Single Family | Multifamily | Business | Municipal | Industrial | UC Santa Cruz | Irrigation | Golf | Total |
|---|---|---|---|---|---|---|---|---|---|
| **2015** | 19,029 | 2,745 | 1,897 | 312 | 40 | 11 | 460 | 2 | 24,496 |
| **2020** | 19,456 | 2,886 | 1,948 | 218 | 39 | 12 | 651 | 2 | 25,212 |
| **2025** | 19,854 | 2,972 | 1,971 | 218 | 41 | 14 | 723 | 2 | 25,795 |
| **2030** | 20,260 | 3,122 | 2,008 | 218 | 43 | 16 | 845 | 1 | 26,514 |
| **2035** | 20,636 | 3,238 | 2,055 | 218 | 43 | 18 | 951 | 1 | 27,162 |

## 5.2 Demand Methodology Overview

Maddaus Water Management (MWM) employed its Least Cost Planning Decision Support System Model (DSS Model) for the technical analysis. In addition to considering historical demand trends based on billing consumption data, the DSS Model takes into account the following parameters: total population, single family population, multifamily population, UC Santa Cruz population, commercial employment, business-industrial growth, and municipal growth.

As shown in the following figure, the first step for forecasting water demands using the DSS Model was to gather customer category billing data from the City. The next step was to check the model by comparing water use data with available demographic data to characterize water usage for each customer category (single family, multifamily, commercial, municipal, industrial, USCS, irrigation, and golf) in terms of number of users per account and per capita water use. During the model calibration process, data was further analyzed to approximate the indoor/outdoor split by customer category. The indoor/outdoor water usage was also further divided into typical end uses for each customer category. Published data on average per capita indoor water use and average per capita end use was combined with the number of water users to verify that the volume of water allocated to specific end uses in each customer category was consistent with social norms from end-use studies on water use behavior (e.g., for flushes per person per day).

**Figure 5-2. DSS Model Flow Diagram**




### 5.2.1 Water Use Data Analysis and Key Inputs to the DSS Model

The demand analysis process includes an investigation of baseline average water use per customer. This analysis includes the following elements:

- *Model Start Year* – This is the starting year for the analysis. For this project, the start year for the model is 2015. The DSS Model includes 20 years of data projecting information until the year 2035.
- *Base Year for Indoor Water Use Factors* – Based on an analysis of historical water billing data, the City selected years that are representative of current water use and used as a base year demand factor for developing future indoor water use projections. An average of 2007 and 2008 was used for all customer categories and was chosen by the City for the following reasons:
  - Note that it is recognized that the years 2009-2011 show a dip in water demand in many areas nationally due to reduction in economic activity.
  - The years selected had relatively "normal" climate conditions (i.e., not a drought or excessively wet year), so no significant weather adjustments were necessary. More recent years (2012-2015) were affected by drought conditions. The water billing or production data shown in Section 3.2 was normalized for this analysis.
  - Section 3.3 presents historical customer category water use graphs. Historical water use was provided by the City, taken from the Department of Water Resources' (DWR's) annual Public Water System Statistics

(PWSS) reports, or taken from previous modeling efforts conducted by MWM. The data was reviewed and confirmed by the City. Units shown are average gallons of water per account per day. These graphs were reviewed to better identify outlier data points and years so that a representative baseline water use value (of average account water use by category) could be determined. The effects of drought, economic recessions, and other influences on water use are typically evident in these figures.

- *Average gal/day/acct* – This is the amount of water in gallons that is used per day, per account.
- *Indoor/outdoor Water Use* – This is the amount of water per account split into the percent that is used indoors and outdoors.
- *Consumption by Customer Class* – This shows the annual amount of water used for an entire calendar year, broken down by customer class (Single Family, Multifamily, Commercial, Irrigation, etc.).
- *Non-Revenue Water (NRW)* – This is the sum of all water input to the system that is not billed (metered and unmetered), including apparent (metering accuracy) and real losses. The values were calculated by taking the difference between the amount of water produced and the amount of water sold.
- *Census Data* – Census data was used as a general reference when determining household sizes for the City.
- *Current Service Area Population* – Year 2015 City population is based on the Department of Finance City of Santa Cruz and relevant jurisdictional estimates. The population forecast of service area population comes directly from the AMBAG 2014 Regional Growth Forecast and the Water Department staff's usage of data from this forecast.

The following table presents the key inputs and assumptions used in the model. The assumptions having the most dramatic effect on future demands were the natural replacement rate of fixtures, how residential or commercial future use is projected, and the percent of estimated non-revenue water. More details on these assumptions, including screenshots of where they are incorporated into the DSS Model, can be found in Appendix C.

**Table 5-3. Water Use Data Analysis and DSS Model Key Assumptions**

| Parameter | Model Input Value, Assumptions, and Key References | | |
|---|---|---|---|
| **Model Start Year** | 2015 | | |
| **Non-Revenue Water in Start Year** | 7.5% | | |
| | This value can be found in the green Non-Revenue Water section of the DSS Model. | | |
| **Population Projection Source** | AMBAG 2014 Regional Growth Forecast | | |
| **Start Year Water Use Profile** | | | |
| **Customer Categories** | **Water Use Distribution** | **Indoor Use %** | **Residential Indoor Water Use (GPCD)** |
| **Single Family** | 42% | 77% | 57 |
| **Multifamily** | 25% | 88% | 54 |
| **Business** | 18% | 83% | N/A |
| **Municipal** | 2% | 32% | N/A |
| **Industrial** | 2% | 81% | N/A |
| **UC Santa Cruz** | 6% | 73% | N/A |
| **Irrigation** | 3% | 0% | N/A |
| **Golf** | 2% | 0% | N/A |
| **Total** | 100% | N/A | N/A |
| **Residential End Uses** | City of Santa Cruz Residential and Commercial Baseline Water Use Survey (2013).<br>Key Reference: CA DWR Report "California Single Family Water Use Efficiency Study," (DeOreo, 2011 – Page 28, Figure 3: Comparison of household end-uses) and AWWA Research Foundation (AWWARF) Report "Residential End Uses of Water, Version 2 - 4309" (DeOreo, 2016).<br>Table 2-A. Water Consumption by Water-Using Plumbing Products and Appliances - 1980-2012. PERC Phase 1 Report. Plumbing Efficiency Research Coalition. 2013.<br>http://www.map-testing.com/content/info/menu/perc.html<br>Model Input Values are found in the "End Uses" section of the DSS Model on the "Breakdown" worksheet. | | |
| **Non-Residential End Uses, %** | City of Santa Cruz Residential and Commercial Baseline Water Use Survey (2013).<br>Key Reference: AWWARF Report "Commercial and Institutional End Uses of Water" (Dziegielewski, 2000 – Appendix D: Details of Commercial and Industrial Assumptions, by End Use).<br>Model Input Values are found in the "End Uses" section of the DSS Model on the "Breakdown" worksheet. | | |
| **Efficiency Residential Fixture Current Installation Rates** | City of Santa Cruz Residential and Commercial Baseline Water Use Survey (2013).<br>U.S. Census, Housing age by type of dwelling plus natural replacement plus rebate program (if any).<br>Key Reference: California Urban Water Conservation Council Potential Best Management Practice Report "High Efficiency Plumbing Fixtures – Toilets and Urinals" (Koeller, 2005 – Page 42, Table 8 and Table 9: Residential toilet installation rates in California).<br>Key Reference: Consortium for Efficient Energy (www.cee1.org).<br>Model Input Values are found in the "Codes and Standards" green section of the DSS Model by customer category fixtures. | | |

| Parameter | Model Input Value, Assumptions, and Key References |
|---|---|
| **Water Savings for Fixtures, gal/capita/day** | Key Reference: AWWARF Report "Residential End Uses of Water, Version 2 - 4309" (DeOreo, 2016).<br>Key Reference: CA DWR Report "California Single Family Water Use Efficiency Study" (DeOreo, 2011 – Page 28, Figure 3: Comparison of household end-uses). WCWCD supplied data on costs and savings; professional judgment was made where no published data was available.<br>Key Reference: California Energy Commission, Staff Analysis of Toilets, Urinals and Faucets, Report # CEC-400-2014-007-SD, 2014.<br>Model Input Values are found in the "Codes and Standards" green section on the "Fixtures" worksheet of the DSS Model. |
| **Non-Residential Fixture Efficiency Current Installation Rates** | City of Santa Cruz Residential and Commercial Baseline Water Use Survey (2013).<br>Key Reference: 2010 U.S. Census, Housing age by type of dwelling plus natural replacement plus rebate program (if any). Assume commercial establishments built at same rate as housing, plus natural replacement.<br>California Energy Commission, Staff Analysis of Toilets, Urinals and Faucets, Report # CEC-400-2014-007-SD, 2014.<br>Model Input Values are found in the "Codes and Standards" green section of the DSS Model by customer category fixtures. |
| **Residential Frequency of Use Data, Toilets, Showers, Faucets, Washers, Uses/user/day** | Key Reference: AWWARF Report "Residential End Uses of Water, Version 2 - 4309" (DeOreo, 2016). Summary values of the report can be found in the following presentation: http://watersmartinnovations.com/documents/pdf/2014/sessions/2014-T-1458.pdf<br>Key Reference: California Energy Commission, Staff Analysis of Toilets, Urinals and Faucets, Report # CEC-400-2014-007-SD, 2014.<br>Key Reference: Alliance for Water Efficiency, The Status of Legislation, Regulation, Codes & Standards on Indoor Plumbing Water Efficiency, January 2016.<br>Model Input Values are found in the "Codes and Standards" green section on the "Fixtures" worksheet of the DSS Model and confirmed in each "Service Area Calibration End Use" worksheet by customer category. |
| **Non-Residential Frequency of Use Data, Toilets, Urinals, and Faucets, Uses/user/day** | Key References: Estimated based on AWWARF Report "Commercial and Institutional End Uses of Water" (Dziegielewski, 2000 – Appendix D: Details of Commercial and Industrial Assumptions, by End Use).<br>Key Reference: California Energy Commission, Staff Analysis of Toilets, Urinals and Faucets, Report # CEC-400-2014-007-SD, 2014.<br>Based on three studies of office buildings in which the numbers varied from 2.0 to 3.45 toilet flushes per employee per day: Darell Rogers cited in Schultz Communications (1999); Konen Plumbing Engineer (July/August 1986); and Eva Opitz cited in PMCL (1996). Fixture uses over a 5-day work week are prorated to 7 days.<br>Non-residential 0.5 gpm faucet standards per Table 2-A. Water Consumption by Water-Using Plumbing Products and Appliances – 1980-2012. PERC Phase 1 Report. Plumbing Efficiency Research Coalition, 2013. http://www.map-testing.com/content/info/menu/perc.html<br>Model Input Values are found in the "Codes and Standards" green section on the "Fixtures" worksheet of the DSS Model and confirmed in each "Service Area Calibration End Use" worksheet by customer category. |
| **Natural Replacement Rate of Fixtures (% per year)** | Residential Toilets 2% (1.28 gpf and lower), 3% (1.6 gpf toilets), 4% (3.5 gpf and higher toilets). |
| | Non-Residential Toilets 2% (1.6 gpf and lower), 3% (3.5 gpf and higher toilets). |
| | Residential Showers 4% (corresponds to 25-year life of a new fixture). |

| Parameter | Model Input Value, Assumptions, and Key References |
|---|---|
| | Residential Clothes Washers 10% (based on 10-year washer life).<br>Key References: "Residential End Uses of Water" (DeOreo, 2016) and "Bern Clothes Washer Study, Final Report" (Oak Ridge National Laboratory, 1998). |
| | Residential Faucets 10% and Non-Residential Faucets 6.7% (every 15 years). California Energy Commission (CEC) uses an average life of 10 years for faucet accessories (aerators). A similar assumption can be made for public lavatories, though no hard data exists and since CII fixtures are typically replaced less frequently than residential, 15 years is assumed. CEC, Analysis of Standards Proposal for Residential Faucets and Faucet Accessories, a report prepared under CEC's Codes and Standards Enhancement Initiative, Docket #12-AAER-2C, August 6, 2013. |
| | Model Input Value is found in the "Codes and Standards" green section on the "Fixtures" worksheet of the DSS Model. |

## 5.3 Baseline Demand Forecast

In August 2015, M.Cubed conducted an econometric analysis of water demand and developed independent forecasts of class-level customer demands and total system production through 2035. (M.Cubed, 2015) The report was commissioned by the City of Santa Cruz Water Department and the City's Water Supply Advisory Committee. Its purpose was to update the Department's existing demand forecast adopted as part of the 2010 UWMP to reflect current information on water usage and to account for effects of current conservation (using DSS Model Program A), water rates, and other factors expected to impact the future demand for water. With the start of Phase 2, MWM's DSS Model was carefully updated to incorporate this econometric analysis by inputting the regression equations and data sets used by M.Cubed and calibrated to ensure consistency between the two demand forecast models.

The updated DSS model starts with a "baseline" demand forecast, which is not the same forecast as presented by M.Cubed. It differs in that it backs out the earlier estimates for plumbing code savings and the estimated future water saving associated with the City's current water conservation program that were provided by MWM to M.Cubed in 2015 and embedded in that final demand forecast. All other variables, including average water use per account, forecasts of account growth, and economic factors used to forecast water use in the M.Cubed report, were taken directly from that model and used to populate the DSS model.

Table 5-4 below compares the primary water demand forecast presented by M.Cubed without the code savings and program savings that were previously generated from the DSS Model analysis completed in October 2014 compared to the updated DSS "baseline" demand completed in February 2016.

**Table 5-4. Comparison of M.Cubed Demand Forecast and DSS "Baseline" Forecast**

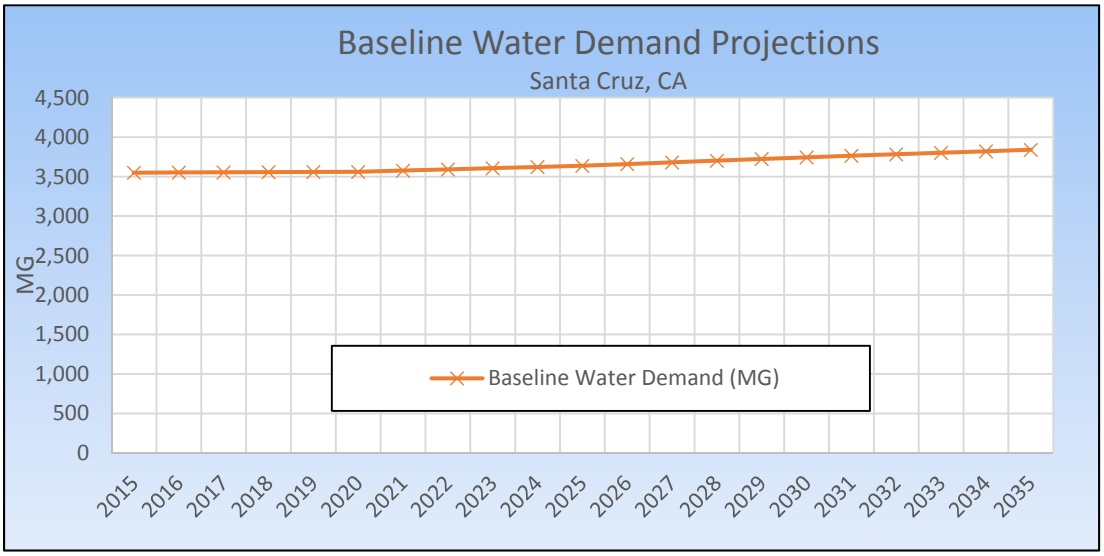
| Demand (MG) | 2020 | 2025 | 2030 | 2035 |
|---|---|---|---|---|
| **M.Cubed Final Demand Forecast, October 2015** | 3,385 | 3,351 | 3,388 | 3,442 |
| **2014 Estimate of Plumbing Code Savings (Prior DSS Model version)** | 65 | 132 | 197 | 235 |
| **M.Cubed Final Demand Forecast without Plumbing Code or Conservation Program Savings** | 3,560 | 3,626 | 3,724 | 3,811 |
| **DSS Model "Baseline" Demand** | 3,560 | 3,636 | 3,743 | 3,838 |
| **Difference, MG** | 0 | 10 | 19 | 27 |
| **Difference, %** | 0.0% | 0.3% | 0.5% | 0.7% |

**Note: Plumbing code and program savings: M.Cubed, 2015, Attachment 8, were originally based on results from the DSS Model prior work in 2014 by Maddaus Water Management, which are updated with the most recent DSS Model results from February 2016.**

As can be seen in the above table, the two models are in close agreement and in all years differ by less than 1%.

The baseline demand forecast is shown in the following Figure 5-3. As referenced in the M.Cubed report, the baseline forecast is predicated on average weather and normal economic conditions and is not expected to match realized demand, especially in the short term. City staff will continue to monitor production and consumption through and following the drought.

**Figure 5-3. Baseline Demand Forecast Without Plumbing Code Savings**




Source: City of Santa Cruz. DSS Model, Section: Demand Analysis, Feb 16, 2016.

The next step involves calculating the effect of passive savings against the "baseline" demand described in the following Section 5.4. The results differ from earlier estimates of plumbing code savings presented in 2014-15 for two reasons: 1) lower baseline demand and 2) additional passive savings due to recent changes in California codes resulting from 2015 emergency conservation regulations adopted in California, effective December 1, 2015 (after the publication of the M.Cubed report).

## 5.4 Water Demand Projections with Plumbing Code Savings

Future community-wide conservation savings will be achieved by implementing both passive and active measures. Passive measures are federal and state codes and standards that increase conservation savings as older appliances and fixtures are replaced naturally over time with more water efficient models. Active measures are those in which the City will invest to promote water conservation, such as incentives and educational programs. As explained previously, the September 2015 M.Cubed baseline forecast was closely matched before the MWM DSS Model applied plumbing code savings.

### 5.4.1 Basis for Plumbing Code Savings

Since it is beneficial to model the impact of the natural changes in the mix of types of appliances, the DSS Model forecasts service area water demand aggregated at the fixture level. In the codes and standards part of the DSS Model, specific fixture end-use type (point of use fixture or appliance), average water use, and lifetime are compiled. Additionally, state and national plumbing codes and appliance standards for toilets, urinals, showers, and clothes washers are modeled by customer category using the Baseline Survey results as a starting place and projecting future replacements. These fixtures and plumbing codes can be added to, edited, and/or deleted by the user. This yields two demand forecasts – one with and one without plumbing code savings.

Key inputs in the model are fixture water use and life as well as the initial proportions of individual fixtures in each customer class. The following figure presents an example of the initial proportions used in existing single family accounts. Further in this section, Figure 5-4 provides the list of fixtures, average water use, and assumptions for fixture life used in this analysis.

**Figure 5-4. Initial Fixture Proportions for Single Family Toilets**

| Initial Fixture Proportions - Single Family Toilets | |
|---|---|
| 1.28 gpf HET Residential | 7.2% |
| 1.6 gpf ULFT Residential | 82.7% |
| High Use Toilet Residential | 10.1% |
| <1.0 gpf Toilet Residential | 0.0% |
| Total | 100.0% |

Source: Screen shot from the DSS Model.

Data collected from the recently completed City of Santa Cruz Water Use Baseline Survey was used for this purpose. Other input parameters include estimates for annual replacement rate and assumed market share for both replacement and new equipment at various points in the planning horizon.

The scope of analysis involved assessing the rate of change for toilets, shower heads, lavatory and non-lavatory/kitchen faucets, and clothes washers in both existing single family and multifamily accounts; and toilets, urinals, and lavatory and non-lavatory/kitchen faucets in commercial accounts.

Fixture characteristics are also tracked in new accounts, which are subject to the requirements of the 2015 California Green Building Code and 2015 California Code of Regulations Title 20 Appliance Efficiency Regulations adopted by the California Energy Commission on September 1, 2015. This was an update in Phase 2, from the prior work in Phase 1, of preparing the DSS Model.

The controlling law for **toilets** is Assembly Bill (AB) 715. This bill requires high efficiency toilets (1.28 gpf) to be exclusively sold in California as of January 1, 2014. The controlling law for wall-mounted urinals is the 2015 CEC efficiency regulations requiring that ultra-high efficiency pint **urinals** (0.125 gpf) be exclusively sold in California as of January 1, 2016. This is an efficiency progression for urinals from AB 715's requirement of high-efficiency (0.5 gpf) urinals starting in 2014 that was modeled during the WCMP Phase 1.

Standards for **residential clothes washers** fall under the regulations of the U.S. Department of Energy. Even though both front loading and top loading models will still be available for the foreseeable future, national water efficiency standards for both types are becoming more stringent over time. In March 2015, the federal standard reduced the maximum water factor for non-Energy Star® certified top- and front-loading washing machines to 8.4 and 4.7, respectively. In 2018, the maximum water factor for standard top-loading machines will be further reduced to 6.5. Beginning in 2015, the maximum water factor for Energy Star® certified washers has been 4.3 for top-loading machines and 3.7 for front-loading.

**Showerhead** flow rates are newly regulated under the 2015 California Code of Regulations Title 20 Appliance Efficiency Regulations adopted by the CEC, which requires the exclusive sale in California of 2.0 gpm showerheads at 80 psi as of July 1, 2016 and 1.8 gpm showerheads at 80 psi as of July 1, 2018. The WaterSense specification applies to showerheads that have a maximum flow rate of 2.0 gallons per minute (gpm) or less. This represents a 20% reduction in showerhead flow rate over the current federal standard of 2.5 gpm, as specified by the Energy Policy Act of 1992.

**Faucet** flow rates have likewise been recently regulated by the 2015 CEC Title 20 regulations. This standard requires that the residential faucets and aerators manufactured on or after July 1, 2016 be exclusively sold in California at 1.2 gpm at 60 psi; and public lavatory and kitchen faucet/aerators sold or offered for sale on or after January 1, 2016 to be 0.5 gpm at 60 psi and 1.8 gpm at 60 psi (with optional temporary flow of 2.2 gpm), respectively. Previously, all faucets had been regulated by the 2010 California Green Building Code at 2.2 gpm at 60 psi.

Plumbing code related water savings are considered reliable, long-term savings and can be counted on over time to help reduce the City's overall system water demand. This assumption of permanent savings is based on when fixtures are replaced at minimum with similarly efficient equipment given fixture efficiency levels are mandated under state law. It does not take into account any reductions efficiency from aging fixtures or hypothetical higher savings from newer technology that will come on the market in the future.

This projection further assumes no active involvement by the City and that the costs of purchasing and installing replacement equipment (as well as new equipment in new construction) are borne solely by the customers, occurring at no direct utility expense. The inverse of the fixture life is the natural replacement rate, expressed as a percent (i.e., 10 years is a rate of 10% per year).

Table 5-5 on the following page presents the list of fixtures, average fixture water use and assumed fixture life use in the DSS model.

**Table 5-5. List of Fixtures**

| Fixture Name | End Use | Average Water Use | Units | Fixture Life (yrs.) |
|---|---|---|---|---|
| **Efficient Front Loader** | Clothes Washers | 13.0 | gal per use | 10 |
| **Medium Efficient Front Loader** | Clothes Washers | 19.0 | gal per use | 10 |
| **Top Loader** | Clothes Washers | 34.0 | gal per use | 10 |
| **0.5 gpm Non-Residential Lavatory Faucet** | Lavatory Faucets | 0.1 | gal per use | 15 |
| **1.2 gpm Residential Lavatory Faucet** | Lavatory Faucets | 0.3 | gal per use | 10 |
| **2.2 gpm Residential Lavatory Faucet** | Lavatory Faucets | 0.6 | gal per use | 10 |
| **2.2 gpm Non-Residential Lavatory Faucet** | Lavatory Faucets | 0.6 | gal per use | 15 |
| **2.5 gpm Residential Lavatory Faucet** | Lavatory Faucets | 0.6 | gal per use | 10 |
| **2.5 gpm Non-Residential Lavatory Faucet** | Lavatory Faucets | 0.6 | gal per use | 15 |
| **>2.5 gpm Residential Lavatory Faucet** | Lavatory Faucets | 0.9 | gal per use | 10 |
| **>2.5 gpm Non-Residential Lavatory Faucet** | Lavatory Faucets | 0.9 | gal per use | 15 |
| **1.8 gpm Residential Non-Lavatory/Kitchen Faucet** | Non-Lavatory/Kitchen Faucets | 1.8 | gal per use | 10 |
| **1.8 gpm Non-Residential Non-Lavatory/Kitchen Faucet** | Non-Lavatory/Kitchen Faucets | 1.8 | gal per use | 15 |
| **2.2 gpm Residential Non-Lavatory/Kitchen Faucet** | Non-Lavatory/Kitchen Faucets | 2.2 | gal per use | 10 |
| **2.2 gpm Non-Residential Non-Lavatory/Kitchen Faucet** | Non-Lavatory/Kitchen Faucets | 2.2 | gal per use | 15 |
| **2.5 gpm Residential Non-Lavatory/Kitchen Faucet** | Non-Lavatory/Kitchen Faucets | 2.5 | gal per use | 10 |
| **2.5 gpm Non-Residential Non-Lavatory/Kitchen Faucet** | Non-Lavatory/Kitchen Faucets | 2.5 | gal per use | 15 |
| **>2.5 gpm Residential Non-Lavatory/Kitchen Faucet** | Non-Lavatory/Kitchen Faucets | 3.5 | gal per use | 10 |
| **>2.5 gpm Non-Residential Non-Lavatory/Kitchen Faucet** | Non-Lavatory/Kitchen Faucets | 3.5 | gal per use | 15 |
| **High Efficiency 1.5 gpm** | Showers | 10.4 | gal per use | 25 |
| **High Efficiency 1.8 gpm** | Showers | 12.5 | gal per use | 25 |
| **High Efficiency 2 gpm** | Showers | 13.9 | gal per use | 25 |
| **Low Flow 2.5 gpm** | Showers | 18.3 | gal per use | 25 |
| **High Flow > 3 gpm** | Showers | 23.5 | gal per use | 25 |
| **<1.0 gpf Toilet Non-Residential** | Toilets | 1.0 | gpf | 50 |
| **1.28 gpf HET Residential** | Toilets | 1.3 | gpf | 50 |
| **1.28 gpf HET Non-Residential** | Toilets | 1.3 | gpf | 50 |
| **1.6 gpf ULFT Residential** | Toilets | 1.8 | gpf | 33 |
| **1.6 gpf ULFT Non-Residential** | Toilets | 1.8 | gpf | 50 |
| **High Use Toilet Residential** | Toilets | 3.5 | gpf | 25 |
| **High Use Toilet Non-Residential** | Toilets | 3.5 | gpf | 33 |
| **Waterless Urinal** | Urinals | 0.0 | gpf | 50 |
| **Pint Urinal** | Urinals | 0.1 | gpf | 50 |
| **Quart Urinals** | Urinals | 0.3 | gpf | 50 |

More information and assumptions about plumbing code and appliance standards can be found in Appendix A.

### 5.4.2 State Building Code for New Development – 2015 CALGreen

The 2015 CALGreen requirements effect all new development in the State of California after July 1, 2015.[2] The DSS Model includes the CALGreen requirements that effect all new development in the State of California after July 1, 2015. The DSS Model modeled water savings from the CALGreen building code by adding Multi-family and Commercial customer categories as appropriate to applicable conservation measures.

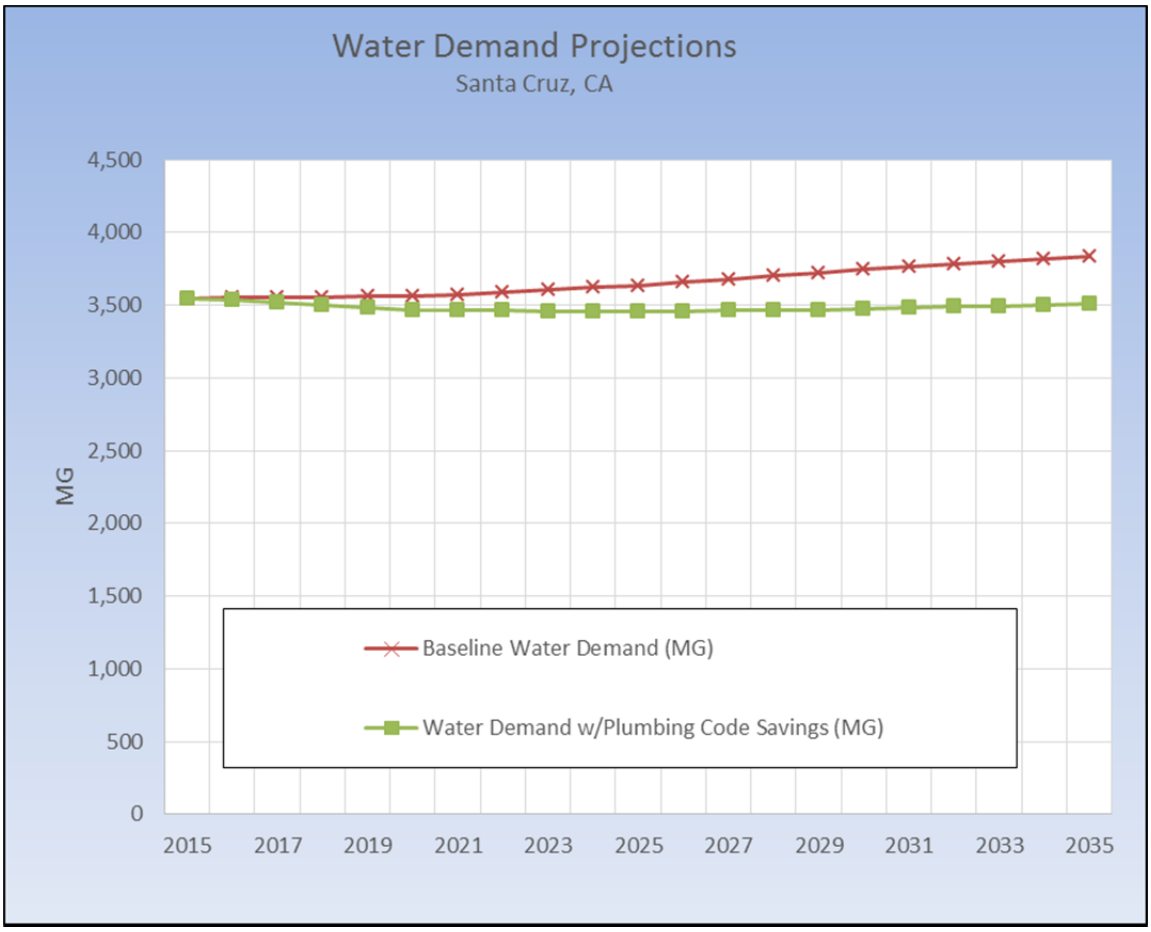
### 5.4.3 Baseline Demands with Passive Savings 2015-2035

The DSS Model estimates total cumulative plumbing code savings of 329 million gallons per year in 2035. As seen in Figure 5-5, water savings from fixture and appliance codes alone is expected to reduce total water demand (without plumbing code) from approximately 3.8 billion gallons per year to about 3.5 billion gallons by 2035, a reduction of about 8.6% due to plumbing code savings. As shown in Figure 5-5, overall water demand adjusted for plumbing code savings is expected to be essentially level over the 20-year planning horizon, with savings from plumbing codes effectively offsetting added demand from expected population growth and economic development within the City's service area.

Note that demand projections are normalized, without drought or recession conditions, whereas historical demands have been affected by drought and economic influences.

[2] More information on the California Building Standards Commission reference documents are available online: http://www.bsc.ca.gov/pubs/bullet.aspx

**Figure 5-5. Demand Forecast With and Without Plumbing Code Savings**




Source: City of Santa Cruz. DSS Model, Section: Demand Analysis, Feb 16, 2016.

Water demand projections were developed to the year 2035 using the DSS Model. Table 5-6 shows the savings in 5-year increments for the plumbing codes and the projected demands in 5-year increments with plumbing codes and appliance standards.

**Table 5-6. Water Demand Forecast With and Without Plumbing Code Savings**

| Water Demand Forecast With and Without Plumbing Code Savings | 2020 | 2025 | 2030 | 2035 |
|---|---|---|---|---|
| Baseline Demand without Codes or Conservation (MGY) | 3,560 | 3,636 | 3,743 | 3,839 |
| Plumbing Code Savings (MGY) | 96 | 179 | 269 | 329 |
| Demand with Plumbing Code Savings (MGY) | 3,464 | 3,456 | 3,474 | 3,510 |

Note: Values include Non-Revenue Water (NRW).

# 6. GOAL SETTING AND POTENTIAL NEW WATER CONSERVATION MEASURES

This section presents the City's conservation planning goals and the conservation measure screening process the City undertook to accomplish these goals.

## 6.1 Conservation Planning Goals and Approach

The goal of the Water Conservation Master Plan is to further enhance the existing water conservation program. To accomplish this goal, additional measures could be added to the existing program. Most of these measures are targeting new technologies to support customers to be more efficient with their water use.

Experience from many utilities has shown that there is a reasonable limit to how many measures can be feasibility implemented at one time. Programs that consist of a large number of measures are historically difficult to implement successfully; therefore, prioritization of measures is important both as an outcome of this planning effort and as the program is implemented. The approach to program implementation is viewed as a "living" process where new opportunities may be adopted as new technologies become available over time.

## 6.2 Potential New Conservation Measures and Measure Screening Process

As discussed at a public kickoff meeting March 4, 2013, development of the City's Water Conservation Master Plan involved a systematic process to evaluate a range of possible conservation measures and determine which measures were best suited to the City's service area. The overall goal was to create a roadmap to achieve maximum practical water use efficiency through 2035.

As part of this effort, the City cast a wide net to request that the community review existing implementation methods, including pros/cons of current efforts, and consider implementing additional conservation measures presented in this Plan.

It was envisioned that roughly 20-25 measures would be selected for further evaluation, including the existing measures that are currently being implemented and are planned to continue and new conservation measures not yet implemented. Sometimes not all programs need to be modeled to be incorporated into the plan (but can be qualitatively included in the plan instead), such as water waste prohibition or other non-quantifiable best practices like public education.

An important step in updating the water conservation program was the review and screening of new water conservation measures. This task included a review of the current water conservation measures, identification of measures that may be appropriate for the City's service area, and the screening of these measures to a short-list for detailed evaluation (benefit-cost analysis). To complete this process, a list of potential demand management measures (DMMs) for qualitative evaluation (screening) was compiled. This list, in Appendix F, includes 54 potential types of conservation measures in a variety of program implementation approaches that, when combined, total 99 individual measures ranging from those aimed at reducing real water losses to programs designed to improve customer awareness. The list also reflects the focus of specific programs based on the following categories:

- All Customers
- Residential
- Commercial, Industrial, and Institutional
- Landscape Irrigation
- System (focused on measures for the public water system rather than customers)

Additionally, the list reflects whether customer participation in a program is solely voluntary, encouraged with incentives, or mandatory through adopted rules or ordinances. This can significantly impact anticipated levels of adoption, with those that are purely voluntary likely to have the least participation, those with incentives leading to greater market penetration, and mandatory measures potentially having the highest levels of adoption. These classifications also have cost implications, with incentive programs being popular but adding expense to the utility, whereas required programs typically involve minimal cost to the utility, but may result in some costs for customers.

Appendix F lists the conservation measures considered potentially appropriate for the Santa Cruz community. The table includes devices or programs (e.g., a new high efficiency toilet that would save water if installed by the City, contractor, or customer) that can be used to achieve water conservation, the means through which the device or program will be implemented, and what distribution method, or mechanism, can be used to activate the device or program.

The list of potential measures in Appendix F was drawn from MWM's general experience and review of what the City and other water agencies with conservation programs are currently implementing. Current Program Measures implemented in the project service area as of March 2013 are indicated in the column "Current City Program" in Appendix F, mostly reflecting the City's conservation activities.

The Water Commission and community members were welcomed to add additional measures to the list presented in Appendix F. City staff and MWM reviewed these ideas as part of developing recommendations for the selection of conservation measures to be evaluated in detail. The City set up the ability to suggest ideas through its website for the project.

The screening was conducted by City staff with advice and facilitation support from MWM. Input was welcomed following the Water Commission Meeting on April 1, 2013. The public comment period, provided to stakeholders and policy makers to add new ideas to the list of potential measures, was closed after two weeks on April 15, 2013 in order to allow for the screening process to take place from April 17-24, 2013. The results of the screening process and the measures recommended for selection for the benefit-cost analysis were provided to the Water Commission at the May 6, 2013 meeting for final review and acceptance.

The screening was conducted by Water Department staff in consultation with MWM. MWM described each measure prior to the rating and answered questions about its applicability as well as potential savings and costs. MWM did not specifically recommend any one measure.

Ratings with respect to each criterion were made on a scale of 0 to 5, where 5 was the highest score. Ancillary benefits were rated on a scale of 0 to 2, where 2 was the highest score. It should be emphasized that a measure that passed the screening was not necessarily included in the recommended conservation plan, but it was analyzed.

The measures were screened using the following six criteria:

- *Water Savings Potential (Service Area Match) – emphasis on the measure's ability to reduce average daily water use within the Santa Cruz community (e.g., largely based on individual end use savings and current level of saturation)*
    - Higher savings = 5 (e.g., high end use water savings, low saturation), lower savings (e.g., low end use savings, or very saturated) = 0
- *Sustainable Water Savings – emphasis on savings lifetime/reliability*
    - Permanent = 5 (e.g., codes and technological changes ensure future reliable savings), short, temporary savings or draconian behavioral change = 0
- *Quantifiable Water Savings – emphasis on measures where water savings can be accurately predicted*

  - Highly quantifiable = 5 (substantial evidence exists to demonstrate reliable, accurate conservation savings), measure savings not quantifiable = 0

- *Widespread Community & Social Acceptance (Technology/Market Maturity) – emphasis on willingness to participate, out of pocket expenses, equity/perceived fairness, aesthetics*
  - High expected participation = 5, low expected acceptance/reject mandatory participation =0
- *Feasibility of Implementation/Secondary Impacts – emphasis on ability to achieve objectives*
  - Fully within City capacity/legally possible = 5, fatally flawed = 0 (insurmountable obstacle to implementation)
- *Ancillary Benefits – emphasis on achieving additional goals, including reduction in energy/greenhouse gases (GHG) and/or reduction in peak season use, providing valuable customer service, or other non-quantifiable benefits (behavioral change, public awareness)*
  - Multiple benefits = 2 and singular or very limited benefits = 0

Ratings were summed for all six criteria. A passing score was selected so that the number of measures with the highest scores passing the screening was 20-25 measures total.

The initial screening of all the conservation measures was a very iterative process, as was the screening and selection of the conservation measures to be included in the Recommended Program. From this iterative screening process, the Water Commission added to and approved the recommended list of measures from the technical analysis phase of the project.

More information about the City's measure screening process can be found in Appendix F.

## 6.3 Additional Measures to Address Peak Season Water Use

During the WSAC Report development, several additional measures were considered and added to the program. The result of the WSAC work on demand management was to shift the focus more toward reducing peak season use to increase supply reliability. It did so not only by considering measures to reduce outdoor use in residences and large landscapes, but also by enhancing base or indoor measures that lessen overall demand or that target specific uses, including visitor-serving uses, thereby helping to reduce the City's peak season water use. More information about the City's peak water use can be found in section 3.5.1.

# 7. CONSERVATION MEASURE EVALUATION

This section presents the conservation measures evaluated in the DSS Model. The total list of measures evaluated includes the recommended measures list published in the October 2015 Water Supply Advisory Committee Final Report on Agreements and Recommendations, Table 14.

## 7.1 Conservation Measures Evaluated

A total of 33 individual measures were evaluated in the Santa Cruz DSS Model. For each measure selected to be modeled, a measure description, as well as details on each measure's utility and customer costs, time period, and targets, can be found in the DSS Model's measure inputs.

Some of the key assumptions used in evaluating the water savings, benefits, and costs include the following:

- Applicable customer class
- Applicable end use
- Estimated annual account participation rates
- Estimated number of fixtures per account
- Evaluation start and end year
- Measure length, years
- Measure life, years
- Utility unit cost, $
- Customer unit cost, $
- Estimated annual administration and marketing overhead, %

The measures listed in Table 7-1 presents a basic description of each active measure and the types of customers each measure targets. Measures 29-35 listed in the table were requested additions by the WSAC in October 2015. More detailed information and assumptions for each modeled measure were developed in collaboration with City staff and are presented in Appendix C.

Water use efficiency savings due to plumbing codes, such as CALGreen (California Statewide New Development Building Code), SB 407 (Plumbing Fixture Retrofit on Resale or Remodel), and any new development ordinances, are included in the DSS Model and presented in Section 4.6.4 and Appendix A. Plumbing code measures account for 53% of the future conservation potential achieved and are independent of any program.

**Table 7-1. Conservation Measure Descriptions[1]**

| No. | Measure Name | Type of Customer | Description |
|---|---|---|---|
| **1** | System Water Loss Reduction | System | This measure's purpose is to identify and reduce water losses in the City's water system. The City is currently doing a water loss control study to review its annual water audit, look at water losses, and design a cost-effective water loss control program. The City currently loses an average of 7.5% of all treated water due to leaks, meter inaccuracies, and other problems. The goal of this measure is to reduce the City's system water losses on a long-term basis by an average of 1%. A new state law passed in 2015 that will require water suppliers to conduct water system audits, verify, and report water losses every year to the state beginning in 2017. |
| **2** | Advanced Metering Infrastructure (AMI) | Single Family (SF), Multifamily (MF), Commercial (COM) | This measure involves a major investment to upgrade meter reading technology and data management abilities. The City currently uses an Automatic Meter Reading (AMR) system in which water meters are read monthly by radio equipment that then transmits the information back to the City. This system may increase the frequency of meter reading from once a month to once an hour. The main water conservation (savings) benefits are for customer in-home or outdoor leak detection and increased customer awareness of water use. Other benefits include more action in enforcing the drought restrictions and more efficient customer service. Utility billing would continue to be on a monthly basis. |
| **3** | Large Landscape Budget-Based Water Rates | Irrigation (IRR) | This measure includes the development of individual monthly water budgets for irrigation customers. Water budgets are connected to a water rate schedule where water rates increase when a customer goes above their landscape water budget, or decreases if they are below budget. Budgets are typically based on factors like the size of the irrigated area, plant material, and changes in weather conditions. |
| **4** | General Public Information | SF | This measure addresses opportunities to use public information programs as an effective tool to inform customers of the need for water conservation and conservation-related benefits. The current campaign is called "*Surf City Saves"* program. This measure includes paid and public service advertising, newsletters, bill inserts, information on the utility bill, a website, flyers and brochures, media campaigns, community meetings, direct mailings, community engagement at local activities, and other techniques. Public information is often carried out and coordinated with other agencies, groups, and schools. |
| **5** | Public Information (Home Water Use Report) | SF | This measure involves contracting with a firm to produce a detailed water billing report for high-use customers that is in addition to their normal utility bill. This billing report compares water use in the neighborhood and offers suggestions to customers on ways to reduce water use. |

| No. | Measure Name | Type of Customer | Description |
|---|---|---|---|
| 6 | Residential Leak Assistance | SF, MF | Customer leaks can go uncorrected at homes where owners are not able to pay the costs of repair. This measure would involve the City either paying part of the repair or paying the entire cost of the repair with funds that are paid back from customer water bills over time. This measure may also include an option to replace inefficient plumbing fixtures at low-income residences. |
| 7 | Single Family Residential Surveys | SF | This measure provides an outdoor water survey for existing single family residential customers. High water users will be targeted. This measure may include giving away water-efficient showerheads, faucet aerators, and toilet devices. This measure would provide a basic outdoor survey (look for leaks, irrigation problems and scheduling, plant information, etc.) and promote landscape and irrigation programs and improvements to reduce peak season water use. |
| 8 | Plumbing Fixture Giveaway/ Opt | SF, MF | The City would buy large amounts of efficient showerheads, kitchen and lavatory faucet aerators, shower timers, and hose timers. Hose nozzles and leak detection tablets would be available for distribution at the Utility office and at community events. |
| 9 | Residential Ultra High Efficiency Toilet Rebates | SF, MF | This measure provides a rebate or voucher for the installation of an ultra-high efficiency toilet (UHET) that uses 1.0 gallons of water or less per flush (gpf). |
| 10 | High Efficiency Clothes Washer Rebates | SF, MF | The City would provide a rebate for high efficiency clothes washing machines (HECW) to single family homes and in-unit condo/apartment complexes that do NOT have common laundry rooms. This program would be similar to the City's current program, except that higher rebate amounts would be increased for qualifying machines that are listed as Energy Star® “Most Efficient” Clothes Washers. |
| 11 | High Efficiency Clothes Washer - New Development | SF, MF, COM | This measure would involve amending the City’s building regulations to require building developers to install an efficient clothes washer (meeting certain water efficiency standards, such as gallons per load). Inspections would be coordinated with City and County building departments to make sure that an efficient washer is installed before the new home or building is occupied. |
| 12 | Hot Water On Demand - New Development | SF, MF, COM | The City would work to pass an ordinance requiring developers and permitted building remodels to equip new homes or buildings with efficient hot-water-on-demand systems. These systems use a pump placed under the sink to recycle water sitting in the hot water pipes to the water heater or to move the water heater into the center of the house and/or reduce hot water waiting times by having an on-demand pump on a recirculation line looping back to the hot water heater. |
| 13 | Toilet Retrofit at Time of Sale | SF, MF, COM | This measure involves tracking real estate sales within the City’s water service area and working with buyers, sellers, and the real estate industry to retrofit older, inefficient toilets, showerheads, and urinals with the most efficient, upgraded fixtures when real estate is sold. A property inspection by either City staff or a licensed plumbing/general building contractor would be required to verify compliance with the regulation. |

| No. | Measure Name | Type of Customer | Description |
|---|---|---|---|
| **14** | COM, MF Common Laundry Room High Efficiency Clothes Washer[4] | MF, COM | This measure provides a rebate for the installation of a high efficiency commercial washer (HEW) in COM laundromats and MF common area laundry rooms. |
| **15** | COM Incentives | MF, COM | After getting a free water use survey (Measure 17), the City will analyze the survey recommendations and determine if the MF or COM site qualifies for a financial incentive (reward). Financial incentives will be provided after analyzing the benefit-cost ratio of each proposed project. Incentives are designed to fit each individual site as each site has varying water savings potentials. Incentives will be given based on the decisions of the City specifically and while the money lasts. |
| **16** | Pre-Rinse Spray Nozzle Installation | COM | The City will provide free 1.3 gpm (or lower) pre-rinse spray nozzles, and possibly free installation of nozzles, in restaurants and other commercial kitchens. |
| **17** | COM Surveys | MF, COM | This measure will offer top MF and COM water customers a professional water survey that would evaluate ways for the site to save water and money. The surveys would be for large accounts (accounts that use more than 5,000 gallons of water per day, or the top 3%), such as hotels, restaurants, stores, and schools. |
| **18** | High Efficiency Urinal Program | COM, Municipal (MUN), Industrial (IND) | The City will provide a rebate or voucher for the replacement of older, high use urinals with high efficiency urinals (HEU) and flush valves using 0.125 gpf (1 pint) or less. |
| **19** | Public Restroom Faucet Retrofit - MUN | MUN | This measure includes the direct installation of high efficiency (0.5 gpm) sensor faucet fixtures in institutional (public) buildings, such as schools, hospitals, etc. High-use municipal building will be focused on first. |
| **20** | Public Restroom Faucet Retrofit - COM | COM | This measure includes the direct installation of high efficiency (0.5 gpm) sensor faucet fixtures in commercial buildings, such as businesses. High-use commercial buildings will be focused on first. |
| **21** | School Retrofit | MUN | This school retrofit program involves schools receiving funding to replace non-efficient fixtures, retrofit mixed use meters to dedicated irrigation meters, and upgrade irrigation systems. |
| **22** | Water Efficient Landscape Ordinance | SF, MF, COM, MUN, IND | This measure accounts for the lower irrigation water use that new accounts have due to their more efficient landscape designs, which are a result of the City's Landscape Code (implementation of Statewide Model Landscape Ordinance). The City is in the process of updating this code to keep up with new state regulations and technology for irrigation controllers and irrigation equipment. |

| No. | Measure Name | Type of Customer | Description |
|---|---|---|---|
| **23** | Single Family Residential Turf Removal | SF | This measure provides a per-square-foot incentive to SF customers to remove and replace turf (grass) with low-water-use plants or permeable hardscape (pavers, concrete, etc. that allows water to soak through and into the ground). This is modeled after the City's current program. The rebate is currently $0.50 per square foot and capped at $500 for a single family residence. To increase participation, this measure would increase the rebate to $1 per square foot and a $1,000 maximum, or more in both cases. |
| **24** | Multifamily Residential/CII Turf Removal | MF, COM, MUN, IRR | This measure provides a per-square-foot incentive to MF, COM, MUN, and IRR customers to remove and replace turf with low-water-use plants or permeable pavers (or other permeable hardscape). The rebate is currently $0.50 per square foot of turf removed and capped at $2,500 for multifamily or commercial residences. This measure would increase the rebate to $1 per square foot and a $5,000 maximum or more to increase participation. |
| **25** | Expand Large Landscape Survey/Water Budgets | IRR | This measure expands on the City's existing landscape water budget program to include more dedicated irrigation accounts. Outdoor water audits will be offered for existing customers with problems of overwatering or water waste. Normally, those with high water use are focused on and provided a customized report telling them how to save water. All multifamily residential, CII, and public irrigators of large landscapes would be eligible for free landscape water audits upon request. This measure is connected to Measure 3 above, Large Landscape Budget-Based Water Rates. |
| **26** | Sprinkler Nozzle Rebates | SF, MF, COM | The City will provide rebates to replace standard spray sprinkler nozzles with more efficient rotating nozzles. Nozzles cost about $6 each. |
| **27** | Gray Water Retrofit | SF | The City will hold a workshop to support a Gray Water Challenge or similar program. A rebate will be offered that will help to cover a portion of the cost to single family homeowners per year who install gray water systems. A gray water kit/package, available from local hardware stores, would be supported by this City rebate. |
| **28** | Residential Rain Barrels | SF | The City will provide an incentive for the installation of rain barrels. This could involve rebates, purchasing rain barrels in high quantities, and giveaways of barrels as well as workshops on proper installation and use of captured rain water for landscape irrigation. |
| **29**[2] | Climate Appropriate Landscaping and Rainwater Infiltration | SF, MF, COM, MUN | This measure will provide incentives for the installation of climate-appropriate and rainwater infiltration landscape (soaks up water on-property as opposed to running off-property). This measure will provide rebates to Home Owners Associations (HOAs), businesses, and institutions that increase their outdoor water use efficiency by replacing qualifying high water use landscape and/or upgrading to qualifying high efficiency irrigation equipment or climate appropriate landscape. To qualify, sites must participate in a pre-inspection before beginning their project or purchasing materials. Single family homes, multifamily homes, and business properties with qualifying irrigated landscape (i.e., irrigated turf or a functional swimming pool) can receive rebates for replacing high water use landscape (e.g., irrigated turf grass) with a minimum |

| No. | Measure Name | Type of Customer | Description |
|---|---|---|---|
| | | | of 50% plant coverage consisting of low water use plants from the Approved Plant List.<br><br>Recommendations from the Water Supply Alternatives Committee (WSAC) Report include:<br>• Increase turf conversion rebate<br>• Require conversion of spray to drip for shrub irrigation<br>• Discourage runoff through rainwater infiltration features (i.e., permeable pavers)<br>• Support local actions for climate-appropriate landscaping<br>• Focus on landscape narrower than 10 feet – no spray irrigation and/or next to hardscapes |
| **30 SF**[2] | SF Conservation Pricing - Water and Sewer[3] | SF | This measure is awaiting the results of an ongoing rate study conducted by Raftelis Financial Consultants, Inc. in 2016. |
| **30 MF**[2] | MF Conservation Pricing - Water and Sewer[3] | MF | This measure is awaiting the results of an ongoing rate study conducted by Raftelis Financial Consultants, Inc. in 2016. |
| **30 COM**[2, 4] | COM Conservation Pricing - Water and Sewer | COM | This measure is awaiting the results of an ongoing rate study conducted by Raftelis Financial Consultants, Inc. in 2016. |
| **31**[2, 4] | Single Family, Multifamily Dishwasher Rebates | SF, MF | This measure provides incentives for the purchase of water efficient dishwashers (Residential WF of 6.25 or less). |
| **32**[2, 4] | Hot Water Recirculation Systems | SF, MF, COM | This measure provides incentives for the installation of a hot water recirculation system. Having hot water discharge promptly is important for energy and water use efficiency. A hot water recirculating system enables the cold water in the hot water pipes to be continually returned to the water heater and reheated before the hot water faucet is turned on. Rebates would be available to the following water customer groups:<br>- single family dwellings, including townhomes and mobile homes<br>- apartment complexes<br>- commercial institutions<br>- commercially zoned businesses or institutions<br><br>Maximum rebates allowable: 1) $300 per single family account per year; and 2) $3,000 per commercial, industrial, or institutional account (e.g., laundromats and apartments) per year. |

| No. | Measure Name | Type of Customer | Description |
|---|---|---|---|
| **33**[2, 4] | Rewarding Businesses for Adopting Best Practices | COM | This measure offers commercial customers who employ best practices an increased water supply reliability and a lower price. For a business, the difficulty of rationing water during severe drought years can have a negative effect on its profits. This measure proposes that the City's Water Shortage Contingency Plan be changed so that businesses who adopt best practices, such as efficient plumbing fixtures, hotel laundry recycling, and climate-appropriate landscaping, would get a lower level of water usage reduction during a severe drought. For example, in a Stage 4 drought, with a system-wide goal of 35% reduction, the current plan is to have the water allotment of businesses be 87% of their normal year water use. Under this measure, businesses adopting best practices would be expected to cut back to only 95% of normal use, rather than 87%. These businesses could also be rewarded with a lower rate for their water use. |
| **34**[2, 4] | Additional Building Code Requirements for New Development | SF, MF, COM, MUN, IND | New CALGreen Building Codes already included in the DSS Model (see Section 5.4) takes many of the items recommended by WSAC into account.<br>This measure currently cannot be measured with regard to future additional CALGreen updates and water savings. This measure involves the coming together of a working group of planners, builders, conservation groups, and Water Department personnel to evaluate possible additions to current codes and fee structures that would encourage water conservation. Some examples include: 1) requiring high efficiency washers in new development; and 2) requiring hot water on demand/structured plumbing in new development. It is also intended that the work group track and incorporate new technologies in future City codes. |
| **35**[2, 4] | Innovation Incubator Program | SF, MF, COM, MUN | This measure would establish an Innovation Incubator Program allowing Santa Cruz to continue its leadership in water management by creating a program that supports new developments in:<br>• New technologies, customer financing programs, and customer outreach programs; and<br>• Pilot projects to promote popular adoption of rainwater for toilets and washers, new technology toilets in institutional buildings, onsite recycling of graywater, rainwater irrigated lawns, and promotion of native plant landscapes. Small grants would be offered to local businesses and/or working with state and national organizations like California Urban Water Conservation Council, California Water Foundation, California Urban Water Agencies, University of California (Santa Cruz or Davis), Alliance for Water Efficiency, Water Research Foundation, US Bureau of Reclamation, or other coalitions of utilities or research-focused organizations. |

**Notes:**

AMI – Advance Metering Infrastructure
AMR – Automatic Meter Reading System
COM – commercial
gpf – gallons per flush
gpm – gallons per minute
HECW – high efficiency clothes washing machine
HEU – high efficiency urinal
HEW – high efficiency commercial washer
HOA – Home Owners Association
IND – industrial
IRR – irrigation
MF – multifamily
MUN – municipal
SF – single family
UHET – ultra-high efficiency toilet
WF – water factor, gallons per cubic foot
WSAC – Water Supply Alternatives Committee

[1] Source: Santa Cruz Final Technical Memorandum (City of Santa Cruz, 2016).
[2] Measures 29-35 were requested additions by the WSAC in October 2015.
[3] A comprehensive cost of service water rate study was being conducted by Raftelis Financial Consultants, Inc. when the modeling effort for this conservation plan was finalized. It was later completed in August 2016. The DSS model is set up to analyze the impacts of the new rates and rate structure on water consumption in the future if needed.
[4] These measures target both CII and residential customers.

## 7.2 Assumptions about Avoided Costs

The four main sources of water for the City are 1) the North Coast sources; 2) the San Lorenzo River; 3) Loch Lomond Reservoir; and 4) the Live Oak Wells. The avoided cost of water to the City is estimated to be $2,550/MG as a place holder value set to be five times the variable cost of current annual supplies. Until the City has a recommended water supply project approved with known costs, a better avoided cost is not available. For this evaluation, the avoided cost of treated water is assumed to be $2,500/MG (water production operational costs) and the avoided cost of wastewater is assumed to be $50/MG (wastewater operational costs). These values can be found in the "Avoided Costs" red section of the City's DSS Model. It is recommended in the future that this cost be updated when new cost information becomes available. It is important to note that $10,000/MG is the average total program cost threshold established by the WSAC; this value is lower than the expected unit cost of various supply augmentation projects recommended to be pursued as a result of the WSAC's work.

## 7.3 Comparison of Individual Measures

Table 7-2 presents each measure's water savings in million gallons (MG) per year for year 2035 as a result of each measure's design and implementation schedule. Year 2035 savings include ongoing savings still valid since the measure's start. Savings per measure presented in the table assume measures are implemented on a stand-alone basis (i.e., without interaction or overlap from other measures that might address the same end use or uses).

It is important to understand that the savings from measures presented in the table which address the same end use(s) are not simply additive. The DSS Model uses impact factors to avoid double counting in estimating the water savings from programs of measures. For example, if two measures are planned to address the same end use and both save 10% of the prior water use, then the net effect is not the simple sum (20%). Rather it is the cumulative impact of the first measure reducing the use to 90% of what it was without the first measure in place, then reducing the use another 10% to result in the use being 81% of what it was originally. In this example the net savings is 19%, not 20%. Using impact factors, the model computes the reduction as follows: 0.9 x 0.9 = 0.81 or 19% water savings.

Since interaction between measures has not been accounted for in Table 7-2, it is not appropriate to include a total in the bottom row. However, the table is useful to give a close approximation of the savings of each individual measure.

The four measures that save the most water (more than 20 million gallons per year in 2035) include:

2. Advanced Metering Infrastructure: 45.94 MGY
10. High Efficiency Clothes Washers: 36.20
1. System Water Loss Reduction: 34.87 MGY
6. Residential Leak Assistance: 22.03 MGY

Of the remaining 31 measures, five measures are each estimated to save between 10 and 20 MGY in 2035, and the remaining 26 measures all save less than 10 MGY each.

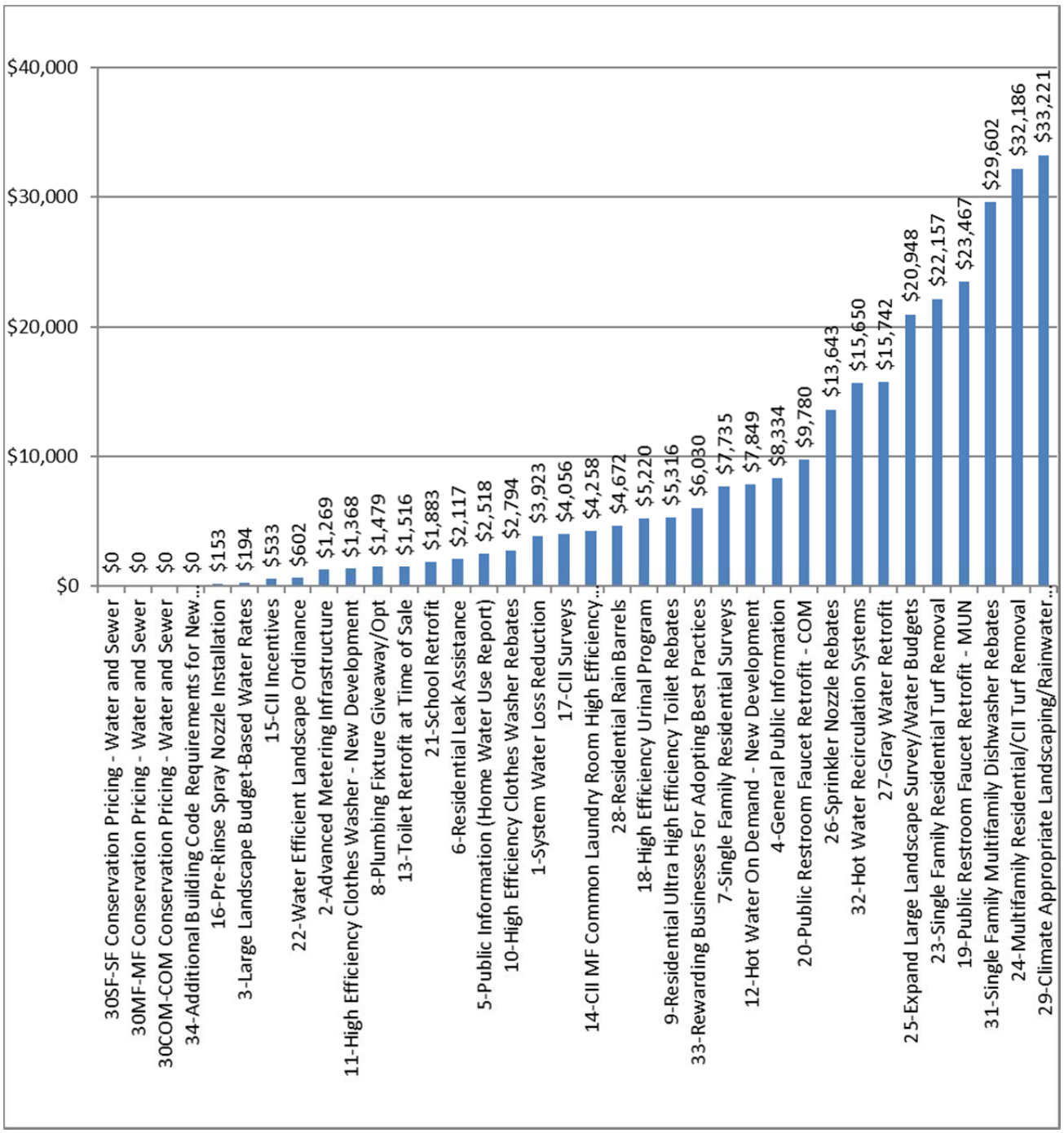
**Table 7-2. Individual Measure Estimated Cost of Water Saved and 2035 Water Savings[1]**

| No. | Measure Name | Estimated Cost of Water Saved ($/MG) | Estimated 2035 Water Savings (MGY) |
|---|---|---|---|
| **1** | System Water Loss Reduction | $3,923 | 34.87 |
| **2** | Advanced Metering Infrastructure | $1,269 | 45.94 |
| **3** | Large Landscape Budget-Based Water Rates | $194 | 12.83 |
| **4** | General Public Information | $8,334 | 5.73 |
| **5** | Public Information (Home Water Use Report) | $2,518 | 11.39 |
| **6** | Residential Leak Assistance | $2,117 | 22.03 |
| **7** | Single Family Residential Surveys | $7,735 | 2.78 |
| **8** | Plumbing Fixture Giveaway/Opt | $1,479 | 2.03 |
| **9** | Residential Ultra High Efficiency Toilet Rebates | $5,316 | 2.91 |
| **10** | High Efficiency Clothes Washer Rebates | $2,794 | 36.20 |
| **11** | High Efficiency Clothes Washer - New Development | $1,368 | 12.53 |
| **12** | Hot Water On Demand - New Development | $7,849 | 4.46 |
| **13** | Toilet Retrofit at Time of Sale | $1,516 | 8.70 |
| **14** | CII MF Common Laundry Room High Efficiency Clothes Washer | $4,258 | 3.07 |
| **15** | CII Incentives | $533 | 18.39 |
| **16** | Pre-Rinse Spray Nozzle Installation | $153 | 9.16 |
| **17** | CII Surveys | $4,056 | 19.24 |
| **18** | High Efficiency Urinal Program | $5,220 | 3.22 |
| **19** | Public Restroom Faucet Retrofit – MUN | $23,467 | 0.29 |
| **20** | Public Restroom Faucet Retrofit – COM | $9,780 | 8.47 |
| **21** | School Retrofit | $1,883 | 2.88 |
| **22** | Water Efficient Landscape Ordinance | $602 | 6.66 |
| **23** | Single Family Residential Turf Removal | $22,157 | 4.18 |
| **24** | Multifamily Residential/CII Turf Removal | $32,186 | 2.39 |
| **25** | Expand Large Landscape Survey/Water Budgets | $20,948 | 1.97 |
| **26** | Sprinkler Nozzle Rebates | $13,643 | 3.35 |
| **27** | Gray Water Retrofit | $15,742 | 0.24 |
| **28** | Residential Rain Barrels | $4,672 | 3.42 |
| **29**[2] | Climate Appropriate Landscaping and Rainwater Infiltration | $33,221 | 8.26 |
| **30SF**[2] | SF Conservation Pricing - Water and Sewer[3] | N/A | N/A |
| **30MF**[2] | MF Conservation Pricing - Water and Sewer[3] | N/A | N/A |
| **30COM**[2] | COM Conservation Pricing - Water and Sewer[3] | N/A | N/A |
| **31**[2] | Single Family Multifamily Dishwasher Rebates | $29,602 | 0.20 |
| **32**[2] | Hot Water Recirculation Systems | $15,650 | 1.38 |
| **33**[2] | Rewarding Businesses for Adopting Best Practices | $6,030 | 3.64 |
| **34**[2] | Additional Building Code Requirements for New Development[4] | N/A | N/A |
| **35**[2] | Innovation Incubator Program | $121,679 | 1.08 |

[1] Source: City of Santa Cruz. DSS Model, Section: Conservation Analysis, Feb 16, 2016. This table does not contain a total in bottom row since interaction between measures has not been accounted for in table but is accounted for at the program level.
[2] Measures 29-35 were requested additions by the WSAC in October 2015.
[3] Pricing measure costs and savings not yet available. Awaiting results of ongoing rate study scheduled to be completed in 2016.
[4] New CALGreen Building codes, effective January 2016, are already modeled. This measure is awaiting support from a Working Group yet to be formed.

Figure 7-1 shows the costs of water saved for individual measures ranked from lowest to highest (excluding Measure 35 Innovation Incubator Program). The measures to be implemented in the next several years are a mix of some lower cost and some higher cost measures. It was assumed by the City's Water Supply Advisory Committee that the recommended program, even with higher cost measures included, would incur an average total program cost of no more than $10,000 per million gallons of water saved.

**Figure 7-1. Conservation Measures Unit Cost of Water Saved**




Notes:

1. Units are $/MG.
2. Source: City of Santa Cruz. DSS Model, Section: Results, Feb 16, 2016.

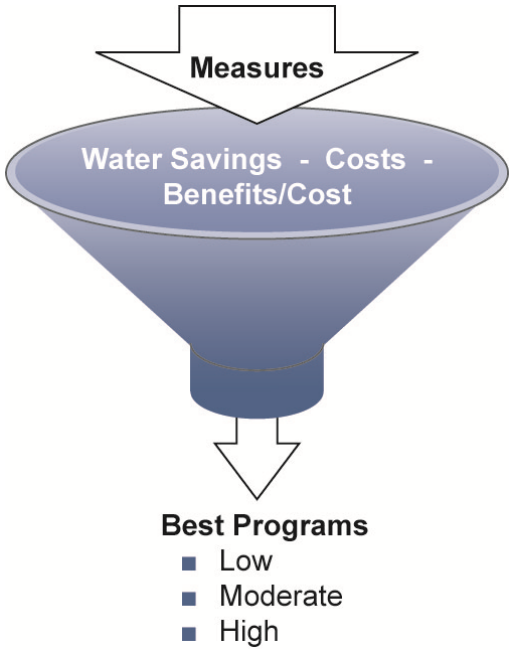
# 8. RECOMMENDED PROGRAM

This section of the Plan addresses the public and technical process involved to evaluate all measures available and how the final selection of measures for the Recommended Program was made. It also addresses estimated per capita water use reductions, projected total water savings, and the overall cost of water saved.

## 8.1 Selection of Measures for Recommended Program

During the evaluation process, as presented in Section 7 and below, the water savings and costs were estimated for the quantifiable measures using assumptions for each measure that were collaboratively developed by MWM and City staff. Benefits and costs were compared in a formal present value analysis. Conclusions were drawn about which measures produce cost-effective water savings and these were then further discussed and evaluated. This process can be considered an economic screening process (Figure 8-1). Packaging the best measures into alternative program scenarios allowed the City to consider what level of conservation was appropriate.

**Figure 8-1. Overview of the Conservation Measure Evaluation Process**




As part of this Program development, several measure combinations were developed and program scenarios explored in order to develop the Recommended Program that is presented below. These included several iterations with the City Staff, Water Commission and then the WSAC. The reviews included discussions on mix of measures as well as various measure design levels (e.g., more or less accounts targeted and earlier or later, longer or shorter measure lengths) such that these recommended measures were well vetted with stakeholder input.

Appendix C presents the assumptions and inputs used in the City's DSS Model to evaluate each water conservation measure, including water reduction methodology, perspectives on benefits and costs, present value parameters, and assumptions about unit costs, water savings, measure costs, and market penetration.

Benefit-cost analysis has been used by many water agencies to evaluate and select water supply alternatives, including water conservation measures best suited to local conditions. For the City's Water Department, this analysis requires a Santa Cruz-specific set of data, such as historical water consumption patterns by customer class, population projections, results of the pilot projects and Baseline Water Use Study, and prior conservation efforts. The end result is the recommended measures previously described above in Table 7-1.

The City's Recommended Program consists of both passive and active elements. Plumbing code measures account for 53% of the future conservation potential achieved and are independent of any program – the savings are based on customers following applicable current local, state, and federal laws, building codes and ordinances. Recommended Program active measures fall within one of four categories (see Table 8-1): 1) general measures; 2) residential measures (indoor); 3) commercial measures (indoor); and 4) irrigation measures (outdoor).

The following table lists the Recommended Program active measures and how each falls within one of four categories.

**Table 8-1. Elements of Recommended Program**

| Utility Measures | Residential Measures | CII Measures | Landscape Measures |
|---|---|---|---|
| System Water Loss Reduction | Residential Leak Assistance | CII Incentives | Large Landscape Budget-Based Water Rates |
| Advanced Metering Infrastructure | Single Family Residential Surveys | Pre-Rinse Spray Nozzle Installation | Water Efficient Landscape Ordinance |
| SF, MF, COM Conservation Pricing - Water and Sewer | Plumbing Fixture Giveaway/Opt | CII Surveys | Single Family Residential Turf Removal |
| General Public Information | Residential Ultra High Efficiency Toilet Rebates | High Efficiency Urinal Program | Multifamily Residential/CII Turf Removal |
| Public Information (Home Water Use Report) | High Efficiency Clothes Washer Rebates | Public Restroom Faucet Retrofit - MUN | Expand Large Landscape Survey/Water Budgets |
| | Gray Water Retrofit | Public Restroom Faucet Retrofit - COM | Sprinkler Nozzle Rebates |
| | | School Retrofit | Residential Rain Barrels |
| | Hot Water On Demand - New Development | Hot Water On Demand - New Development | Climate Appropriate Landscaping and Rainwater Infiltration |
| | Toilet Retrofit at Time of Sale | Toilet Retrofit at Time of Sale | |
| | CII MF Common Laundry Room High Efficiency Clothes Washer* | CII MF Common Laundry Room High Efficiency Clothes Washer* | |
| | Single Family/Multifamily Dishwasher Rebates* | Rewarding Businesses for Adopting Best Practices* | |
| | Hot Water Recirculation Systems* | Hot Water Recirculation Systems* | |
| | Additional Building Code Requirements for New Development* | Additional Building Code Requirements for New Development* | |
| | Innovation Incubator Program* | Innovation Incubator Program* | |

* These measures target both CII and residential customers.

## 8.2 Projected Total Water Savings of Program

The following Table 8-2 presents the benefit cost analysis summary for the Recommended Program, which includes all the measures evaluated as discussed in Section 7.

Cost categories are defined as follows:

- Utility Costs – those costs that the City as a water utility will incur to operate the measure, including administrative costs
- Utility Benefits – the avoided cost of producing water

The column headings in Table 8-2 are defined as follows:

- Average Cost of Water Saved ($/MG) = average cost to implement the program divided by the water savings over the life of the conservation measure
- Water Savings in 2035 (MGY) = water saved in million gallons. The year 2035 is presented as this represents the end of the planning horizon for both the 2015 UWMP and this analysis effort.

**Table 8-2. Recommended Program Costs and Savings**

| Conservation Program | Average Cost of Water Saved ($/MG) | Water Savings over "Baseline" Demand in 2035 (MGY) |
|---|---|---|
| Recommended Program with Plumbing Code Savings | $4,572/MG | 619 |

Notes:
1. Across the modeling time period of 2015-2035, administrative costs average approximately 22% of total utility costs annually.
2. Source: City of Santa Cruz. DSS Model, Section: Results, Feb 16, 2016.

Table 8-3 shows the savings in 5-year increments for the plumbing codes, Recommended Program, and the Recommended Program with plumbing code savings.

**Table 8-3. Long Term Conservation Program Savings over "Baseline" Demand**

| Conservation Program | 2020 | 2025 | 2030 | 2035 |
|---|---|---|---|---|
| Baseline Demand without Codes or Conservation (MGY) | 3,560 | 3,636 | 3,743 | 3,839 |
| Plumbing Code (MGY) | 96 | 179 | 269 | 329 |
| Recommended Program (MGY) | 137 | 232 | 269 | 291 |
| Recommended Program with Plumbing Code Savings (MGY) | 233 | 411 | 538 | 619 |

Source: City of Santa Cruz. DSS Model, Feb 16, 2016.

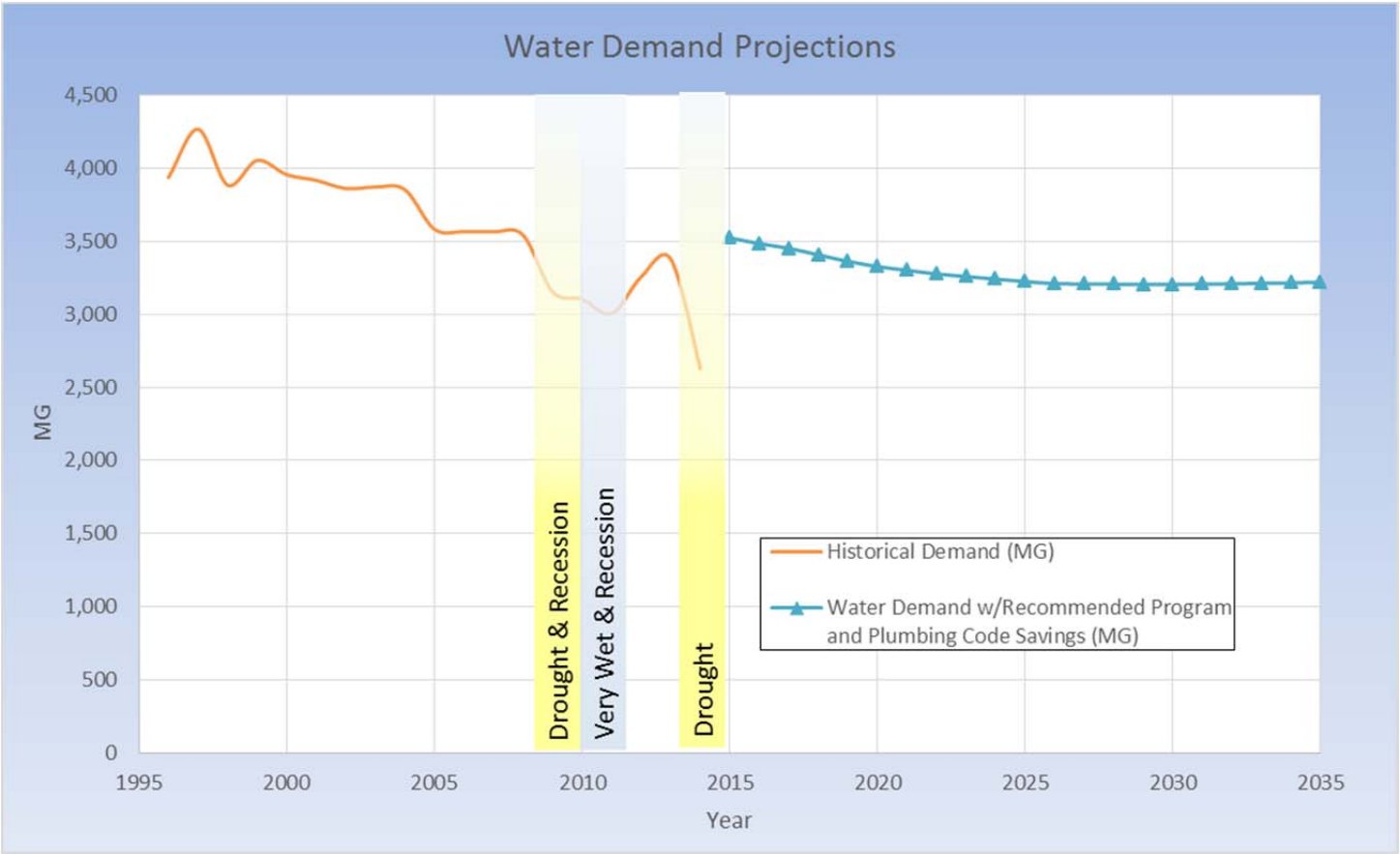
The Recommended Program is envisioned to include strong customer participation to support additional planned growth while keeping total water use relatively constant for the next 20 years. New development will be built to water efficient standards following the 2015 CALGreen Plumbing Code, 2015 CEC Code, and other local ordinances (e.g., City's landscape ordinance). Water use in new homes should be more efficient than existing homes on comparable lot sizes. Table 8-4 and Figure 8-2 below present the Recommended Program projected water demands. Note that the Recommended Program with Plumbing Code is lower than the Demand Forecast by M.Cubed shown in Table A-1 in Appendix A of this Plan. The Recommended Program forecast is 222 MGY lower (6%) than the M.Cubed forecast in 2035. This is due to increased savings by the new plumbing codes and new conservation programs that would be added over time. As seen in Table 8-4, total water savings from both plumbing code and the recommended program is expected to reduce total water demand from approximately 3.8 billion gallons per year to about 3.2 billion gallons per year, a reduction of over 600 million gallons or more than 16% by 2035.

**Table 8-4. Normalized Water Use Projections**

| | 2020 | 2025 | 2030 | 2035 |
|---|---|---|---|---|
| "Baseline" Demand | 3,560 | 3,636 | 3,743 | 3,839 |
| Demand with Plumbing Code (MGY) | 3,464 | 3,456 | 3,474 | 3,510 |
| Demand with Plumbing Code and Recommended Program (MGY) | 3,327 | 3,225 | 3,205 | 3,220 |

Source: City of Santa Cruz. DSS Model, Section: Results, Feb 16, 2016.

**Figure 8-2. Projected Water Demands with Recommended Program**




Source: City of Santa Cruz. DSS Model, Section: Results, Feb 16, 2016.

The current and projected number of connections and deliveries to the City's water distribution system by sector are identified in the following table. Note that total deliveries include plumbing code savings, Recommended Program savings, and Non-Revenue Water.

**Table 8-5. Accounts and Recommended Program Demands by Customer Category***

| | | Single Family | Multi-family | Business | Municipal | Industrial | UC Santa Cruz | Irrigation | Golf | Non-Revenue Water | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2020 | # of accounts | 19,456 | 2,886 | 1,948 | 218 | 39 | 12 | 651 | 2 | N/A | 25,212 |
| | Deliveries MGY | 1,277 | 772 | 574 | 46 | 56 | 196 | 81 | 58 | 267 | 3,327 |
| 2025 | # of accounts | 19,854 | 2,972 | 1,971 | 218 | 41 | 14 | 723 | 2 | N/A | 25,795 |
| | Deliveries MGY | 1,223 | 714 | 541 | 43 | 59 | 234 | 87 | 52 | 273 | 3,225 |
| 2030 | # of accounts | 20,260 | 3,122 | 2,008 | 218 | 43 | 16 | 845 | 1 | N/A | 26,514 |
| | Deliveries MGY | 1,191 | 690 | 525 | 41 | 60 | 271 | 100 | 47 | 281 | 3,205 |
| 2035 | # of accounts | 20,636 | 3,238 | 2,055 | 218 | 43 | 18 | 951 | 1 | N/A | 27,162 |
| | Deliveries MGY | 1,170 | 678 | 519 | 40 | 61 | 308 | 110 | 46 | 288 | 3,220 |

*Demands include plumbing code savings and Recommended Program savings.

## 8.3 Estimated Per Capita Water Use Reductions

The City currently and in the future is projected to exceed the two possible conservation targets that are being tracked by the City, both in terms of the State's SB X7-7 mandate and the voluntary California Urban Water Conservation Council MOU commitments. As published in the 2010 and 2015 UWMPs, the City has selected to aim to achieve SB X7-7 Method 3: 95% of State Hydrological Region Target by 2020. The City's baseline and target GPCD are as follows:

- Baseline GPCD = 113 GPCD
- 2015 Interim Target = 111 GPCD
- 2020 target = 110 GPCD
- CUWCC 2018 target = 101 GPCD

Table 8-6 below shows the projected per capita water use in gallons per day per person (GPCD) in 5-year increments for the projected demand with no plumbing code savings, projected demand with plumbing code savings, and projected demand with Recommended Program implementation and plumbing code savings. Note that demand projections are normalized, without drought or recession conditions, whereas historical demands have been affected by drought and economic influences.

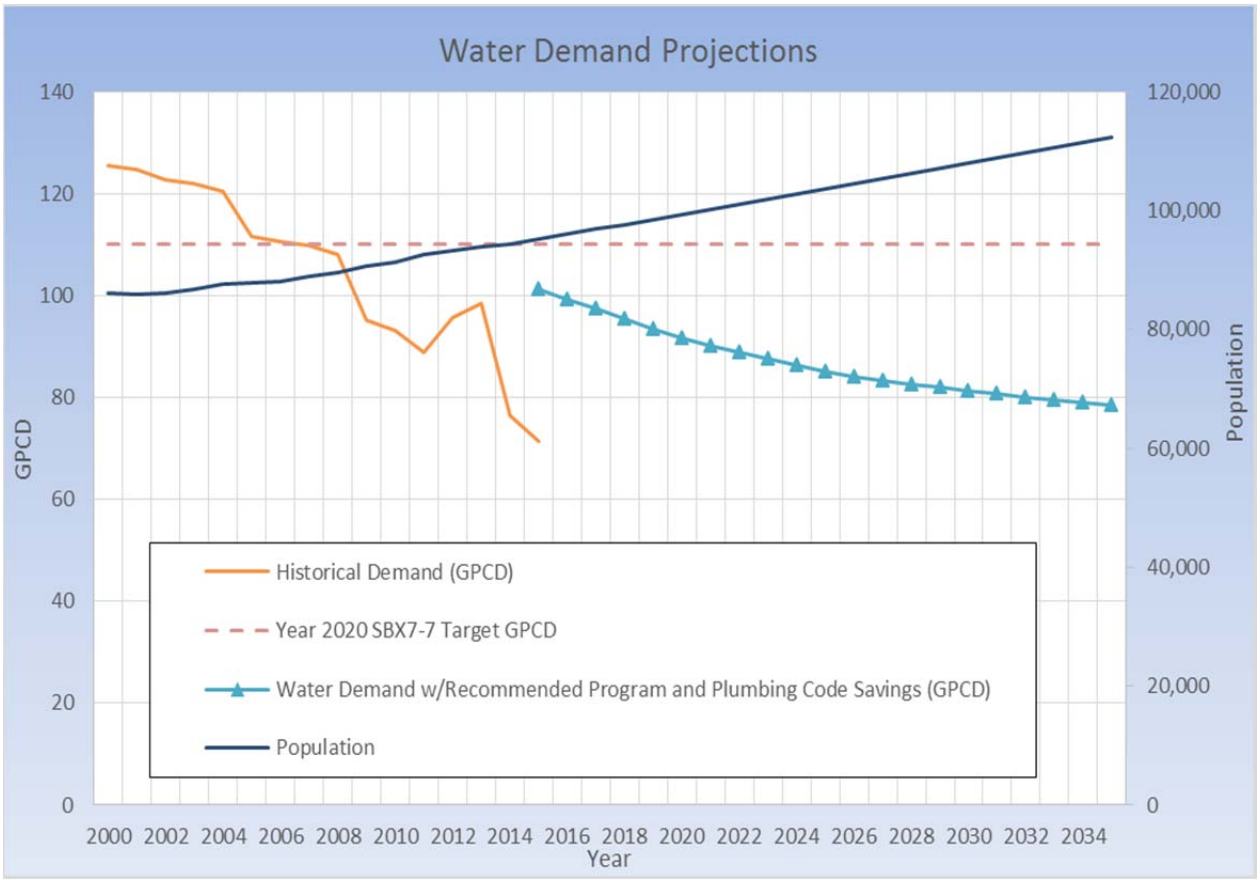
**Table 8-6. Projected Population and Per Capita Water Use[1]**

| | 2020 | 2025 | 2030 | 2035 |
|---|---|---|---|---|
| Population [2] | 99,403 | 103,620 | 107,989 | 112,390 |
| "Baseline" Demand without Plumbing Code (GPCD) | 98 | 96 | 95 | 94 |
| Demand with Plumbing Code (GPCD) | 95 | 91 | 88 | 86 |
| Demand with Plumbing Code and Recommended Program (GPCD) | 92 | 85 | 81 | 78 |

[1] Source: City of Santa Cruz. DSS Model, Section: Results, Feb 16, 2016.
[2] Source: WSAC Final Report, October 2015.

Figure 8-3 below presents the SB X7-7 year 2020 GPCD target and historical and projected GPCD estimates with plumbing codes and Recommended Program savings. As seen below in Figure 8-3, the City has already met its state-mandated 2020 target and surpassed its voluntary CUWCC 2018 goal. The goal of the City's plan is to press beyond these state targets and instead maximize conservation savings to help meet local resource needs for current and future customer water demands.

**Figure 8-3. Water Conservation Program Savings Projections – SB X7-7 Target**




Notes:

1. Historical values based on actual data and projections are based on normalized future values.
2. Source: City of Santa Cruz. DSS Model, Section: Results, Feb 16, 2016.

## 8.4 Overall Cost of Water Saved

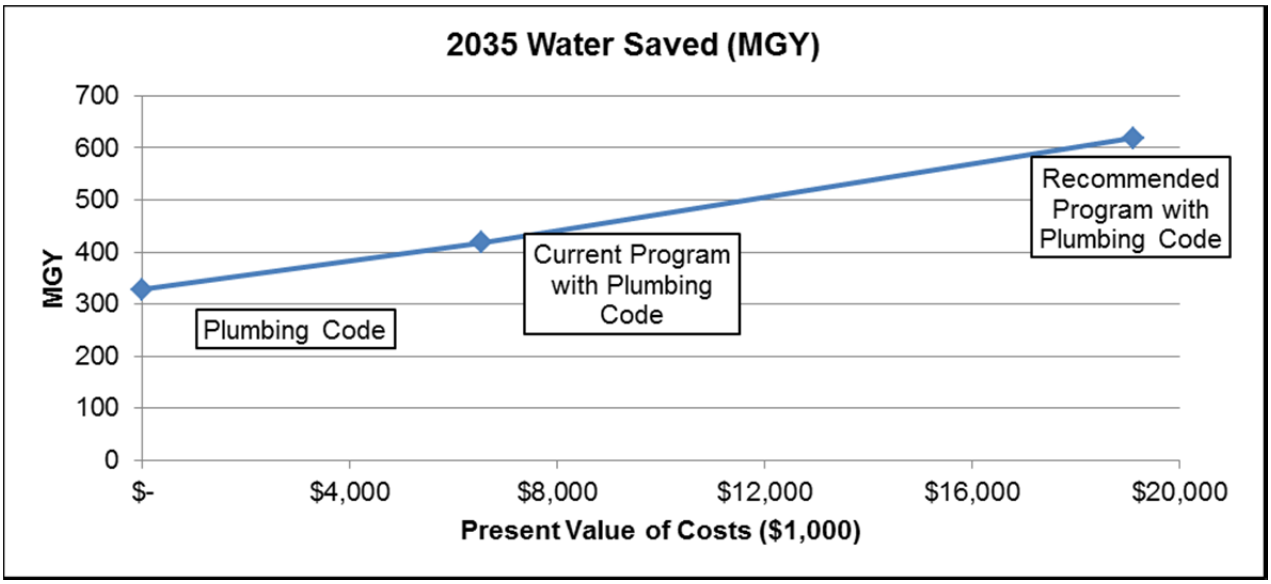
The cost of water saved per unit volume ($/MG) for the Recommended Program is $4,572/MG. This is below the Water Supply Alternatives Committee's recommended threshold for overall cost of water saved, which is $10,000/MG.

Several of the measures addressing peak season water use have the highest unit costs, but, together as a package, the Recommended Program is $4,572/MG, well below $10,000/MG (City of Santa Cruz, 2016), the maximum level established by the WSAC, which is lower than the expected unit cost of supply augmentation projects recommended to be pursued as a result of the WSAC's work.

It should be noted that the cost of water saved value somewhat undervalues the cost of savings because program costs are discounted to present value and the water benefit is not.

The following figure shows how the costs and savings of the City's current water conservation program compare to the Recommended Program as more utility dollars are spent to achieve greater water savings.

**Figure 8-4. Present Value of Utility Costs vs. Cumulative Water Saved**




## 8.5 GHG Savings Analysis

The City has a Climate Action Plan an expressed goal to reduce greenhouse gases. For the conserved water supply, there is an estimated embedded energy intensity of 1,948 kWh/MG saved, estimated in 2015 from the Pacific Gas and Electric (PG&E) GHG Inventory and City staff. The total annual GHG savings can be estimated simply by multiplying the water savings times the energy intensity times the PG&E GHG emission factor.

The following assumptions were made in estimating the GHG emissions savings:

- Estimated water savings in 2020 are 233 MGY and in 2035 are 619 MGY (Table 8-3).
- Same energy intensity as 2015 of 1,984 kWh/gallon saved (which is considered to be a preliminary estimate of future savings provided that the City is not required to add more energy intensive treatment facilities).
- PG&E emission factor of 290 lb. $CO_2$/MWh estimated for 2020 as provided in their November 2015 Guidance for PG&E Customers. Note that the recent average emission factor from 2009-2013 was 457 lb. $CO_2$/MWh. Emission factors are estimated based on the California Public Utilities Commission calculator who regulates private energy utilities and requires tracking and reporting of GHG emissions. The CPUC calculator was developed prior to the drought with reduction in hydropower and also does not extend to 2035, such that the 2020 value was used.
- Additional GHG savings from hot water savings at the end user level and from reduced wastewater collection, treatment, and disposal energy use is not quantified in this analysis.

Based on the parameters above, the total projected annual savings due to conserved water from the 2015 water supply sources is estimated to be a total of 61 metric tons of $CO_2$ per year equivalent savings in 2020 and 162 metric tons of $CO_2$ per year equivalent savings in 2035. Cumulative greenhouse gas reduction over the 20-year planning horizon is expected to be approximately 307 metric tons of $CO_2$.

# 9. IMPLEMENTATION STRATEGY

Each year a progress update will be used to analyze the progress being made regarding meeting the Recommended Program's targeted water savings. It will be imperative to track activities and water demand to understand the level of progress being made in meeting overall goals for the program.

The Program is intended to be dynamic and changes and adjustments are expected. Monitoring progress on implementing recommended measures should be a priority. Costs, participation rates, and water use should be tracked to ensure that the Program is on target to meet goals. As new promising technologies emerge, they should be tested and possibly replace programs that are underachieving. Summary reports should be issued citing progress and recommending changes in program content.

The following sections outline the recommended schedule as well as estimated budget and staffing needs to implement the Recommended Program. It also describes recommendations for potential future activities in support of the Santa Cruz Water Conservation Master Plan, including:

- Concepts for data collection and management systems
- Considerations of emerging new technologies
- Implications for responding to water shortages
- Future DSS Model updates

## 9.1 Proposed Implementation Schedule

The following Figure 9-1 presents the planned Recommended Program implementation schedule. A description of each measure can be found in Table 7-1. Some measures involve modifying existing programs and are relatively simple to implement. Other measures could involve extensive planning and or additional authority to implement. At least three measures involve the City passing new ordinances or amending building codes. One measure, No. 16 (Pre-Rinse Spray Nozzle Installation), has already been completed in conjunction with drought response during 2014.

**Figure 9-1. Recommended Program Planned Implementation Schedule**

| No. | Measure | Time Period | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 | 2035 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | System Water Loss Reduction | 2015 - 2035 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 2 | Advanced Metering Infrastructure | 2021 - 2035 | | | | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 3 | Large Landscape Budget-Based Water Rates | 2018 - 2020 | | | | ■ | ■ | ■ | | | | | | | | | | | | | | | |
| 4 | General Public Information | 2015 - 2035 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 5 | Public Information (Home Water Use Report) | 2018 - 2035 | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 6 | Residential Leak Assistance | 2018 - 2035 | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 7 | Single Family Residential Surveys | 2015 - 2035 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 8 | Plumbing Fixture Giveaway/Opt | 2015 - 2017 | ■ | ■ | ■ | | | | | | | | | | | | | | | | | | |
| 9 | Residential Ultra High Efficiency Toilet Rebates | 2015 - 2020 | ■ | ■ | ■ | ■ | ■ | ■ | | | | | | | | | | | | | | | |
| 10 | High Efficiency Clothes Washer Rebates | 2015 - 2026 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | | | | | | | | |
| 11 | High Efficiency Clothes Washer - New Development | 2021 - 2035 | | | | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 12 | Hot Water On Demand - New Development | 2021 - 2035 | | | | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 13 | Toilet Retrofit at Time of Sale | 2015 - 2019 | ■ | ■ | ■ | ■ | ■ | | | | | | | | | | | | | | | | |
| 14 | CII MF Common Laundry Room High Efficiency Clothes Washer | 2015 - 2024 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | | | | | | | | | | |
| 15 | CII Incentives | 2021 - 2026 | | | | | | | ■ | ■ | ■ | ■ | ■ | ■ | | | | | | | | | |
| 16 | Pre-Rinse Spray Nozzle Installation | 2015 - 2016 | ■ | ■ | | | | | | | | | | | | | | | | | | | |
| 17 | CII Surveys | 2021 - 2026 | | | | | | | ■ | ■ | ■ | ■ | ■ | ■ | | | | | | | | | |
| 18 | High Efficiency Urinal Program | 2015 - 2018 | ■ | ■ | ■ | ■ | | | | | | | | | | | | | | | | | |
| 19 | Public Restroom Faucet Retrofit - MUN | 2021 - 2023 | | | | | | | ■ | ■ | ■ | | | | | | | | | | | | |
| 20 | Public Restroom Faucet Retrofit - COM | 2021 - 2030 | | | | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | | | | |
| 21 | School Retrofit | 2021 - 2030 | | | | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | | | | |
| 22 | Water Efficient Landscape Ordinance | 2015 - 2035 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 23 | Single Family Residential Turf Removal | 2015 - 2035 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 24 | Multifamily Residential/CII Turf Removal | 2015 - 2035 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 25 | Expand Large Landscape Survey/Water Budgets | 2018 - 2035 | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 26 | Sprinkler Nozzle Rebates | 2018 - 2035 | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 27 | Gray Water Retrofit | 2015 - 2035 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 28 | Residential Rain Barrels | 2015 - 2035 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 29 | Climate Appropriate Landscaping and Rainwater Infiltration | 2015 - 2035 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 30SF | SF Conservation Pricing - Water and Sewer | 2018 - 2035 | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 30MF | MF Conservation Pricing - Water and Sewer | 2018 - 2035 | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 30COM | COM Conservation Pricing - Water and Sewer | 2018 - 2035 | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 31 | Single Family Multifamily Dishwasher Rebates | 2018 - 2022 | | | | ■ | ■ | ■ | ■ | ■ | | | | | | | | | | | | | |
| 32 | Hot Water Recirculation Systems | 2018 - 2022 | | | | ■ | ■ | ■ | ■ | ■ | | | | | | | | | | | | | |
| 33 | Rewarding Businesses For Adopting Best Practices | 2020 - 2035 | | | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 34 | Additional Building Code Requirements for New Development | 2018 - 2035 | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 35 | Innovation Incubator Program | 2021 - 2035 | | | | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |

Source: City of Santa Cruz. DSS Model.

## 9.2 Estimated Implementation Budget

Over the next five years (2015-2020), the average annual cost to the City to implement the Recommended Program is approximately $1,064,000 per year of additional budget and includes additional staff time, materials, rebates, giveaways, etc. The annual utility cost and administrative cost breakdown for each conservation measure can be found in the DSS Model measure screen shots in Appendix C.

This budget was developed as part of the DSS Model evaluations for level of activity by year. The opportunities for State grants or cost sharing partnership with other County utilities or other means for lowering the cost of a conservation measure would lower the budgetary needs for implementation. The City should develop a detailed annual work plan;

use the DSS Model to monitor progress on demand reductions; and update the implementation cost estimates and associated budgets on an annual basis.

**Table 9-1. Five-year Implementation Budget**

| Measure | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 |
|---|---|---|---|---|---|---|
| Total Utility Costs | $991,343 | $995,453 | $984,192 | $1,228,850 | $1,147,135 | $1,032,241 |
| Total Admin Costs | $199,333 | $200,346 | $196,967 | $257,707 | $236,558 | $222,420 |
| Admin % of Total Costs | 20% | 20% | 20% | 21% | 21% | 22% |

Source: City of Santa Cruz. DSS Model, Section: Conservation Analysis, Program Scenarios, Program Details, Feb 16, 2016.

**Table 9-2. Long Range Budget Forecast**

| | Costs | | |
|---|---|---|---|
| | Utility | Customer | Total |
| 2015 | $991,343 | $958,295 | $1,949,637 |
| 2016 | $995,453 | $963,305 | $1,958,757 |
| 2017 | $984,192 | $968,314 | $1,952,506 |
| 2018 | $1,228,850 | $1,329,686 | $2,558,536 |
| 2019 | $1,147,135 | $1,295,705 | $2,442,840 |
| 2020 | $1,032,241 | $1,307,901 | $2,340,142 |
| 2021 | $1,512,745 | $2,864,331 | $4,377,076 |
| 2022 | $1,518,574 | $2,871,599 | $4,390,173 |
| 2023 | $1,418,219 | $2,593,586 | $4,011,805 |
| 2024 | $1,384,731 | $2,580,369 | $3,965,100 |
| 2025 | $1,363,955 | $2,562,136 | $3,926,090 |
| 2026 | $1,383,788 | $3,247,801 | $4,631,588 |
| 2027 | $993,319 | $2,955,101 | $3,948,420 |
| 2028 | $998,287 | $2,961,365 | $3,959,652 |
| 2029 | $1,003,255 | $2,967,629 | $3,970,884 |
| 2030 | $1,008,223 | $2,973,893 | $3,982,116 |
| 2031 | $888,237 | $2,770,177 | $3,658,414 |
| 2032 | $892,379 | $2,776,042 | $3,668,422 |
| 2033 | $896,522 | $2,781,907 | $3,678,430 |
| 2034 | $900,665 | $2,787,772 | $3,688,438 |
| 2035 | $904,808 | $2,793,638 | $3,698,445 |

Source: City of Santa Cruz. DSS Model, Section: Conservation Analysis, Program Scenarios, Recommended Programs, Feb 16, 2016.

### 9.2.1 Overall Program Staffing Needs

The overall vision for conservation spans across the City's Water Department with multiple sections supporting planning and implementation tasks. A summary of each section's roles and responsibilities are as follows:

- Water Department: responsible for leading the efforts for both the internal and external conservation programs with a Conservation Section supported by four staff positions currently. It is estimated that the Water

Department may need to add up to two more full-time equivalent personnel to implement the additional workload represented by the recommended plan.

- Operations (Production and Distribution sections): responsible for implementation of the water loss control program as part of the water loss control program initiative.
- Customer Service section: responsible for responding to direct customer questions related to water conservation or for referring the questions to the appropriate staff, as well as meter shop operations.
- Communications staff: responsible for outreach and awareness campaigns to educate the public related to the need to use water wisely and the quality of the City's water in order to help sustain Santa Cruz's quality of life.
- In addition, implementation of the plan will require coordination and assistance of other City Departments, including IT, Finance, Planning and Community Development (building inspectors), Public Works, and Parks and Recreation.

The governing body for the Water Department is the Santa Cruz City Council. A seven-member Water Commission advises the City Council on policy matters involving the operations and management of the water system, including water conservation initiatives and activities.

Water conservation activities are also coordinated with neighboring water districts and other jurisdictions served by the City of Santa Cruz. These include the County of Santa Cruz, City of Capitola, Soquel Creek Water District, Scotts Valley Water District, San Lorenzo Valley Water District, and the City of Watsonville. The Regional Water Management Foundation and Resource Conservation District of Santa Cruz County also assist with coordination, outreach, integrated regional planning, and grant administration.

## 9.3 Conservation Data Collection and Management System

Tracking conservation data can and should be well organized. As conservation is a vital part of the water supply portfolio for City to meet projected future demands, estimating and analyzing water savings due to water demand reductions is necessarily based on reviewing customer usage data and conservation program activities. The City is embarking on a significant expansion of its existing efforts. As a result, taking an ad-hoc approach to data management where different employees maintain various program data inevitably leads to information having compatibility or quality issues over time as attempts at creating program activity summaries and water savings estimates are compiled. Different conservation measures have different options for tracking data. A summary of primary data tracking and management needs by program area are presented in Table 9-3.

Conservation database systems can be designed to integrate within a customer information system (e.g., billing system) and/or a work order system or be created as a stand-alone database (or utilize all three systems) to implement the conservation program (e.g., issue requests for surveys or water waste call follow-up sent to staff) and track data (e.g., post survey reports or water waste enforcement actions). Most systems track by address and not customer account number, given that these can open and close and legacy data can be lost. These information systems used to manage conservation program actions and data are custom to each utility, given the individual conservation measures and implementation strategies are unique to each agency and their existing data management system. Most important is a plan for data collection and due diligence on implementation of data tracking according to the Program. Without adequate data collection, analysis of past water savings and future planning adjustments for the conservation program become very challenging and end up being based mainly on assumptions or inferences of savings achieved or possible.

**Table 9-3. Overview of Data Tracking and Management Needs**

| Program Area | Primary Data Tracking and Management Needs |
|---|---|
| **Program Database Tracking** | • Budget tracking (especially rebate and incentive programs for funds remaining).<br>• Overall program water savings (e.g., calculator of quantifiable savings by activity or create a monitoring version of DSS Model using "actual" versus "planned activities").<br>• Workload planning (e.g., survey requests and technician assigned, through the customized work order system).<br>• Contracts and agreements.<br>• Overall programs and measures status.<br>• Demand Use Study data - flow meter logging or connection to an existing database.<br>• Saturation estimates of hardware or the measure (toilets, faucets, etc.) similar to the stats from the Baseline Water Use Survey and with updates every 3-5 years on a formal survey.<br>• Retail audit information from periodic checks with local hardware stores. |
| **Water Loss Control Program** | • Use both Geographic Information System (GIS) and Customer Information System (CIS).<br>• Manage data for annual AWWA system water audit software.<br>• Analyze data for capital planning purposes (e.g., repeat main breaks earmarked for replacement versus repair).<br>• Data from various leak detection products, data, etc.<br>• Main break and leak information - dates, time, location, size of main, etc. This can be linked to existing database. Annually create a summary of program statistics.<br>• Pipeline failure analysis - also can be linked to the existing database. Annually create a summary of program statistics.<br>• Cathodic protection (CP) information - CP testing data.<br>• Photo library of the main breaks - can be tied to mapping but it may be more organized through a data search and or location/demographic search. |
| **Public Awareness and Education** | • Customer Information System to manage customer contacts (e.g., attending classes, etc.).<br>• Inventory of current outreach materials.<br>• Educational classes for schools and to target groups such as school teachers, landscapers, etc. |
| **Water Waste Violations** | • CIS linked to GIS to manage customer water waste violations and repeat violation history and past fines. |
| **All Rebate and Incentive Programs** | • CIS linked to GIS to manage customer participating in any rebate or incentive program (e.g., allows for quick checking on exceeding number of eligible rebates, fraud protection, financial tracking on budget expended, etc.). |

| Program Area | Primary Data Tracking and Management Needs |
|---|---|
| **Residential Surveys** | • CIS linked to GIS to manage customer data (e.g., usage history queries, survey reports, notes customer needs [like medical for when drought comes to allow for variances], etc.). |
| **Commercial Surveys** | • CIS linked to GIS to manage customer data (e.g., usage history queries, survey reports, notes customer unique uses and needs [any issues for when drought comes to allow for variances], etc.). |
| **Landscape Surveys and Water Budgets** | • CIS linked to GIS to manage customer data (e.g., usage history queries, landscape survey reports, water budget tracking related to actual usage compared to budget, site photos, etc.). |

Data tracking will be customized to each measure. At a minimum, the City staff will need the data for the DSS Model updates if it is desired to use the model to estimate achieved water savings. Ideally, City staff would also include enough data to support an annual report and/or publish summary accomplishments on the City's website.

Related to supporting future DSS Model updates, as described in Section 9.3, the City will need to collect data regarding measure implementation in separate worksheets (i.e., one worksheet per measure). Important parameters to track on the individual measure worksheets include the following for measures that involve rebates:

- All parameters requested in the rebate application
- City cost
- Pre-retrofit consumption
- Post-retrofit consumption
- Estimated savings

Related to incentive program information, it is recommended that the City develop rebate application forms that require the customer to complete the following fields in order to receive their rebate:

- Measure name
- Customer name
- Customer address
- Customer phone number
- Customer City water account number
- Customer PG&E account number (only applicable if cost-sharing measure with PG&E)
- Assessor parcel number (if needed to cross reference with other utility program for cost sharing)
- Water use of fixture being replaced, including the year that the fixture was manufactured (particularly for the HET retrofit)
- Original type of plumbing or appliance data – means to determine water usage (e.g., date purchased [plumbing fixtures] or manufacturer and model number)
- Behavior use information, as appropriate (e.g., number of loads of clothes per washer per week)

- New equipment date purchased
- New equipment date installed
- Purchase price
- Brand
- Model number
- Store name
- Any customer satisfaction related questions (e.g., toilet double flushing experienced before with old fixture and then with new fixture)
- Year property built
- Square footage
- Property type (include check-boxes with all customer types eligible to receive a rebate for particular measure)

Additionally, it should be required that the City require that the following are submitted with rebate applications:

- Proof of purchase
- Signed application for rebate (to be developed and provided by City)

The City should take the same approach to collecting data on other measures (e.g., surveys) to track progress. The following parameters should be tracked on individual measure worksheets for surveys:

- Measure name
- Customer name
- Customer address
- Customer phone number
- Customer City account number
- Customer PG&E account number (only applicable if cost-sharing measure with PG&E)
- Water use of fixture being replaced, including the year that the fixture was manufactured (particularly for the HET retrofit)
- Survey date
- Total acres of turf surveyed (if landscape survey)
- Inventory of water using appliances (and appropriate usage information if seeking to estimate before water savings)
- Documentation of any upgraded equipment on site (already occurred, planned or potential future) – especially important if a rebate or other incentive for upgrade is to be offered
- Information related to cooling tower or other larger water using equipment on site (dependent on building type and occupant usage)

## 9.4 Track and Update for New Codes and Emerging Technologies

More challenging is tracking the changes in the consumer marketplace for the vast array of water-using appliances and plumbing fixtures in both the residential and commercial sectors. Some means for tracking the latest in national standards and building codes as well as technologies and emerging trends in customer preferences include the following resources:

- Having staff member(s) assigned to voluntarily participate on the AWWA Water Conservation Division's committees with attendance at the Annual Conference Committee Meetings and conference calls, in particular the Water Efficiency Programs and Technology Committee.
- Monitor the Alliance for Water Efficiency (AWE) for updates on changes in National Standards and Codes and opportunities to comment on future changes to codes and regulations at the national level.
- As a WaterSense Partner, the City should continue to track the U.S. EPA WaterSense new technologies and post updated equipment lists of newly labeled products and services. Frequently, AWE or CUWCC have performance testing results posted on their websites that provide very useful information to consumers. Performance information may also be available through Consumer Reports or Consortium for Energy Efficiency (http://www.cee1.org).
- Attend the WaterSmart Innovations Conference for exposure to the vendors participating in the exhibition and also to attend technical sessions on emerging trends in water conservation programs.
- Leverage the State and County process for adopting new building codes and regulations, especially building codes to help implement proactive changes in future development in Santa Cruz. Many new codes first appear in appendices that can be easily excluded.
- Maintain and use a network of ten to twenty key contacts at progressive utilities to inquire about new technologies (e.g., through known contacts or new contacts made at WaterSmart Innovations or AWWA conferences).
- Host events with other partner utilities and applicable stakeholders on related water loss control programs or conservation measures.
- Conduct surveys every three years with other utilities nationally to gain insight on programs and testing of products.

Staying on or ahead of the curve with tracking new technologies would lead to water savings without City investment for later upgrades through incentive programs. One caution is adopting new technologies that have yet to have adequate research or product testing. These emerging products may be worthy of pilot programs and potentially attractive for grant funding projects through agencies like the U.S. EPA or U.S. Bureau of Reclamation (USBR).

## 9.5 Implications for Responding to Water Shortages

Given the investment and response by the Community both with the most recent 2013-2015 drought and through implementation of this conservation program in the coming years, the City will need to revise its Water Shortage Contingency Plan. This is needed in order to modify its expectations in meeting future reductions during low water supply conditions as it's assumed that the City has been and will continue to be subject to "demand hardening." This term refers to the concept that certain upgrades or changes can only have realized savings once (e.g., replacing an older toilet with a new high efficiency 1.28 gpf toilet).

In an attempt to achieve equity, it is recommended that the City's policies and Water Shortage Contingency Plan be expanded to include additional definition for other customer user classes. It is also recommended that priority for fire, health, and sanitation protection be placed above other discretionary uses. In other states, such as California, the Water Code Section 350 sets priority for order of demand to be served in times of drought, including fire protection, health and sanitation, with more discretionary uses following later. The California Water Code in Section 10632(a) specifies requirements for any water supplier serving more than 3,000 acre feet or 3,000 connections to plan for up to a 50% reduction in demand in times of drought. Section 10632(b) sets the criteria for planning for minimum water supply conditions based on the driest three-year sequence on record. These sections of the Water Code are required to be addressed every five years in a Water Shortage Contingency Plan, which is to be filed with the California Department of Water Resources.

Given the goal to reduce peak water savings and preserve surface water storage supplies, more concentrated efforts aimed at lowering irrigation and non-potable demands in times of drought should be explored for potential inclusion in the City's Water Shortage Contingency Plan.

## 9.6 Suggestions for Future DSS Model Updates

With the level of investment in both capital projects that may be deferred due to this program and also investments in the program itself, City staff should be ready with an answer to the question: "How much water has been saved and at what cost?" In addition, due to the need for ongoing water conservation efforts to attain and maintain more water savings, the City will need to track program water savings, programs costs, and benefits (i.e., cost savings).

The DSS Model is only for the quantifiable measures that have estimates for water savings. There are two types of updates envisioned for the DSS Model: 1) regular monitoring of costs and water savings; and 2) model recalibration with updated base year data and model inputs and assumptions. The following describes each type of update in more detail:

- Annual or more frequent model monitoring updates: The conservation measure worksheets can each be used to track actual activities and compared to the planned activities defined as part of the model development for this program plan. This update is recommended to happen as part of developing an annual work plan and budget. At minimum, it should happen on the order of every 3-5 years.
- Recalibration of the model: The DSS Model has a base year set in 2015. Depending on water demand and account growth rates, it is advisable to update the base year on a 5-year basis, which can be a few percent change in the number of total accounts served by the City. This update requires reviewing historical demand trends, future population and demand forecasts, fixture models calibration, new or updated conservation measures, and cost and water savings assumptions. The next model recalibration update is likely due around 2020 after the next U.S. Census is completed and when development of the next Urban Water Management Plan is underway.

Specific triggers for updates may include:

- Significant cost in the water pumped (more than 10-20% energy or chemical cost increase or decrease would modify the "savings worksheet" and change the benefit cost ratios)
- Significant change in population or accounts by one of the billing categories (more than 5% shift)
- Revision to the end use (e.g., study of end uses that modify the breakdown of the water system balance on the Demand Scenarios Worksheet)
- Significant changes to water system balance (e.g., more than 10% change in water losses or other parameter on the Demands Section of the Model)

- New codes or regulations that affect natural replacement rates of fixtures (need to modify to fixture models)
- Alternatives for staffing versus outsource contracting or other change to cost of implementation of a conservation measure (change to conservation measure worksheet only)
- New technologies for conservation measure being considered (change or addition of new conservation measure worksheet)
- Any other change in conservation measures (e.g., updates to the measure worksheets can be changed or modified at any time without altering the water system balance worksheets or affecting fixture model calibration)

A separate deliverable of the DSS Model and accompanying model source data documentation are also being provided to the City under a license from Maddaus Water Management, Inc.

# 10. CONCLUSIONS

The City staff and community teamed with MWM and developed this comprehensive water conservation program over the course of 2 phases and 3 years. The Program is in full alignment with and supports the City's recommended plan outlined in the WSAC Report. Overall, this Conservation Plan strives to balance the three interdependent goals of cost effective demand reduction, affordability, and organizational stability or capability. This section provides a summary of the planning effort, overall benefits and key findings from this Plan's development.

## 10.1 Summary of Planning Efforts

Throughout this planning effort, MWM teamed with City staff to achieve the goals of providing conservation program planning services that included the following components:

- Development and implementation support of pilot projects, Baseline Water Use Study, economic analysis tools, and metrics to define the planning assumptions appropriate to the Santa Cruz community
- A measure screening and evaluation process to select the specific water conservation measures for City's water conservation program
- An outline for the schedule and budget to implement the selected conservation measures
- A blueprint for an organizational staffing structure to support the wide variety water demand-side management projects and programs to implement the measures

Santa Cruz and MWM with this Plan have now documented the Water Conservation Program that clearly defines the following:

- City needs and objectives with a recommended, phased implementation strategy for meeting the objectives including scope, budget, and schedule for each of conservation measures selected
- An organizational structure for the City's water conservation program
- A process for ongoing use of the DSS Model as a decision-making tool using benefit-cost analysis, or business case evaluations, for the current planned and potential future new conservation measures

## 10.2 Key Benefits from the Water Conservation Program

This Program, when successfully implemented, will deliver a host of benefits. These benefits are listed in this section.

### 10.2.1 Resource Sustainability

**Maximize available freshwater sources**: The Santa Cruz community has finite limits on fresh surface and groundwater supplies to meet supply reliability needs and a growing population. The more efficient the existing demands become with the Program being implemented, the more resilient the existing water supplies will become.

**Enhance stream ecosystems:** Local streams and waterways are unique ecosystems and are home to sensitive listed species such as steelhead and Coho salmon. Decreasing the amount of water diverted for municipal purpose through water conservation allows for increased habitat value and healthier ecosystems.

### 10.2.2 Economic Sustainability

Allow for accelerated investment in rehabilitation and replacement programs under the Capital Improvement Plan: The costs for all utility services are projected to increase; however, the costs will be lower than otherwise with conservation due to lower demands and less wear and tear on infrastructure. The City would also be better able to afford increasing fiscal demands to rehabilitate and replace aging infrastructure by avoiding adding costlier supplies to meet future demands or savings from debt service to the extent projects can be delayed. Any reductions in lower demand are offset by lower fiscal requirements from the cost-effective conservation program that has been selected for implementation.

**Utilize the least costly sources of supply**: Conservation is often the cheapest source of water when offsetting the cost of future supplies that may be more than $10,000/MG. The unit cost of the recommend conservation program is about half the estimated cost of new supply in terms of $/MG produced.

**Supply Augmentation Strategy**: The water conservation program is estimated to assist in meeting future demands of more than 700 MG per year through 2035.

### 10.2.3 Social Sustainability

**Support the City Council's sustainability initiatives**: The national trend to minimize reliance on imported oil and use all resources more efficiently has been evolving and accelerating in recent years. City has unique resources and natural biodiversity that leads the community to flourish economically through tourism and other industry and is wholly dependent on local residents and visitors respecting the need to live sustainably.

**Strengthen the socioeconomic conditions of Santa Cruz's residents**: By maintaining more reasonable costs for water, energy, and sewer utility bills, local residents and businesses can better afford to reinvest in their community and have more dispensable income to support the local economy.

## 10.3 Key Findings from the Water Conservation Program

As a result of this comprehensive analysis here are some summary observations and conclusions:

1. The additional, incremental water savings from the Recommended Program, compared to the City's recent demand forecast, amount to about 220 million gallons in 2035.
2. The estimated annual demand will decline over time to about 3.2 billion gallons per year (BGY) in 2035, versus about 3.4 BGY estimated in the demand study. That estimate is comparable to the actual level of water production experienced in the late 1960s, when the service area population was around 50,000. This decrease represents an almost 16% reduction is water use over 20 years.
3. The impact on water savings from 2015 changes in the fixture plumbing codes prompted by the emergency conservation regulations (which would not have been factored in but for the delay associated with the Water Supply Advisory Committee's process) is over 100 million gallons more than previously estimated.
4. The overall cost of water saved by the Recommended Program is about half of what the WSAC set as a recommended threshold.
5. Gross per capita water use is expected to gradually decline to a level of less than 80 GPCD in 2035.

## 10.4 Recommended Next Steps

Successful implementation of the Program will require a significant increase in efforts on the part of the City. Many new conservation measures will be employed and high participation rates are needed to achieve Program goals. At current staffing and budget levels, the City would have difficultly implementing such an aggressive conservation program. Additional resources are needed. Recommendations to assist with implementation include the following next steps:

- Budget an additional $1.1 million per year to cover the added cost of implementing this plan
- Prioritize measures for implementation with those that contribute the most to meeting water saving targets being given highest priority for implementation
- Consider working with the largest water using customers to try to reduce water use as described in Section 3.5
- Develop a Measure Implementation Plan that describes exactly how the plan measures will be designed and implemented

- Develop an annual work plan for each plan year as soon as budget is adopted (or in concert with budget planning process)
- Update codes and ordinances, as necessary
- Form partnerships and apply for grants, where appropriate
- Contract to gain enough staff support to help administer or accelerate the new program measures, if needed
- Develop analytical tools to track water use by customer class and overall water use reductions adjusted for the weather and external factors
- Set up a database to store and manage measure participation, cost, and other data to gauge successes and failures
- Use the tools annually to help decide on priorities for the next plan year
- Use the DSS Model to annually update the Program, including actual measure participation, projected water savings, and expected per capita water use reductions, to ensure Program is on track to meet 2020 targets

To stay focused and on schedule, use input from the City's Water Commission and annual work planning process as the forum to amend the plan, budgets, staffing, contracting, schedule, and so forth to stay on track.

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# APPENDIX A – DEMAND & PASSIVE SAVINGS METHODOLOGY

Plumbing codes and appliance standards for toilets, urinals, faucets, clothes washers, and showerheads will continue to reduce indoor residential and non-residential water demands in the future. This reduction in demand is accounted for in Maddaus Water Management (MWM) Decision Support System (DSS) Model. Background on the DSS Model, as well as details on the method of determining plumbing code savings is presented in the following sections.




## A.1 DSS Model Overview

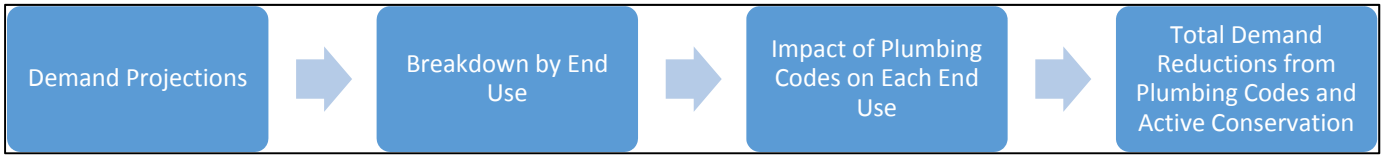
The DSS Model prepares long-range, detailed demand projections. The purpose of the extra detail is to enable a more accurate assessment of the impact of water efficiency programs on demand. A rigorous modeling approach is especially important if the project will be subject to regulatory or environmental review.

The DSS Model is an end-use model that breaks down total water production (water demand in the service area) to specific water end-uses. The model uses a bottom-up approach that allows for multiple criteria to be considered when estimating future demands, such as the effects of natural fixture replacement, plumbing codes, and conservation efforts. The DSS Model may also use a top-down approach with a utility prepared water demand forecast.

To forecast urban water demands using the DSS Model, customer demand data are obtained from the water agency being modeled. The demand data are reconciled with available demographic data to characterize the water usage for each customer category in terms of number of users per account and per capita water use. The data are further analyzed to approximate the split of indoor and outdoor water usage in each customer category. The indoor/outdoor water usage is further divided into typical end uses for each customer category. Published data on average per-capita indoor water use and average per-capita end use are combined with the number of water users to calibrate the volume of water allocated to specific end uses in each customer category. In other words, the DSS Model checks that social norms from end studies on water use behavior (e.g., for flushes per person per day) are not exceeded.

The DSS Model evaluates conservation measures using benefit cost analysis with the present value of the cost of water saved ($/Acre-Foot). Benefits are based on savings in water and wastewater facility operations and maintenance (O&M). The figure below illustrates the process for forecasting conservation water savings, including the impacts of fixture replacement due to plumbing codes and standards already in place.

The DSS Model has been used for practical applications of conservation planning in over 250 service areas representing 20 million people including extensive efforts nationally in California, Colorado, Hawaii, Idaho, Utah, Georgia, Florida, North Carolina, Tennessee, Oregon, Texas, Ohio, and internationally in Australia, New Zealand and Canada. The California Urban Water Conservation Council (CUWCC) did a peer review and has endorsed the model since 2006. The model is offered to all of their members for use to estimate water demand, plumbing code and conservaiton program savings. For more information please see the CUWCC Website: [https://www.cuwcc.org/Resources/Planning-Tools-and-Models?folderId=776&view=gridview&pageSize=10](https://www.cuwcc.org/Resources/Planning-Tools-and-Models?folderId=776&view=gridview&pageSize=10)



The DSS Model forecasts service area water fixture use. In the codes and standards part of the DSS Model, specific fixture end use type (point of use fixture or appliance), average water use, and lifetime are compiled. Additionally, state and national plumbing codes and appliance standards for toilets, urinals, showers, and clothes washers are modeled by customer category. These fixtures and plumbing codes can be added to, edited, or deleted by the user. This yields two demand forecasts: 1) with plumbing codes, and 2) without plumbing codes.

Plumbing code measures are independent of any conservation program; they are based on customers following applicable current local, state and federal laws, building codes, and ordinances.

## A.2 Plumbing Codes and Legislation

The DSS Model incorporates the following items as a "code" meaning that the savings are assumed to occur and are therefore "passive" savings.

- National Plumbing Code
- CALGreen
- AB 715
- AB 407
- CA Code of Regulations Title 20 Sections 1601-1608 2015 Appliance Efficiency Rulemaking New Standards

### National Plumbing Code

The Federal Energy Policy Act of 1992, as amended in 2005, mandates that only fixtures meeting the following standards can be installed in new buildings:

- Toilet – 1.6 gal/flush maximum
- Urinals – 1.0 gal/flush maximum
- Showerhead – 2.5 gal/min at 80 psi
- Residential faucets – 2.2 gal/min at 60 psi
- Public restroom faucets – 0.5 gal/min at 60 psi
- Dishwashing pre-rinse spray valves – 1.6 gal/min at 60 psi

Replacement of fixtures in existing buildings is also governed by the Federal Energy Policy Act, which mandates that only devices with the specified level of efficiency (as shown above) can be sold as of 2006. The net result of the plumbing code is that new buildings will have more efficient fixtures and old inefficient fixtures will slowly be replaced with new, more efficient models. The national plumbing code is an important piece of legislation and must be carefully taken into consideration when analyzing the overall water efficiency of a service area.

In addition to the plumbing code, the U.S. Department of Energy regulates appliances, such as residential clothes washers, further reducing indoor water demands. Regulations to make these appliances more energy efficient have driven manufactures to dramatically reduce the amount of water these machines use. Generally, front loading washing machines use 30-50% less water than conventional models (which are still available). In a typical analysis, the DSS Model forecasts a gradual transition to high efficiency clothes washers (using 12 gallons or less) so that by the year 2025 that will be the only type of machines available for purchase. In addition to the industry becoming more efficient, rebate programs for washers have been successful in encouraging customers to buy more water efficient models. Given that machines last about 10 years, eventually all machines on the market will be the more water efficient models. Energy Star® washing machines have a water factor (WF) of 6.0 or less - the equivalent of using 3.1 cubic feet (or 23.2 gallons) of water per load. The maximum water factor for residential clothes washers under current federal standards is 9.5. The water factor equals the number of gallons used per cycle per cubic foot of capacity. Prior to year 2000, the water factor for a typical new residential clothes washer was about 12. In March 2015, the federal standard reduced the maximum water factor for top- and front-loading machines to 8.4 and 4.7, respectively. In 2018, the maximum water factor for top-loading machines will be further reduced to 6.5. For commercial washers, the maximum water factors were reduced

in 2010 to 8.5 and 5.5 for top- and front-loading machines, respectively. Beginning in 2015, the maximum water factor for Energy Star® certified washers was 3.7 for front-loading and 4.3 for top-loading machines. In 2011, the Environmental Protection Agency (EPA) estimated that Energy Star® washers comprised more that 60% of the residential market and 30% of the commercial market (Energy Star®, 2011). A new Energy Star® compliant washer uses about two-thirds less water per cycle than washers manufactured in the 1990s.

### State Building Code – 2015 CALGreen

The 2015 CALGreen requirements effect all new development in the State of California after July 1, 2015.[3] The DSS Model includes the CALGreen requirements that effect all new development in the State of California after July 1, 2015. The DSS Model modeled water savings from the CALGreen building code by adding Multi-family and Commercial customer categories as appropriate to applicable conservation measures.

### State Plumbing Code – AB 715

Plumbing codes for toilets, urinals, showerheads, and faucets were initially adopted by California in 1991, mandating the sale and use of ultra-low flush 1.6 gallon per flush (gpf) toilets (ULFTs), 1 gpf urinals, and low-flow showerheads and faucets. California Code of Regulations Title 20 California State Law (AB 715) required High Efficiency Toilets and High Efficiency Urinals be exclusively sold in the state by 2014. Effective January 1, 2014, Assembly Bill (AB) 715 (enacted in 2007) required that toilets and urinals sold and installed in California cannot have flush ratings exceeding 1.28 and 0.5 gallons per flush, respectively.

### California State Law – SB 407

SB 407 addresses plumbing fixture retrofits on resale or remodel. The DSS Model carefully takes into account the overlap with SB 407, the plumbing code (natural replacement), CALGreen, AB 715 and rebate programs (such as toilet rebates). SB 407 (enacted in 2009) requires that properties built prior to 1994 be fully retrofitted with water conserving fixtures by the year 2017 for single-family residential houses and 2019 for multifamily and commercial properties. SB 407 program length is variable and continues until all the older high flush toilets have been replaced the service area. The number of accounts with high flow fixtures is tracked to make sure that the situation of replacing more high flow fixtures than actually exist does not occur. SB 837 (enacted in 2011) requires that sellers of real property disclose on their Real Estate Transfer Disclosure Statement whether their property complies with these requirements. Additionally, SB 407 conditions issuance of building permits for major improvements and renovations upon retrofit of non-compliant plumbing fixtures. Each of these laws is intended to accelerate the replacement of older, low efficiency plumbing fixtures, and ensure that only high-efficiency fixtures are installed in new residential and commercial buildings.

### 2015 CALGreen and 2015 CA Code of Regulations Title 20 Appliance Efficiency Regulations

Fixture characteristics in the DSS Model are tracked in new accounts, which are subject to the requirements of the 2015 California Green Building Code and 2015 California Code of Regulations Title 20 Appliance Efficiency Regulations adopted by the California Energy Commission (CEC) on September 1, 2015. The CEC 2015 appliance efficiency standards applies to the following new appliances, if they are sold in California: showerheads, lavatory faucets, kitchen faucets, metering faucets, replacement aerators, wash fountains, tub spout diverters, public lavatory faucets, commercial pre-rinse spray valves, urinals, and toilets. The DSS Model accounts for plumbing code savings due to these standards effects on showerheads, faucets and aerators, urinals, and toilets.

[3] More information on the California Building Standards Commission reference documents are available online: http://www.bsc.ca.gov/pubs/bullet.aspx

- Showerheads: July 2016: 2.0 gpm; July 2018: 1.8 gpm
- Wall Mounted Urinals: 2016: 0.125 (pint) gpf
- Lavatory Faucets and Aerator: July 2016: 1.2 gpm at 60 psi
- Kitchen Faucets and Aerator: July 2016: 1.8 gpm with optional temporary flow of 2.2 gpm at 60 psi
- Public Lavatory Faucets: July 2016: 0.5 gpm at 60 psi

In summary, the controlling law for **toilets** is Assembly Bill (AB) 715. This bill requires high efficiency toilets (1.28 gpf) to be exclusively sold in California beginning January 1, 2014. The controlling law for wall-mounted urinals is the 2015 CEC efficiency regulations requiring that ultra-high efficiency pint **urinals** (0.125 gpf) be exclusively sold in California beginning January 1, 2016. This is an efficiency progression for urinals from AB 715's requirement of high-efficiency (0.5 gpf) urinals starting in 2014.

Standards for **residential clothes washers** fall under the regulations of the U.S. Department of Energy. In March 2015, the federal standard reduced the maximum water factor for non-Energy Star® certified top- and front-loading washing machines to 8.4 and 4.7, respectively. In 2018, the maximum water factor for standard top-loading machines will be further reduced to 6.5.

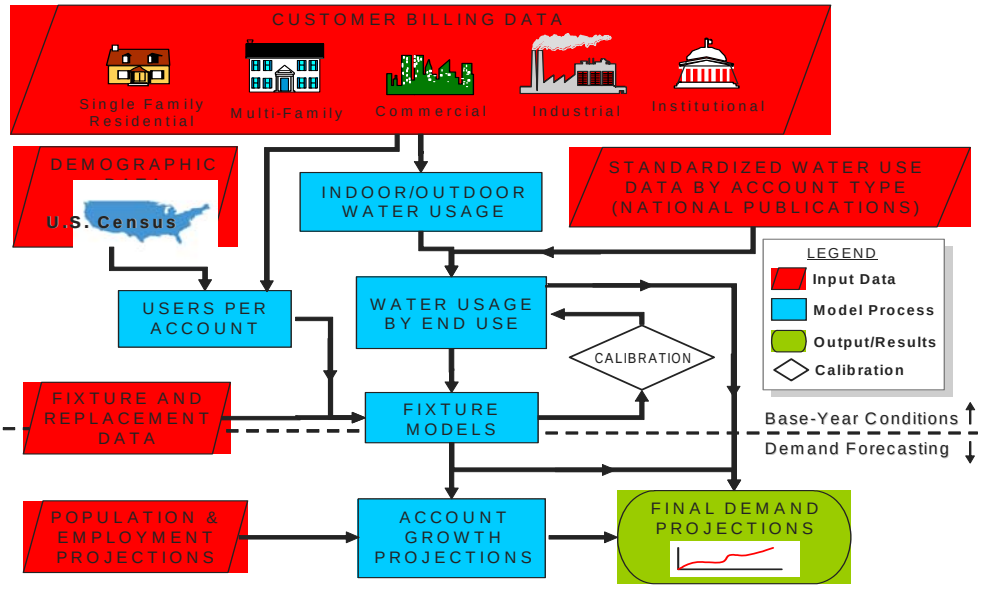
**Showerhead** flow rates are newly regulated under the 2015 California Code of Regulations Title 20 Appliance Efficiency Regulations adopted by the CEC, which requires the exclusive sale in California of 2.0 gpm showerheads at 80 psi as of July 1, 2016 and 1.8 gpm showerheads at 80 psi as of July 1, 2018. The WaterSense specification applies to showerheads that have a maximum flow rate of 2.0 gallons per minute (gpm) or less. This represents a 20% reduction in showerhead flow rate over the current federal standard of 2.5 gpm, as specified by the Energy Policy Act of 1992.

**Faucet** flow rates have likewise been recently regulated by the 2015 CEC Title 20 regulations. This standard requires that the residential faucets and aerators manufactured on or after July 1, 2016 be exclusively sold in California at 1.2 gpm at 60 psi; and public lavatory and kitchen faucet/aerators sold or offered for sale on or after July 1, 2016 be 0.5 gpm at 60 psi, and 1.8 gpm at 60 psi (with optional temporary flow of 2.2 gpm), respectively. Previously, all faucets had been regulated by the 2010 California Green Building Code at 2.2 gpm at 60 psi.

Plumbing code related water savings are considered reliable, long-term savings, and can be counted on over time to help reduce the City's overall system water demand. The demand projections including plumbing code savings further assumes no active involvement by the water utility, and that the costs of purchasing and installing replacement equipment (and new equipment in new construction) are borne solely by the customers, occurring at no direct utility expense. The inverse of the Fixture Life is the natural replacement rate, expressed as a percent (i.e., 10 years is a rate of 10% per year).

The following figure conceptually describes how plumbing codes are incorporated into the flow of information in the DSS Model.

**Figure A-1. DSS Model Overview Used to Make Potable Water Demand Projections**




## DSS Model Fixture Replacement

The DSS Model is capable of modeling multiple types of fixtures, including fixtures with slightly different design standards. For example, currently toilets can be purchased that flush at a rate of 0.8 gallons per flush (gpf), 1.0 gallon per flush or 1.28 gallons per flush. The 1.6 gpf and higher gallons per flush toilets still exist but can no longer be purchased in California. Therefore, they cannot be used for replacement or new installation of a toilet. So, the DSS Model utilizes a fixture replacement table to decide what type of fixture should be installed when a fixture is replaced or a new fixture is installed. The replacement of the fixtures is listed as a percentage, as shown in the following figure. A value of 100% would indicate that all the toilets sold would be of one particular flush volume. A value of 75% means that three out of every four toilets installed would be of that particular flush volume type. The DSS Model contains a pair of replacement tables for each fixture type and customer category combination (i.e., Residential Single Family toilets, Residential Multifamily toilets, Commercial toilets, Residential clothes washing machines, Commercial washing machines, etc.).

In the following example, the DSS Model includes the effects of the Federal Policy Act and AB 715 on each toilet fixture type. This DSS Model feature determines the “saturation” of 1.6 gpf toilets as the Federal Policy Act was in effect from 1992-2014 for 1.6 gpf toilet replacements.

**Figure A-2. Toilet Replacement Percentages by Type of Toilet**

| Replacement Fixture Market Shares | | | | | |
|---|---|---|---|---|---|
| Year | 1.28 gpf HET Residential | 1.6 gpf ULFT Residential | High Use Toilet Residential | <1.0 gpf Toilet Residential | Total |
| 2012 | 75% | 25% | 0% | 0% | 100% |
| 2015 | 100% | 0% | 0% | 0% | 100% |
| 2020 | 90% | 0% | 0% | 10% | 100% |
| 2030 | 65% | 0% | 0% | 35% | 100% |
| 2040 | 50% | 0% | 0% | 50% | 100% |
| | | | | | |
| **New Fixture Market Shares** | | | | | |
| Year | 1.28 gpf HET Residential | 1.6 gpf ULFT Residential | High Use Toilet Residential | <1.0 gpf Toilet Residential | Total |
| 2012 | 100% | 0% | 0% | 0% | 100% |
| 2015 | 100% | 0% | 0% | 0% | 100% |
| 2020 | 90% | 0% | 0% | 10% | 100% |
| 2030 | 65% | 0% | 0% | 35% | 100% |
| 2040 | 50% | 0% | 0% | 50% | 100% |

## A.3 Basis for the Demand Forecast

In the City of Santa Cruz Water Demand Forecast, M.Cubed conducted an econometric analysis of water demand and forecasts of class-level customer demands and total system production through 2035. (M.Cubed, 2015) The report was commissioned by the City of Santa Cruz Water Department and the City's Water Supply Advisory Committee. Its purpose was to update the Department's existing demand forecast adopted as part of the 2010 UWMP to reflect current information on water usage and to account for effects of current conservation, water rates, and other factors expected to impact the future demand for water. MWM's DSS Model incorporates this econometric analysis by inputting the regression equations and data sets used by M.Cubed and calibrated to ensure consistency between the two demand forecast models.

The City's DSS Model starts with a "baseline" demand forecast, which is not the same forecast as presented by M.Cubed. It differs in that it backs out the earlier estimates for plumbing code savings and the estimated future water saving associated with the City's current water conservation program that were provided by MWM to M.Cubed in 2015 and embedded in that final demand forecast. All other variables, including average water use per account, forecasts of account growth, and economic factors used to forecast water use in the M.Cubed report, were taken directly from that model and used to populate the DSS Model.

The following table compares the primary water demand forecast presented by M.Cubed without the code savings and program savings that were previously generated from the DSS Model analysis completed in October 2014 compared to the updated DSS "baseline" demand completed in February 2016.

**Table A-1. Comparison of M.Cubed Demand Forecast and DSS "Baseline" Forecast**

| Demand (MG) | 2020 | 2025 | 2030 | 2035 |
|---|---|---|---|---|
| **M.Cubed Final Demand Forecast, September 2015** | 3,385 | 3,351 | 3,388 | 3,442 |
| **2014 Estimate of Plumbing Code Savings (prior DSS Model version)** | 65 | 132 | 197 | 235 |
| **2014 Estimate of Conservation Program Savings – Program "A" (prior DSS Model version)** | 110 | 143 | 139 | 134 |
| **M.Cubed Final Demand Forecast without Plumbing Code or Conservation Program Savings** | 3,560 | 3,626 | 3,724 | 3,811 |
| **DSS Model "Baseline" Demand** | 3,560 | 3,636 | 3,743 | 3,838 |
| **Difference, MG** | 0 | 10 | 19 | 27 |
| **Difference, %** | 0.0% | 0.3% | 0.5% | 0.7% |

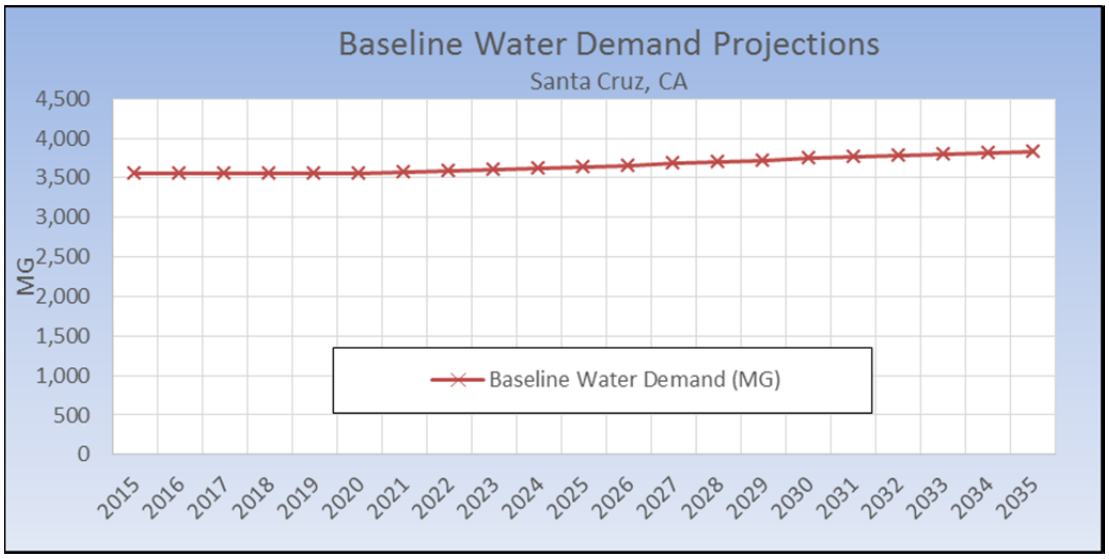
Note: Plumbing code and program savings (M.Cubed, 2015, Attachment 8) were originally based on results from the 2014 DSS Model work by Maddaus Water Management; they were updated with the most recent DSS Model results from February 2016.

As can be seen in the previous table, the two models are in close agreement and in all years differ by less than 1%.

The baseline demand forecast is shown in the following figure. As referenced in the 2015 M.Cubed report, the baseline forecast is predicated on average weather and normal economic conditions and is not expected to match realized demand, especially in the short term. City staff will continue to monitor production and consumption through and following the drought.

The next step involves calculating the effect of passive savings against the "baseline" demand. The results differ from previous estimates of plumbing code savings presented in 2014-15 for two reasons: 1) lower baseline demand and 2) additional passive savings due to recent changes in California codes resulting from 2015 emergency conservation regulations adopted in California, effective December 1, 2015 (after the publication of the M.Cubed report).

**Figure A-3. Baseline Demand Forecast Without Plumbing Code Savings**




Source: City of Santa Cruz. DSS Model, Section: Demand Analysis, Feb 16, 2016.

## A.4 Water Reduction Methodology

Each conservation measure targets a particular water use such as indoor single family water use. Targeted water uses are categorized by water user group and by end use. Targeted water user groups include single family residential, multifamily residential, commercial, industrial, and institutional (CII), etc. Measures may apply to more than one water user group. Targeted end uses include indoor and outdoor use. The targeted water use is important to identify because the water savings are generated from reductions in water use for the targeted end use. For example, a residential retrofit conservation measure targets single family and multifamily residential indoor use, and in some cases specifically shower use. When considering the water savings potential generated by a residential retrofit one considers the water saved by installing low-flow showerheads in single family and multifamily homes.

The market penetration goal for a measure is the extent to which the product or service related to the conservation measure occupies the potential market. In essence, the market penetration goal identifies how many fixtures, rebates, surveys, etc. the wholesale customer would have to offer or conduct over a period of time to reach its water savings goal for that conservation measure. This is often expressed in terms of the number of fixtures, rebates, surveys, etc. offered or conducted per year.

The potential for errors in market penetration goal estimates for each measure can be significant because they are based on previous experience, chosen implementation methods, projected utility effort, and funds allocated to implement the measure. The potential error can be corrected through re-evaluation of the measure as the implementation of the measure progresses. For example, if the market penetration required to achieve specific water savings turns out to be more or less than predicted, adjustments to the implementation efforts can be made. Larger rebates or additional promotions are often used to increase the market penetration. The process is iterative to reflect actual conditions and helps to ensure that market penetration and needed savings are achieved regardless of future variances between estimates and actual conditions.

In contrast, market penetration for mandatory ordinances can be more predictable with the greatest potential for error occurring in implementing the ordinance change. For example, requiring dedicated irrigation meters for new accounts through an ordinance can assure an almost 100% market penetration for affected properties.

Water utilities are constantly looking at when a measure reaches saturation. Baseline surveys are the best approach to having the most accurate information on market saturation. This was taken into account when analyzing individual conservation measures where best estimates were made. MWM was not provided with any baseline surveys for this analysis, but discussions were held with the City staff regarding what their best estimates were for saturation for their service area.

## A.5 Perspectives on Benefits and Costs

The determination of the economic feasibility of water conservation programs involves comparing the costs of the programs to the benefits provided. This analysis was performed using the DSS Model developed by MWM. The DSS Model has received the endorsement of the California Urban Water Conservation Council, and calculates cost effectiveness of conservation measure savings at the end-use level; for example, the model determines the amount of water a toilet rebate program saves in daily toilet use for each single family account.

## A.6 Present Value Parameters

Present value analysis using constant FY 2015 dollars and a real discount rate of 2.25% is used to discount costs and benefits to the base year; this is based on a nominal interest rate of 4.5% and an assumed inflation rate of 2.2%. From this analysis, benefit-cost ratios of each measure are computed. When measures are put together in programs, the model is set up to avoid double counting savings from multiple measures that act on the same end use of water. For example, multiple measures in a program may target toilet replacements. The model includes assumptions to apportion water savings between the multiple measures.

Economic analysis can be performed from several different perspectives, based on which party is affected. For planning water use efficiency programs for utilities, the perspectives most commonly used for benefit-cost analyses are the "utility" perspective and the "community" perspective. The Utility Benefit-Cost Analysis is based on the benefits and costs to the water provider. The Community Benefit-Cost Analysis includes the utility benefit and costs together with account owner/customer benefits and costs. These include customer energy and other capital or operating cost benefits plus costs of implementing the measure, beyond what the utility pays.

The utility perspective offers two advantages. First, it considers only the program costs that will be directly borne by the utility. This enables the utility to fairly compare potential investments for saving versus supplying increased quantities of water. Second, revenue shifts are treated as transfer payments, which means program participants will have lower water bills and non-participants will have slightly higher water bills so that the utility's revenue needs continue to be met. Therefore, the analysis is not complicated with uncertainties associated with long-term rate projections and retail rate design assumptions. It should be noted that there is a significant difference between the utility's savings from the avoided cost of procurement and delivery of water and the reduction in retail revenue that results from reduced water sales due to water use efficiency. This budget impact occurs slowly, and can be accounted for in water rate planning. Because it is the water provider's role in developing a water use efficiency plan that is vital in this study, the utility perspective was primarily used to evaluate elements of this report.

The community perspective is defined to include the utility and the customer costs and benefits. Costs incurred by customers striving to save water while participating in water use efficiency programs are considered, as well as the benefits received in terms of reduced energy bills (from water heating costs) and wastewater savings, among others. Water bill savings are not a customer benefit in the aggregate for reasons described above. Other factors external to the utility, such as environmental effects, are often difficult to quantify or are not necessarily under the control of the utility. They are therefore frequently excluded from economic analyses, including this one.

The time value of money is explicitly considered. Typically, the costs to save water occur early in the planning period whereas the benefits usually extend to the end of the planning period. A long planning period of 20-30 years is typically used because costs and benefits that occur beyond 2050 years have very little influence on the total present value of the costs and benefits. The value of all future costs and benefits is discounted to the first year in the DSS Model (the base year, which in this case is 2015), at the real interest rate of 2.25%. The DSS Model calculates this real interest rate, adjusting the current nominal interest rate (assumed to be approximately 4.5%) by the assumed rate of inflation (2.2%). The formula to calculate the real interest rate is: (nominal interest rate – assumed rate of inflation)/ (1 + assumed rate of inflation). Cash flows discounted in this manner are herein referred to as "Present Value" sums.

## A.7 Measure Assumptions Including Unit Costs, Water Savings, and Market Penetrations

Measure assumptions including unit costs, water savings and market penetrations were made for each measure.

- Targeted Water User Group End Use – Water user group (e.g., single family residential) and end use (e.g., indoor or outdoor water use).
- Utility Unit Cost – Cost of rebates, incentives, and contractors hired to implement measures. The assumed dollar values for the measure unit costs were closely reviewed by staff and are found to be adequate for each individual measure. The values in the majority of cases are in the range of what is currently offered by other water utilities in the region.
- Retail Customer Unit Cost – Cost for implementing measures that is paid by retail customers (i.e., the remainder of a measure's cost that is not covered by a utility rebate or incentive).
- Utility Administration and Marketing Cost – The cost to the utility for administering the measure, including consultant contract administration, marketing, and participant tracking. The mark-up is sufficient (in total) to cover conservation staff time and general expenses and overhead.

The unit costs vary according to the type of customer account and implementation method being addressed. For example, a measure might cost a different amount for a residential single family account than a residential multifamily

account, and for a rebate versus an ordinance requirement or a direct installation implementation method. Typically water utilities have found there are increased costs associated with achieving higher market saturation, such as more surveys per year. The DSS Model calculates the annual costs based on the number of participants each year. The general formula for calculating annual utility costs is:

- Annual Utility Cost = Annual market penetration rate x total accounts in category x unit cost per account x (1+administration and marketing markup percentage)
- Annual Customer Cost = Annual number of participants x unit customer cost
- Annual Community Cost = Annual utility cost + annual customer cost

## A.8 Assumptions about Measure Costs

Costs were determined for each of the measures based on industry knowledge, past experience and data provided by the City. Costs may include incentive costs, usually determined on a per-participant basis; fixed costs, such as marketing; variable costs, such as the costs to staff the measures and to obtain and maintain equipment; and a one-time set-up cost. The set-up cost is for measure design by staff or consultants, any required pilot testing, and preparation of materials that will be used in marketing the measure. The model was run for 25 years, (each year between 2015 and 2035) to encompass the 10-year conservation planning period of 2015 to 2025. The model provides long range forecasted savings, with a focus on conservation measure implementation period of 10 years. Costs were spread over the time period depending on the length of the implementation period for the measure and estimated voluntary customer participation levels.

Lost revenue due to reduced water sales is not included as a cost because the conservation measures evaluated herein generally take effect over a span of time that is sufficient to enable timely rate adjustments, if necessary, to meet fixed cost obligations.

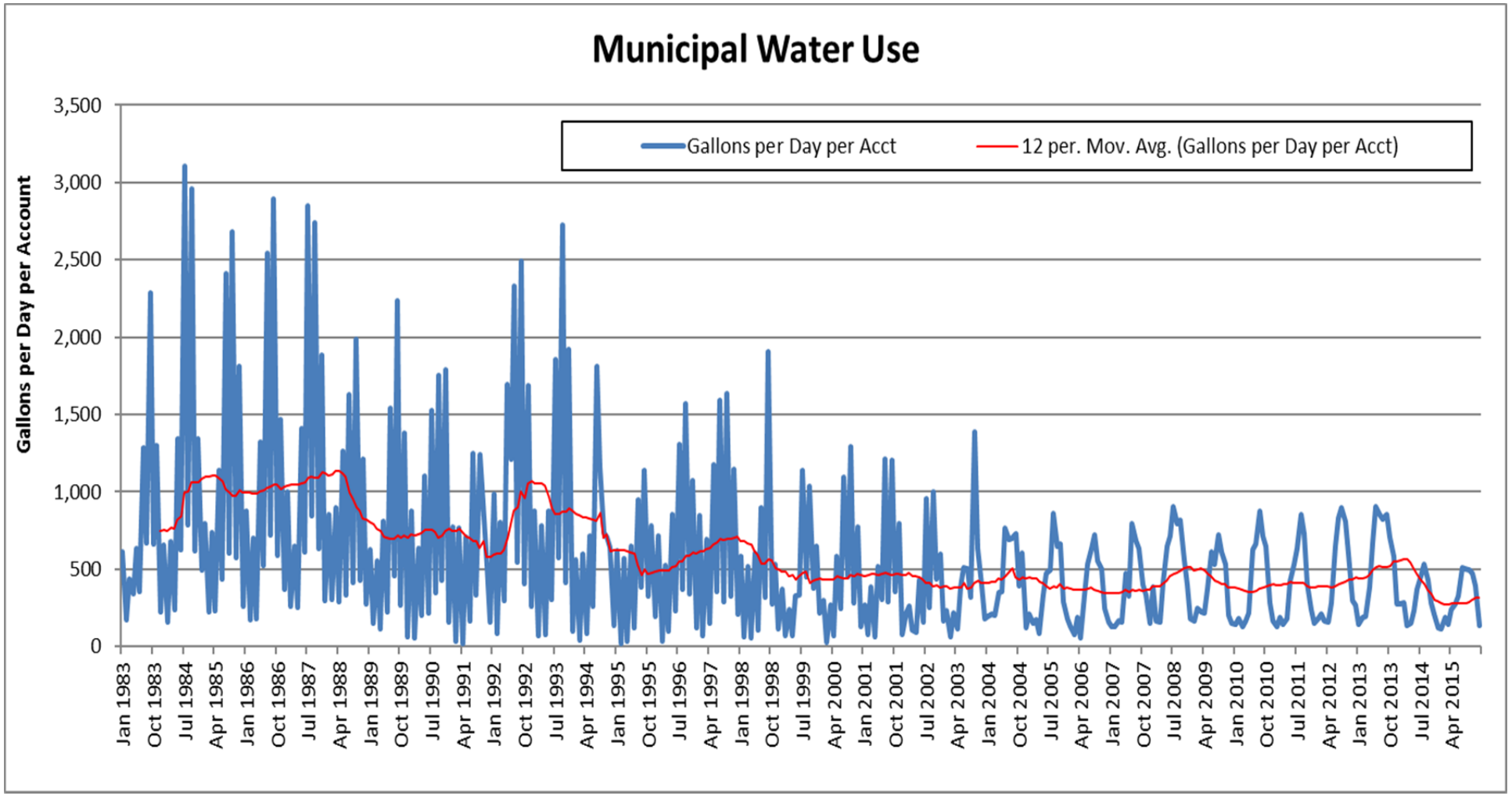
## A.9 Assumptions about Measure Savings

Data necessary to forecast water savings of measures include specific data on water use, demographics, market penetration, and unit water savings. Savings normally develop at a measured and predetermined pace, reaching full maturity after full market penetration is achieved. This may occur three to seven years after the start of implementation, depending upon the implementation schedule. For every conservation activity or replacement with more efficient devices, there is a useful life. The useful life is called the “Measure Life” and is defined to be how long conservation measure stays in place and continues to save water. It is assumed that measures implemented because of codes, standards or ordinances, like toilets for example, would be “permanent” and not revert to an old inefficient level of water use if the device needed to be replaced. However, some measures that are more behavioral based like residential surveys are assumed to need to be repeated on an ongoing basis to retain the water savings (e.g., homeowners move away and new homeowners may have less efficient water using practices around the home). Surveys typically have a measure life on the order of five years.

# APPENDIX B – HISTORICAL MONTHLY WATER USE PER ACCOUNT TYPE

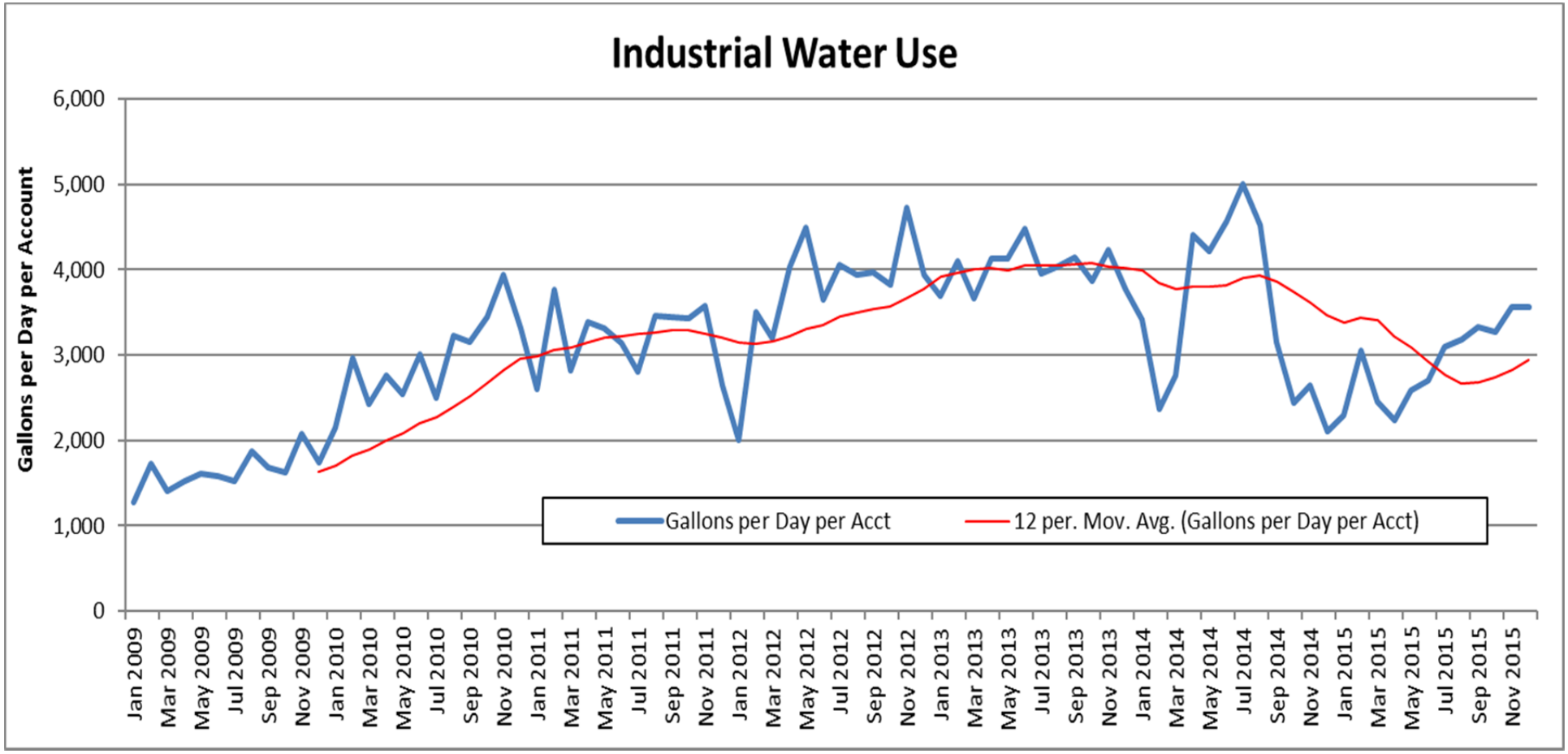
The average monthly usage per account per day for the four primary types of customers in the City are presented in the following figures.

**Figure B-1. Municipal Consumption per Account per Day***




* The City experienced drought years in 1976-77, 1988-1992, and 2009-2015 and economic recession in years 2008-2012.

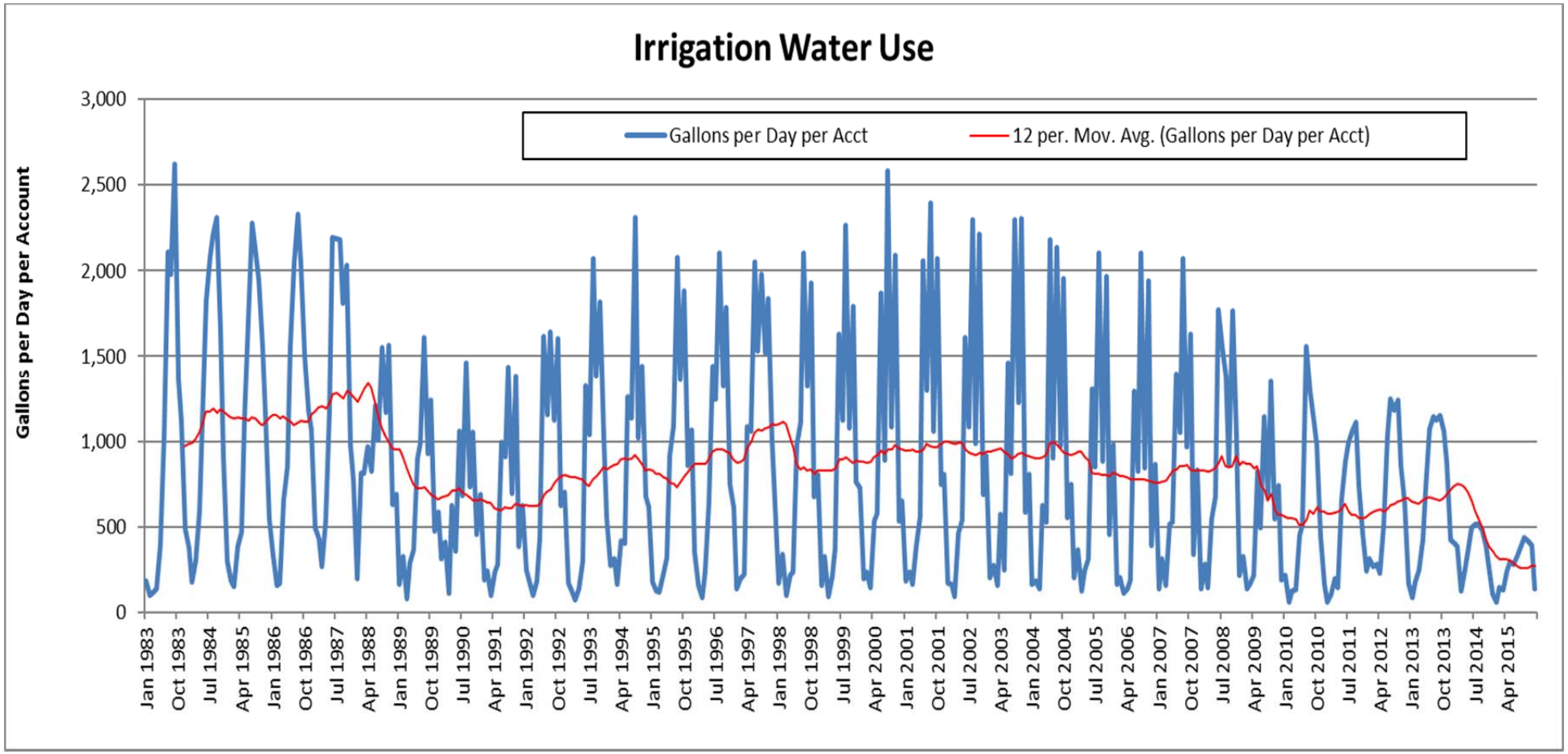
**Figure B-2. Industrial Consumption per Account per Day**




Notes:

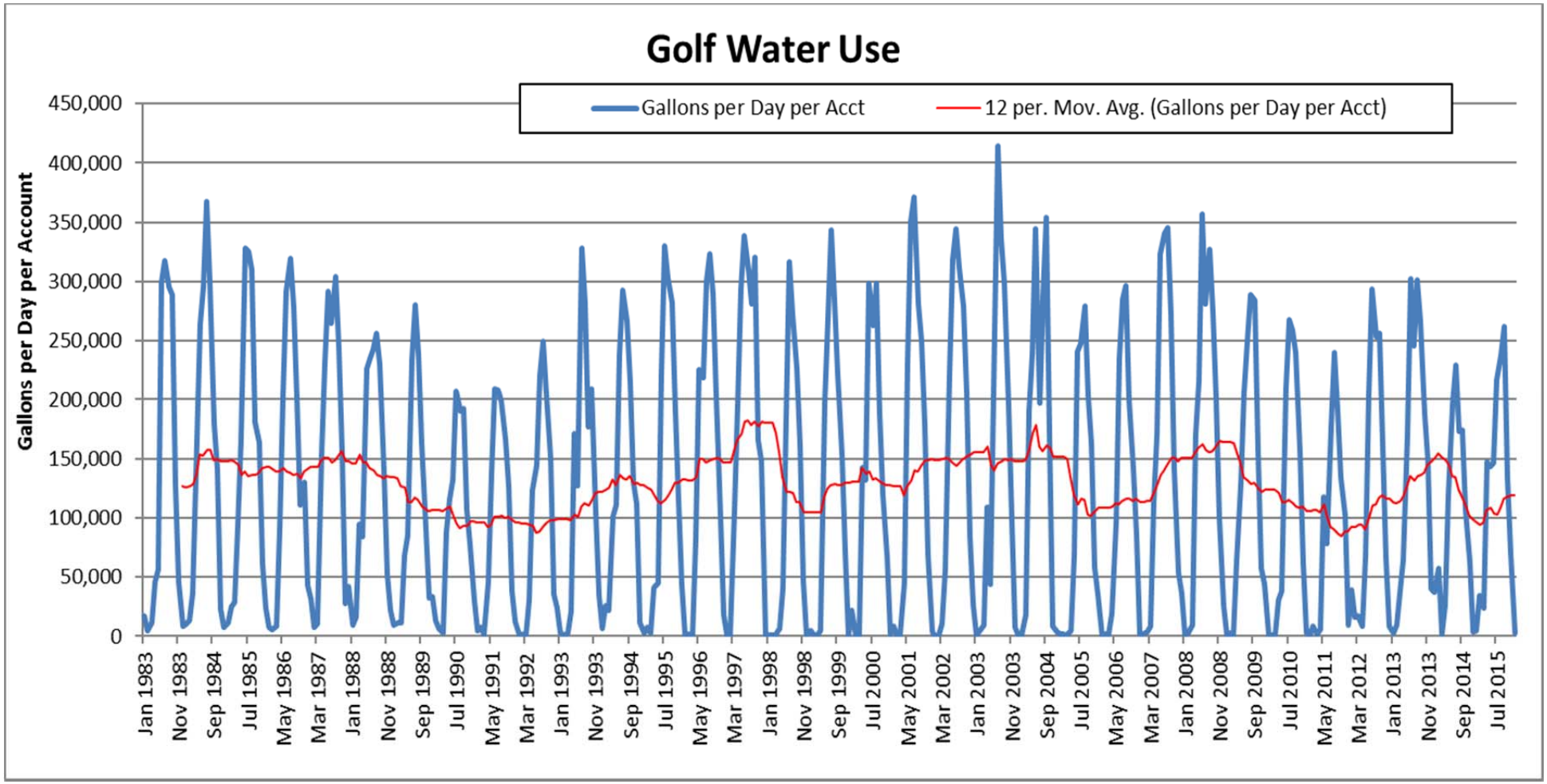
1. Industrial water use was not tracked as a separate customer category until 2009.
2. The City experienced drought years in 1976-77, 1988-1992, and 2009-2015 and economic recession in years 2008-2012.

**Figure B-3. Irrigation Consumption per Account per Day***




* The City experienced drought years in 1976-77, 1988-1992, and 2009-2015 and economic recession in years 2008-2012.

**Figure B-4. Golf Consumption per Account per Day***




* The City experienced drought years in 1976-77, 1988-1992, and 2009-2015 and economic recession in years 2008-2012.

# APPENDIX C – DSS MODELING ASSUMPTIONS FOR CONSERVATION MEASURES



**System Water Loss Reduction**

| Overview | |
|---|---|
| Name | System Water Loss Reduction |
| Abbr | 1 |
| Category | Default |
| Measure Type | Water Loss Measure |

| Time Period | |
|---|---|
| First Year | 2015 |

| Backlog Costs | |
|---|---|
| Total Backlog Work Costs | $1,000,000 |
| Years to Complete Backlog | 5 |

| Maintenance Costs | |
|---|---|
| Annual Maintenance Costs | $120,000 |

| Target | |
|---|---|
| Total GPCD Reduction | 0.9 |

**Description**

City of Santa Cruz's water losses are relatively low. This measure would seek to maintain low non-revenue water rates through controlling both apparent and real water losses. This would be annually tracked through the American Water Works Association (AWWA) Water Balance Water System Audit. The City's Distribution Department implements this measure.

| Results | |
|---|---|
| Average Water Savings (mgd) | |
| | 0.080377 |
| Lifetime Savings - Present Value ($) | |
| Utility | $1,210,408 |
| Community | $1,210,408 |
| Lifetime Costs - Present Value ($) | |
| Utility | $2,418,332 |
| Community | $2,418,332 |
| Benefit to Cost Ratio | |
| Utility | 0.50 |
| Community | 0.50 |
| Cost of Savings per Unit Volume ($/mg) | |
| Utility | $3,923 |

**Comments**

The savings is over the life of the program which is tied to the agency current Non Revenue Water (NRW) percentage which can be found in the GREEN "Non Revenue Water" portion of the DSS Model. "Annual Maintenance Costs" inputs allow for budget estimates for complete program. Additional water savings of "Non-Revenue Water" real water losses may be available when technically feasible. Rule of thumb is minimum system water losses below approximately 6% (as defined as the difference between production and consumption or alternatively as a percent of System Input Volume using AWWA Water System Audit definitions). For NRW below 6% (which can be found in the GREEN "Non Revenue Water" portion of the DSS Model), input "0%" for new real water savings and "$0" in the Backlog Cost section. For NRW above 6%, a GPCD savings input volume can be computed (an estimate of annual savings volume divided by total population). For example a 4.0 GPCD is equivalent to a 2% reduction for the system with a 150 GPCD water use. Additional Water Loss Control Program budget to achieve these water savings is inputted into the "Backlog Cost" section along with the duration of the years to accomplish the estimated reduction. In other words, $250,000 over 5 years would add $50,000 per year to assist with meeting NRW reduction goals.

| Costs | |
|---|---|
| | Utility |
| 2015 | $200,000 |
| 2016 | $200,000 |
| 2017 | $200,000 |
| 2018 | $200,000 |
| 2019 | $200,000 |
| 2020 | $120,000 |
| 2021 | $120,000 |
| 2022 | $120,000 |
| 2023 | $120,000 |
| 2024 | $120,000 |
| 2025 | $120,000 |
| 2026 | $120,000 |
| 2027 | $120,000 |
| 2028 | $120,000 |
| 2029 | $120,000 |
| 2030 | $120,000 |
| 2031 | $120,000 |
| 2032 | $120,000 |
| 2033 | $120,000 |
| 2034 | $120,000 |
| 2035 | $120,000 |

| Targets | |
|---|---|
| | Projected NRW Percent |
| 2015 | 7.3% |
| 2016 | 7.2% |
| 2017 | 7.0% |
| 2018 | 6.8% |
| 2019 | 6.6% |
| 2020 | 6.6% |
| 2021 | 6.6% |
| 2022 | 6.6% |
| 2023 | 6.6% |
| 2024 | 6.6% |
| 2025 | 6.6% |
| 2026 | 6.6% |
| 2027 | 6.6% |
| 2028 | 6.5% |
| 2029 | 6.5% |
| 2030 | 6.5% |
| 2031 | 6.5% |
| 2032 | 6.5% |
| 2033 | 6.5% |
| 2034 | 6.5% |
| 2035 | 6.5% |

| Water Savings | |
|---|---|
| | Total Savings |
| 2015 | 0.016188 |
| 2016 | 0.032660 |
| 2017 | 0.049417 |
| 2018 | 0.066457 |
| 2019 | 0.083782 |
| 2020 | 0.084493 |
| 2021 | 0.085209 |
| 2022 | 0.085926 |
| 2023 | 0.086643 |
| 2024 | 0.087360 |
| 2025 | 0.088077 |
| 2026 | 0.088820 |
| 2027 | 0.089562 |
| 2028 | 0.090305 |
| 2029 | 0.091048 |
| 2030 | 0.091791 |
| 2031 | 0.092539 |
| 2032 | 0.093287 |
| 2033 | 0.094035 |
| 2034 | 0.094783 |
| 2035 | 0.095532 |

**Advanced Metering Infrastructure**

| Overview | |
|---|---|
| Name | Advanced Metering Infrastructure |
| Abbr | 2 |
| Category | Default |
| Measure Type | Standard Measure |

| Time Period | |
|---|---|
| First Year | 2021 |
| Last Year | 2035 |
| Measure Length | 15 |

| Measure Life | |
|---|---|
| Permanent | ☑ |

| Fixture Costs | Utility | Customer | Fix/Acct |
|---|---|---|---|
| SF | $40.00 | $500.00 | 1 |
| MF | $40.00 | $500.00 | 1 |
| COM | $40.00 | $1,500.00 | 1 |

| Administration Costs | |
|---|---|
| Markup Percentage | 40% |

**Description**

Install or retrofit system with AMI meters and associated network capable of providing continuous consumption data to Utility offices. Improved identification of system and customer leaks is major conservation benefit. Some of costs of these systems are offset by operational efficiencies and reduced staffing, as regular meter reading and those for opening and closing accounts are accomplished without need for physical or drive-by meter reading. Also enables enhanced billing options and ability to monitor unauthorized usage (such as use/tampering with closed accounts or irrigation if time of day or days per week are regulated). Customer service is improved as staff can quickly access continuous usage records to address customer inquiries. Optional features include online customer access to their usage, which has been shown to improve accountability and reduce water use. Assume seven year change-out would be a reasonable objective based on City's past experience with AMR installation program.

| Customer Classes | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| | ☑ | ☑ | ☑ | ☐ | ☐ | ☐ | ☐ | ☐ |

| End Uses | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| Toilets | ☐ | ☐ | ☐ | | | | | |
| Urinals | | | ☐ | | | | | |
| Lavatory Faucets | ☐ | ☐ | ☐ | | | | | |
| Showers | ☐ | ☐ | ☐ | | | | | |
| Dishwashers | ☐ | ☐ | ☐ | | | | | |
| Clothes Washers | ☐ | ☐ | ☐ | | | | | |
| Process | | | ☐ | | | | | |
| Kitchen Spray Rinse | | | ☐ | | | | | |
| Internal Leakage | ☑ | ☑ | ☑ | | | | | |
| Baths | ☐ | ☐ | | | | | | |
| Other | ☐ | ☐ | ☐ | | | | | |
| Irrigation | ☐ | ☐ | ☐ | | | | | |
| Pools | ☐ | ☐ | | | | | | |
| Wash Down | ☐ | ☐ | | | | | | |
| Car Washing | ☐ | ☐ | | | | | | |
| External Leakage | ☐ | ☐ | ☐ | | | | | |
| Indoor | | | | | | | | |
| Outdoor | | | | | | | | |
| Cooling | | | ☐ | | | | | |
| tory/Kitchen Faucets | ☐ | ☐ | ☐ | | | | | |

**Comments**

Basis for the starting value cost estimate is $540 per AMI unit where assumes (a) partial % cost share for the "utility" of estimated AMI (automatic meter infrastructure) retrofit cost of $40 with other water utility departments such as operations; and (b) model input for customer unit cost of $500 to cover the reminder of the total unit cost (assumed paid by rate revenue). Cost estimate includes leak repair for those customer-side leaks found and fixed. Cost estimate does not include service leak repair (assume included in Water Loss Control program).

| Results | |
|---|---|
| Average Water Savings (mgd) | |
| 0.048889 | |
| Lifetime Savings - Present Value ($) | |
| Utility | $683,028 |
| Community | $683,028 |
| Lifetime Costs - Present Value ($) | |
| Utility | $475,949 |
| Community | $5,400,600 |
| Benefit to Cost Ratio | |
| Utility | 1.44 |
| Community | 0.13 |
| Cost of Savings per Unit Volume ($/mg) | |
| Utility | $1,269 |

| End Use Savings Per Replacement | % Savings per Account |
|---|---|
| SF Internal Leakage | 50.0% |
| MF Internal Leakage | 50.0% |
| COM Internal Leakage | 50.0% |

| Targets | |
|---|---|
| Target Method | Percentage |
| % of Accts Targeted / yr | 3.000% |
| Only Effects New Accts | ☐ |

**Costs** — View: Summary

| | Utility | Customer | Total |
|---|---|---|---|
| 2015 | $0 | $0 | $0 |
| 2016 | $0 | $0 | $0 |
| 2017 | $0 | $0 | $0 |
| 2018 | $0 | $0 | $0 |
| 2019 | $0 | $0 | $0 |
| 2020 | $0 | $0 | $0 |
| 2021 | $40,977 | $424,451 | $465,428 |
| 2022 | $41,148 | $426,113 | $467,260 |
| 2023 | $41,318 | $427,774 | $469,092 |
| 2024 | $41,489 | $429,436 | $470,924 |
| 2025 | $41,659 | $431,098 | $472,757 |
| 2026 | $41,859 | $433,101 | $474,960 |
| 2027 | $42,058 | $435,104 | $477,163 |
| 2028 | $42,258 | $437,108 | $479,366 |
| 2029 | $42,457 | $439,111 | $481,568 |
| 2030 | $42,657 | $441,115 | $483,771 |
| 2031 | $42,838 | $443,013 | $485,851 |
| 2032 | $43,019 | $444,911 | $487,930 |
| 2033 | $43,200 | $446,809 | $490,009 |
| 2034 | $43,381 | $448,708 | $492,088 |
| 2035 | $43,562 | $450,606 | $494,167 |

**Targets** — View: Accounts

| | SF | MF | COM | Total |
|---|---|---|---|---|
| 2015 | 0 | 0 | 0 | 0 |
| 2016 | 0 | 0 | 0 | 0 |
| 2017 | 0 | 0 | 0 | 0 |
| 2018 | 0 | 0 | 0 | 0 |
| 2019 | 0 | 0 | 0 | 0 |
| 2020 | 0 | 0 | 0 | 0 |
| 2021 | 586 | 87 | 59 | 732 |
| 2022 | 588 | 88 | 59 | 735 |
| 2023 | 591 | 88 | 59 | 738 |
| 2024 | 593 | 89 | 59 | 741 |
| 2025 | 596 | 89 | 59 | 744 |
| 2026 | 598 | 90 | 59 | 747 |
| 2027 | 600 | 91 | 60 | 751 |
| 2028 | 603 | 92 | 60 | 755 |
| 2029 | 605 | 93 | 60 | 758 |
| 2030 | 608 | 94 | 60 | 762 |
| 2031 | 610 | 94 | 61 | 765 |
| 2032 | 612 | 95 | 61 | 768 |
| 2033 | 615 | 96 | 61 | 771 |
| 2034 | 617 | 96 | 61 | 775 |
| 2035 | 619 | 97 | 62 | 778 |

**Water Savings (mgd)**

| | Total Savings (mgd) |
|---|---|
| 2015 | 0.000000 |
| 2016 | 0.000000 |
| 2017 | 0.000000 |
| 2018 | 0.000000 |
| 2019 | 0.000000 |
| 2020 | 0.000000 |
| 2021 | 0.009004 |
| 2022 | 0.017903 |
| 2023 | 0.026695 |
| 2024 | 0.035380 |
| 2025 | 0.043958 |
| 2026 | 0.052397 |
| 2027 | 0.060755 |
| 2028 | 0.069042 |
| 2029 | 0.077267 |
| 2030 | 0.085434 |
| 2031 | 0.093598 |
| 2032 | 0.101719 |
| 2033 | 0.109803 |
| 2034 | 0.117853 |
| 2035 | 0.125872 |

**Large Landscape Budget-Based**

| Overview | |
|---|---|
| Name | Large Landscape Budget-Based W |
| Abbr | 3 |
| Category | Default |
| Measure Type | Standard Measure |

| Time Period | |
|---|---|
| First Year | 2018 |
| Last Year | 2020 |
| Measure Length | 3 |

| Measure Life | |
|---|---|
| Permanent | ☑ |

| Fixture Costs | Utility | Customer | Fix/Acct |
|---|---|---|---|
| IRR | $50.00 | $200.00 | 1 |

| Administration Costs | |
|---|---|
| Markup Percentage | 50% |

**Description**

Develop individualized monthly water budgets for all or a selected category of customers. Water budgets are linked to a rate schedule where rates per unit of water increase when a customer goes above their budget, or decreases if they are below their budget. Budgets typically are based on such factors as the size of the irrigated area and often vary seasonally to reflect weather during the billing period. These rates have been shown to be effective in reducing landscape irrigation demand (AWWARF Reports). This measure would require rate study and capable billing software. Over time lower budgets to climate appropriate irrigation levels.

**Customer Classes**

| SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|
| ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☑ | ☐ |

**End Uses**

| | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| Toilets | | | | | | | | |
| Urinals | | | | | | | | |
| Lavatory Faucets | | | | | | | | |
| Showers | | | | | | | | |
| Dishwashers | | | | | | | | |
| Clothes Washers | | | | | | | | |
| Process | | | | | | | | |
| Kitchen Spray Rinse | | | | | | | | |
| Internal Leakage | | | | | | | | |
| Baths | | | | | | | | |
| Other | | | | | | | | |
| Irrigation | | | | | | | ☑ | |
| Pools | | | | | | | | |
| Wash Down | | | | | | | | |
| Car Washing | | | | | | | | |
| External Leakage | | | | | | | ☑ | |
| Indoor | | | | | | | | |
| Outdoor | | | | | | | | |
| Cooling | | | | | | | | |
| tory/Kitchen Faucets | | | | | | | | |

**Comments**

Basis of water savings: Overwatering is about 30 MGY for all participants or about 12%. Education has dropped the use about 15 MGY and price and other measures should do the rest of 15 MGY or about 6% of this end use category.

**Results**

| Average Water Savings (mgd) | |
|---|---|
| 0.030986 | |
| Lifetime Savings - Present Value ($) | |
| Utility | $460,424 |
| Community | $460,424 |
| Lifetime Costs - Present Value ($) | |
| Utility | $46,122 |
| Community | $169,115 |
| Benefit to Cost Ratio | |
| Utility | 9.98 |
| Community | 2.72 |
| Cost of Savings per Unit Volume ($/mg) | |
| Utility | $194 |

| End Use Savings Per Replacement | % Savings per Account |
|---|---|
| IRR Irrigation | 12.0% |
| IRR External Leakage | 0.0% |

| Targets | |
|---|---|
| Target Method | Percentage |
| % of Accts Targeted / yr | 36.000% |
| Only Effects New Accts | ☐ |

**Costs**

View: Summary

| | Utility | Customer | Total |
|---|---|---|---|
| 2015 | $0 | $0 | $0 |
| 2016 | $0 | $0 | $0 |
| 2017 | $0 | $0 | $0 |
| 2018 | $16,046 | $42,790 | $58,837 |
| 2019 | $16,814 | $44,838 | $61,652 |
| 2020 | $17,582 | $46,885 | $64,467 |
| 2021 | $0 | $0 | $0 |
| 2022 | $0 | $0 | $0 |
| 2023 | $0 | $0 | $0 |
| 2024 | $0 | $0 | $0 |
| 2025 | $0 | $0 | $0 |
| 2026 | $0 | $0 | $0 |
| 2027 | $0 | $0 | $0 |
| 2028 | $0 | $0 | $0 |
| 2029 | $0 | $0 | $0 |
| 2030 | $0 | $0 | $0 |
| 2031 | $0 | $0 | $0 |
| 2032 | $0 | $0 | $0 |
| 2033 | $0 | $0 | $0 |
| 2034 | $0 | $0 | $0 |
| 2035 | $0 | $0 | $0 |

**Targets**

View: Accounts

| | IRR | Total |
|---|---|---|
| 2015 | 0 | 0 |
| 2016 | 0 | 0 |
| 2017 | 0 | 0 |
| 2018 | 214 | 214 |
| 2019 | 224 | 224 |
| 2020 | 234 | 234 |
| 2021 | 0 | 0 |
| 2022 | 0 | 0 |
| 2023 | 0 | 0 |
| 2024 | 0 | 0 |
| 2025 | 0 | 0 |
| 2026 | 0 | 0 |
| 2027 | 0 | 0 |
| 2028 | 0 | 0 |
| 2029 | 0 | 0 |
| 2030 | 0 | 0 |
| 2031 | 0 | 0 |
| 2032 | 0 | 0 |
| 2033 | 0 | 0 |
| 2034 | 0 | 0 |
| 2035 | 0 | 0 |

**Water Savings (mgd)**

| | Total Savings (mgd) |
|---|---|
| 2015 | 0.000000 |
| 2016 | 0.000000 |
| 2017 | 0.000000 |
| 2018 | 0.013868 |
| 2019 | 0.027587 |
| 2020 | 0.041137 |
| 2021 | 0.040711 |
| 2022 | 0.040289 |
| 2023 | 0.039872 |
| 2024 | 0.039459 |
| 2025 | 0.039051 |
| 2026 | 0.038642 |
| 2027 | 0.038238 |
| 2028 | 0.037838 |
| 2029 | 0.037442 |
| 2030 | 0.037050 |
| 2031 | 0.036663 |
| 2032 | 0.036279 |
| 2033 | 0.035900 |
| 2034 | 0.035524 |
| 2035 | 0.035153 |

**General Public Information**

| Overview | |
|---|---|
| Name | General Public Information |
| Abbr | 4 |
| Category | Default |
| Measure Type | Standard Measure |

| Time Period | |
|---|---|
| First Year | 2015 |
| Last Year | 2035 |
| Measure Length | 21 |

| Measure Life | |
|---|---|
| Permanent | ☐ |
| Years | 2 |
| Repeat | ☐ |

| Fixture Costs | Utility | Customer | Fix/Acct |
|---|---|---|---|
| SF | $4.00 | $2.00 | 1 |

| Administration Costs | |
|---|---|
| Markup Percentage | 50% |

**Description**

Comprehensive education and public awareness campaign that would evolve over the years and seek to drive participation in other conservation programs. This measure includes support for the Landscape Water Budget & Water Use Reports and additional overall customer service and administrative support not specific to any particular conservation measure across the Water Department.

| Customer Classes | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| | ☑ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

| End Uses | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| Toilets | ☑ | | | | | | | |
| Urinals | | | | | | | | |
| Lavatory Faucets | ☑ | | | | | | | |
| Showers | ☑ | | | | | | | |
| Dishwashers | ☑ | | | | | | | |
| Clothes Washers | ☑ | | | | | | | |
| Process | | | | | | | | |
| Kitchen Spray Rinse | | | | | | | | |
| Internal Leakage | ☑ | | | | | | | |
| Baths | ☑ | | | | | | | |
| Other | ☑ | | | | | | | |
| Irrigation | ☑ | | | | | | | |
| Pools | ☑ | | | | | | | |
| Wash Down | ☑ | | | | | | | |
| Car Washing | ☑ | | | | | | | |
| External Leakage | ☑ | | | | | | | |
| Indoor | | | | | | | | |
| Outdoor | | | | | | | | |
| Cooling | | | | | | | | |
| tory/Kitchen Faucets | ☐ | | | | | | | |

**Comments**

Cost assumes SF category but impacts all customer classes. Basis of water savings: Assume baseline of 0.5% per year average single family home use. Utility costs are based on staffing support and education materials cost. Have website now.

| Results | |
|---|---|
| Average Water Savings (mgd) | |
| | 0.015759 |
| Lifetime Savings - Present Value ($) | |
| Utility | $247,012 |
| Community | $247,012 |
| Lifetime Costs - Present Value ($) | |
| Utility | $1,007,398 |
| Community | $1,343,197 |
| Benefit to Cost Ratio | |
| Utility | 0.25 |
| Community | 0.18 |
| Cost of Savings per Unit Volume ($/mg) | |
| Utility | $8,334 |

| End Use Savings Per Replacement | % Savings per Account |
|---|---|
| SF Toilets | 0.5% |
| SF Lavatory Faucets | 0.5% |
| SF Showers | 0.5% |
| SF Dishwashers | 0.5% |
| SF Clothes Washers | 0.5% |
| SF Internal Leakage | 0.5% |
| SF Baths | 0.5% |
| SF Other | 0.5% |
| SF Irrigation | 0.5% |
| SF Pools | 0.5% |
| SF Wash Down | 0.5% |
| SF Car Washing | 0.5% |
| SF External Leakage | 0.5% |

| Targets | |
|---|---|
| Target Method | Percentage |
| % of Accts Targeted / yr | 50.000% |
| Only Effects New Accts | ☐ |

**Costs** — View: Summary

| | Utility | Customer | Total |
|---|---|---|---|
| 2015 | $57,290 | $19,097 | $76,387 |
| 2016 | $57,506 | $19,169 | $76,674 |
| 2017 | $57,721 | $19,240 | $76,962 |
| 2018 | $57,937 | $19,312 | $77,249 |
| 2019 | $58,153 | $19,384 | $77,537 |
| 2020 | $58,368 | $19,456 | $77,824 |
| 2021 | $58,607 | $19,536 | $78,143 |
| 2022 | $58,846 | $19,615 | $78,461 |
| 2023 | $59,085 | $19,695 | $78,779 |
| 2024 | $59,323 | $19,774 | $79,098 |
| 2025 | $59,562 | $19,854 | $79,416 |
| 2026 | $59,806 | $19,935 | $79,741 |
| 2027 | $60,050 | $20,017 | $80,066 |
| 2028 | $60,293 | $20,098 | $80,391 |
| 2029 | $60,537 | $20,179 | $80,716 |
| 2030 | $60,781 | $20,260 | $81,041 |
| 2031 | $61,006 | $20,335 | $81,341 |
| 2032 | $61,231 | $20,410 | $81,642 |
| 2033 | $61,457 | $20,486 | $81,942 |
| 2034 | $61,682 | $20,561 | $82,243 |
| 2035 | $61,907 | $20,636 | $82,543 |

**Targets** — View: Accounts

| | SF | Total |
|---|---|---|
| 2015 | 9,548 | 9,548 |
| 2016 | 9,584 | 9,584 |
| 2017 | 9,620 | 9,620 |
| 2018 | 9,656 | 9,656 |
| 2019 | 9,692 | 9,692 |
| 2020 | 9,728 | 9,728 |
| 2021 | 9,768 | 9,768 |
| 2022 | 9,808 | 9,808 |
| 2023 | 9,847 | 9,847 |
| 2024 | 9,887 | 9,887 |
| 2025 | 9,927 | 9,927 |
| 2026 | 9,968 | 9,968 |
| 2027 | 10,008 | 10,008 |
| 2028 | 10,049 | 10,049 |
| 2029 | 10,089 | 10,089 |
| 2030 | 10,130 | 10,130 |
| 2031 | 10,168 | 10,168 |
| 2032 | 10,205 | 10,205 |
| 2033 | 10,243 | 10,243 |
| 2034 | 10,280 | 10,280 |
| 2035 | 10,318 | 10,318 |

**Water Savings (mgd)**

| | Total Savings (mgd) |
|---|---|
| 2015 | 0.008488 |
| 2016 | 0.016847 |
| 2017 | 0.016736 |
| 2018 | 0.016623 |
| 2019 | 0.016507 |
| 2020 | 0.016389 |
| 2021 | 0.016329 |
| 2022 | 0.016271 |
| 2023 | 0.016211 |
| 2024 | 0.016148 |
| 2025 | 0.016084 |
| 2026 | 0.016020 |
| 2027 | 0.015964 |
| 2028 | 0.015914 |
| 2029 | 0.015869 |
| 2030 | 0.015830 |
| 2031 | 0.015797 |
| 2032 | 0.015766 |
| 2033 | 0.015738 |
| 2034 | 0.015714 |
| 2035 | 0.015694 |

**Public Information (Home Water**

| Overview | |
|---|---|
| Name | Public Information (Home Water |
| Abbr | 5 |
| Category | Default |
| Measure Type | Standard Measure |

| Time Period | |
|---|---|
| First Year | 2018 |
| Last Year | 2035 |
| Measure Length | 18 |

| Measure Life | |
|---|---|
| Permanent | ☐ |
| Years | 5 |
| Repeat | ☐ |

| Fixture Costs | Utility | Customer | Fix/Acct |
|---|---|---|---|
| SF | $31.01 | $0.00 | 1 |

| Administration Costs | |
|---|---|
| Markup Percentage | 35% |

**Description**

Detailed Water Billing Reports for Customers with neighborhood use comparisons and suggestions on customer specific conservation actions. Use or pattern after WaterSmart software's program. Special emphasis and contact for high water users. Design to obtain 5% water savings overall.

**Customer Classes**

| SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|
| ☑ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

**End Uses**

| | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| Toilets | ☑ | | | | | | | |
| Urinals | | | | | | | | |
| Lavatory Faucets | ☑ | | | | | | | |
| Showers | ☑ | | | | | | | |
| Dishwashers | ☑ | | | | | | | |
| Clothes Washers | ☑ | | | | | | | |
| Process | | | | | | | | |
| Kitchen Spray Rinse | | | | | | | | |
| Internal Leakage | ☑ | | | | | | | |
| Baths | ☑ | | | | | | | |
| Other | ☑ | | | | | | | |
| Irrigation | ☑ | | | | | | | |
| Pools | ☑ | | | | | | | |
| Wash Down | ☑ | | | | | | | |
| Car Washing | ☑ | | | | | | | |
| External Leakage | ☑ | | | | | | | |
| Indoor | | | | | | | | |
| Outdoor | | | | | | | | |
| Cooling | | | | | | | | |
| tory/Kitchen Faucets | ☐ | | | | | | | |

**Comments**

Water savings basis: WaterSmart states about 5% savings, City has lower per capita use which will result in less savings, however resulted to account 5% savings. Assume that targeting to the higher 20% of customer users would be sent a report and 4% will act on the billing report (20% over the 5 years respond). Utility costs are based on WaterSmart Software Program cost. Unit cost is assuming $6.20 per account responding and need to multiply by 5 to get to the 20% of accounts that receive a billing report.

**Results**

| Average Water Savings (mgd) | |
|---|---|
| 0.024235 | |
| **Lifetime Savings - Present Value ($)** | |
| Utility | $360,158 |
| Community | $902,012 |
| **Lifetime Costs - Present Value ($)** | |
| Utility | $468,123 |
| Community | $468,123 |
| **Benefit to Cost Ratio** | |
| Utility | 0.77 |
| Community | 1.93 |
| **Cost of Savings per Unit Volume ($/mg)** | |
| Utility | $2,518 |

**End Use Savings Per Replacement**

| | % Savings per Account |
|---|---|
| SF Toilets | 5.0% |
| SF Lavatory Faucets | 5.0% |
| SF Showers | 5.0% |
| SF Dishwashers | 5.0% |
| SF Clothes Washers | 5.0% |
| SF Internal Leakage | 5.0% |
| SF Baths | 5.0% |
| SF Other | 5.0% |
| SF Irrigation | 5.0% |
| SF Pools | 5.0% |
| SF Wash Down | 5.0% |
| SF Car Washing | 5.0% |
| SF External Leakage | 5.0% |

**Targets**

| | |
|---|---|
| Target Method | Percentage |
| % of Accts Targeted / yr | 4.000% |
| Only Effects New Accts | ☐ |

**Costs**

View: Summary

| | Utility | Customer | Total |
|---|---|---|---|
| 2015 | $0 | $0 | $0 |
| 2016 | $0 | $0 | $0 |
| 2017 | $0 | $0 | $0 |
| 2018 | $32,339 | $0 | $32,339 |
| 2019 | $32,460 | $0 | $32,460 |
| 2020 | $32,580 | $0 | $32,580 |
| 2021 | $32,713 | $0 | $32,713 |
| 2022 | $32,847 | $0 | $32,847 |
| 2023 | $32,980 | $0 | $32,980 |
| 2024 | $33,113 | $0 | $33,113 |
| 2025 | $33,246 | $0 | $33,246 |
| 2026 | $33,382 | $0 | $33,382 |
| 2027 | $33,518 | $0 | $33,518 |
| 2028 | $33,654 | $0 | $33,654 |
| 2029 | $33,791 | $0 | $33,791 |
| 2030 | $33,927 | $0 | $33,927 |
| 2031 | $34,052 | $0 | $34,052 |
| 2032 | $34,178 | $0 | $34,178 |
| 2033 | $34,304 | $0 | $34,304 |
| 2034 | $34,430 | $0 | $34,430 |
| 2035 | $34,555 | $0 | $34,555 |

**Targets**

View: Accounts

| | SF | Total |
|---|---|---|
| 2015 | 0 | 0 |
| 2016 | 0 | 0 |
| 2017 | 0 | 0 |
| 2018 | 772 | 772 |
| 2019 | 775 | 775 |
| 2020 | 778 | 778 |
| 2021 | 781 | 781 |
| 2022 | 785 | 785 |
| 2023 | 788 | 788 |
| 2024 | 791 | 791 |
| 2025 | 794 | 794 |
| 2026 | 797 | 797 |
| 2027 | 801 | 801 |
| 2028 | 804 | 804 |
| 2029 | 807 | 807 |
| 2030 | 810 | 810 |
| 2031 | 813 | 813 |
| 2032 | 816 | 816 |
| 2033 | 819 | 819 |
| 2034 | 822 | 822 |
| 2035 | 825 | 825 |

**Water Savings (mgd)**

| | Total Savings (mgd) |
|---|---|
| 2015 | 0.000000 |
| 2016 | 0.000000 |
| 2017 | 0.000000 |
| 2018 | 0.006662 |
| 2019 | 0.013206 |
| 2020 | 0.019630 |
| 2021 | 0.026028 |
| 2022 | 0.032351 |
| 2023 | 0.032227 |
| 2024 | 0.032101 |
| 2025 | 0.031975 |
| 2026 | 0.031847 |
| 2027 | 0.031734 |
| 2028 | 0.031634 |
| 2029 | 0.031547 |
| 2030 | 0.031470 |
| 2031 | 0.031407 |
| 2032 | 0.031351 |
| 2033 | 0.031301 |
| 2034 | 0.031256 |
| 2035 | 0.031216 |

**Residential Leak Assistance**

| Overview | |
|---|---|
| Name | Residential Leak Assistance |
| Abbr | 6 |
| Category | Default |
| Measure Type | Standard Measure |

| Time Period | |
|---|---|
| First Year | 2018 |
| Last Year | 2035 |
| Measure Length | 18 |

| Measure Life | |
|---|---|
| Permanent | ☐ |
| Years | 5 |
| Repeat | ☐ |

| Fixture Costs | Utility | Customer | Fix/Acct |
|---|---|---|---|
| SF | $300.00 | $0.00 | 1 |
| MF | $500.00 | $0.00 | 1 |

| Administration Costs | |
|---|---|
| Markup Percentage | 45% |

**Description**

Customer leaks can go uncorrected at properties where owners are least able to pay costs of repair. These programs may require that customer leaks be repaired, but either subsidize part of the repair and/or pay the cost with revolving funds that are paid back with water bills over time. May also include an option to replace inefficient plumbing fixtures at low-income residences.

| Customer Classes | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| | ☑ | ☑ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

| End Uses | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| Toilets | ☐ | ☐ | | | | | | |
| Urinals | | | | | | | | |
| Lavatory Faucets | ☐ | ☐ | | | | | | |
| Showers | ☐ | ☐ | | | | | | |
| Dishwashers | ☐ | ☐ | | | | | | |
| Clothes Washers | ☐ | ☐ | | | | | | |
| Process | | | | | | | | |
| Kitchen Spray Rinse | | | | | | | | |
| Internal Leakage | ☑ | ☑ | | | | | | |
| Baths | ☐ | ☐ | | | | | | |
| Other | ☐ | ☐ | | | | | | |
| Irrigation | ☐ | ☐ | | | | | | |
| Pools | ☐ | ☐ | | | | | | |
| Wash Down | ☐ | ☐ | | | | | | |
| Car Washing | ☐ | ☐ | | | | | | |
| External Leakage | ☐ | ☐ | | | | | | |
| Indoor | | | | | | | | |
| Outdoor | | | | | | | | |
| Cooling | | | | | | | | |
| tory/Kitchen Faucets | ☐ | ☐ | | | | | | |

| Results | |
|---|---|
| Average Water Savings (mgd) | |
| | 0.046894 |
| Lifetime Savings - Present Value ($) | |
| Utility | $700,539 |
| Community | $700,539 |
| Lifetime Costs - Present Value ($) | |
| Utility | $761,305 |
| Community | $761,305 |
| Benefit to Cost Ratio | |
| Utility | 0.92 |
| Community | 0.92 |
| Cost of Savings per Unit Volume ($/mg) | |
| Utility | $2,117 |

| End Use Savings Per Replacement | % Savings per Account |
|---|---|
| SF Internal Leakage | 595.0% |
| MF Internal Leakage | 549.0% |

| Targets | |
|---|---|
| Target Method | Percentage |
| % of Accts Targeted / yr | 0.500% |
| Only Effects New Accts | ☐ |

**Comments**

Savings is difference between unrepaired and repaired leaks. Assumes SF accounts that have more than 100 gpd/acct leakage (MF>300 gpd/acct leakage) or more are eligible to participate (the savings percentage is estimate of 595% for SF and 549% for MF) is accounting for the fact that the "average internal leakage" of less than 10% (5.7 gpd) in the "average" home). Assuming that City pays 100% of costs for low income, utility costs are based on city checking with local plumbing contractors. Assuming that low income customers pay 0% and some cost share (like City bill credit on high bills) in the future may be considered for customers not in the PG&E Customer Care Program. For SF accts, up to $300 for leak repair or fixture replacement ($500 for MF accts.). Small faucet or toilet repair, irrigation expert to help with leak repair, or customer side service line leak. GreenPlumbers on retainer from a menu to do an upgrade. Assume $100-200 will be multi-family type repairs per dwelling unit, not per account. Cost will be multiplied by 5 for per account cost (average number of units per account), so $500 per MF acct.

**Costs** — View: Summary

| | Utility | Customer | Total |
|---|---|---|---|
| 2015 | $0 | $0 | $0 |
| 2016 | $0 | $0 | $0 |
| 2017 | $0 | $0 | $0 |
| 2018 | $52,233 | $0 | $52,233 |
| 2019 | $52,505 | $0 | $52,505 |
| 2020 | $52,777 | $0 | $52,777 |
| 2021 | $53,013 | $0 | $53,013 |
| 2022 | $53,248 | $0 | $53,248 |
| 2023 | $53,484 | $0 | $53,484 |
| 2024 | $53,719 | $0 | $53,719 |
| 2025 | $53,955 | $0 | $53,955 |
| 2026 | $54,241 | $0 | $54,241 |
| 2027 | $54,527 | $0 | $54,527 |
| 2028 | $54,813 | $0 | $54,813 |
| 2029 | $55,099 | $0 | $55,099 |
| 2030 | $55,385 | $0 | $55,385 |
| 2031 | $55,632 | $0 | $55,632 |
| 2032 | $55,879 | $0 | $55,879 |
| 2033 | $56,127 | $0 | $56,127 |
| 2034 | $56,374 | $0 | $56,374 |
| 2035 | $56,621 | $0 | $56,621 |

**Targets** — View: Accounts

| | SF | MF | Total |
|---|---|---|---|
| 2015 | 0 | 0 | 0 |
| 2016 | 0 | 0 | 0 |
| 2017 | 0 | 0 | 0 |
| 2018 | 97 | 14 | 111 |
| 2019 | 97 | 14 | 111 |
| 2020 | 97 | 14 | 112 |
| 2021 | 98 | 15 | 112 |
| 2022 | 98 | 15 | 113 |
| 2023 | 98 | 15 | 113 |
| 2024 | 99 | 15 | 114 |
| 2025 | 99 | 15 | 114 |
| 2026 | 100 | 15 | 115 |
| 2027 | 100 | 15 | 115 |
| 2028 | 100 | 15 | 116 |
| 2029 | 101 | 15 | 116 |
| 2030 | 101 | 16 | 117 |
| 2031 | 102 | 16 | 117 |
| 2032 | 102 | 16 | 118 |
| 2033 | 102 | 16 | 118 |
| 2034 | 103 | 16 | 119 |
| 2035 | 103 | 16 | 119 |

**Water Savings (mgd)**

| | Total Savings (mgd) |
|---|---|
| 2015 | 0.000000 |
| 2016 | 0.000000 |
| 2017 | 0.000000 |
| 2018 | 0.012965 |
| 2019 | 0.025658 |
| 2020 | 0.038078 |
| 2021 | 0.050471 |
| 2022 | 0.062699 |
| 2023 | 0.062475 |
| 2024 | 0.062224 |
| 2025 | 0.061947 |
| 2026 | 0.061614 |
| 2027 | 0.061333 |
| 2028 | 0.061101 |
| 2029 | 0.060913 |
| 2030 | 0.060767 |
| 2031 | 0.060674 |
| 2032 | 0.060587 |
| 2033 | 0.060505 |
| 2034 | 0.060425 |
| 2035 | 0.060348 |

**Single Family Residential Surveys**

| Overview | |
|---|---|
| Name | Single Family Residential Surveys |
| Abbr | 7 |
| Category | Default |
| Measure Type | Standard Measure |

| Time Period | |
|---|---|
| First Year | 2015 |
| Last Year | 2035 |
| Measure Length | 21 |

| Measure Life | |
|---|---|
| Permanent | ☐ |
| Years | 5 |
| Repeat | ☐ |

| Fixture Costs | Utility | Customer | Fix/Acct |
|---|---|---|---|
| SF | $100.00 | $50.00 | 1 |

| Administration Costs | |
|---|---|
| Markup Percentage | 25% |

**Description**

Outdoor water surveys for existing single family residential customers. Assume survey is triggered for leak forgiveness application (average in 2015 was 700 account applications). Target those with high water use and provide a customized report to owner. May include give-away of efficient shower heads, aerators, toilet devices. Would include a basic outdoor survey (look for leaks, irrigation problems & schedule, plant information, etc.). Personalized outreach to high water users with periodic follow up to maintain savings as long as possible.

**Customer Classes**

| SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|
| ☑ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

**End Uses**

| | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| Toilets | ☐ | | | | | | | |
| Urinals | | | | | | | | |
| Lavatory Faucets | ☐ | | | | | | | |
| Showers | ☐ | | | | | | | |
| Dishwashers | ☐ | | | | | | | |
| Clothes Washers | ☐ | | | | | | | |
| Process | | | | | | | | |
| Kitchen Spray Rinse | | | | | | | | |
| Internal Leakage | ☑ | | | | | | | |
| Baths | ☐ | | | | | | | |
| Other | ☐ | | | | | | | |
| Irrigation | ☑ | | | | | | | |
| Pools | ☑ | | | | | | | |
| Wash Down | ☑ | | | | | | | |
| Car Washing | ☑ | | | | | | | |
| External Leakage | ☑ | | | | | | | |
| Indoor | | | | | | | | |
| Outdoor | | | | | | | | |
| Cooling | | | | | | | | |
| tory/Kitchen Faucets | ☐ | | | | | | | |

**Comments**

Target % considers pushing for more than 100 accounts per year. Utility cost based mainly on internal labor cost (2 hours of labor per survey) and some additional labor for short report. Customer costs based on customer cost to implement recommendations. Water savings based on results from Baseline Study to support conservation potential and CUWCC Cost and Savings Study, 2006.

**Results**

| Average Water Savings (mgd) | |
|---|---|
| 0.007075 | |
| **Lifetime Savings - Present Value ($)** | |
| Utility | $108,353 |
| Community | $108,353 |
| **Lifetime Costs - Present Value ($)** | |
| Utility | $419,749 |
| Community | $587,649 |
| **Benefit to Cost Ratio** | |
| Utility | 0.26 |
| Community | 0.18 |
| **Cost of Savings per Unit Volume ($/mg)** | |
| Utility | $7,735 |

**End Use Savings Per Replacement**

| | % Savings per Account |
|---|---|
| SF Internal Leakage | 25.0% |
| SF Irrigation | 10.0% |
| SF Pools | 10.0% |
| SF Wash Down | 10.0% |
| SF Car Washing | 10.0% |
| SF External Leakage | 25.0% |

**Targets**

| Target Method | Percentage |
|---|---|
| % of Accts Targeted / yr | 1.000% |
| Only Effects New Accts | ☐ |

**Costs**

View: Summary

| | Utility | Customer | Total |
|---|---|---|---|
| 2015 | $23,871 | $9,548 | $33,419 |
| 2016 | $23,961 | $9,584 | $33,545 |
| 2017 | $24,051 | $9,620 | $33,671 |
| 2018 | $24,140 | $9,656 | $33,797 |
| 2019 | $24,230 | $9,692 | $33,922 |
| 2020 | $24,320 | $9,728 | $34,048 |
| 2021 | $24,420 | $9,768 | $34,187 |
| 2022 | $24,519 | $9,808 | $34,327 |
| 2023 | $24,619 | $9,847 | $34,466 |
| 2024 | $24,718 | $9,887 | $34,605 |
| 2025 | $24,818 | $9,927 | $34,745 |
| 2026 | $24,919 | $9,968 | $34,887 |
| 2027 | $25,021 | $10,008 | $35,029 |
| 2028 | $25,122 | $10,049 | $35,171 |
| 2029 | $25,224 | $10,089 | $35,313 |
| 2030 | $25,325 | $10,130 | $35,455 |
| 2031 | $25,419 | $10,168 | $35,587 |
| 2032 | $25,513 | $10,205 | $35,718 |
| 2033 | $25,607 | $10,243 | $35,850 |
| 2034 | $25,701 | $10,280 | $35,981 |
| 2035 | $25,795 | $10,318 | $36,113 |

**Targets**

View: Accounts

| | SF | Total |
|---|---|---|
| 2015 | 191 | 191 |
| 2016 | 192 | 192 |
| 2017 | 192 | 192 |
| 2018 | 193 | 193 |
| 2019 | 194 | 194 |
| 2020 | 195 | 195 |
| 2021 | 195 | 195 |
| 2022 | 196 | 196 |
| 2023 | 197 | 197 |
| 2024 | 198 | 198 |
| 2025 | 199 | 199 |
| 2026 | 199 | 199 |
| 2027 | 200 | 200 |
| 2028 | 201 | 201 |
| 2029 | 202 | 202 |
| 2030 | 203 | 203 |
| 2031 | 203 | 203 |
| 2032 | 204 | 204 |
| 2033 | 205 | 205 |
| 2034 | 206 | 206 |
| 2035 | 206 | 206 |

**Water Savings (mgd)**

| | Total Savings (mgd) |
|---|---|
| 2015 | 0.001659 |
| 2016 | 0.003293 |
| 2017 | 0.004897 |
| 2018 | 0.006473 |
| 2019 | 0.008020 |
| 2020 | 0.007963 |
| 2021 | 0.007933 |
| 2022 | 0.007903 |
| 2023 | 0.007873 |
| 2024 | 0.007842 |
| 2025 | 0.007811 |
| 2026 | 0.007780 |
| 2027 | 0.007753 |
| 2028 | 0.007728 |
| 2029 | 0.007707 |
| 2030 | 0.007688 |
| 2031 | 0.007673 |
| 2032 | 0.007659 |
| 2033 | 0.007647 |
| 2034 | 0.007636 |
| 2035 | 0.007626 |

**Plumbing Fixture Giveaway/Opt**

| Overview | |
|---|---|
| Name | Plumbing Fixture Giveaway/Opt |
| Abbr | 8 |
| Category | Default |
| Measure Type | Standard Measure |

| Time Period | |
|---|---|
| First Year | 2015 |
| Last Year | 2017 |
| Measure Length | 3 |

| Measure Life | |
|---|---|
| Permanent | ☐ |
| Years | 25 |
| Repeat | ☐ |

| Fixture Costs | Utility | Customer | Fix/Acct |
|---|---|---|---|
| SF | $12.00 | $0.00 | 2 |
| MF | $12.00 | $0.00 | 6 |

| Administration Costs | |
|---|---|
| Markup Percentage | 35% |

**Description**

City would buy showerheads and faucet aerators in bulk and give them away at Utility office or community events. Need to coordinate this program with the School Education measure on retrofit kit giveaways to the same customer categories.

| Customer Classes | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| | ☑ | ☑ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

| End Uses | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| Toilets | ☐ | ☐ | | | | | | |
| Urinals | | | | | | | | |
| Lavatory Faucets | ☑ | ☑ | | | | | | |
| Showers | ☑ | ☑ | | | | | | |
| Dishwashers | ☐ | ☐ | | | | | | |
| Clothes Washers | ☐ | ☐ | | | | | | |
| Process | | | | | | | | |
| Kitchen Spray Rinse | | | | | | | | |
| Internal Leakage | ☐ | ☐ | | | | | | |
| Baths | ☐ | ☐ | | | | | | |
| Other | ☐ | ☐ | | | | | | |
| Irrigation | ☐ | ☐ | | | | | | |
| Pools | ☐ | ☐ | | | | | | |
| Wash Down | ☐ | ☐ | | | | | | |
| Car Washing | ☐ | ☐ | | | | | | |
| External Leakage | ☐ | ☐ | | | | | | |
| Indoor | | | | | | | | |
| Outdoor | | | | | | | | |
| Cooling | | | | | | | | |
| tory/Kitchen Faucets | ☐ | ☐ | | | | | | |

**Comments**

Assumes 2 kits per SF account and 6 kits per MF account. Utility Costs provided by BAWSCA for 1.8 gpm showerhead / 1.5 gpm aerator kit. Customer cost is to repair leaks or other minor costs. Current customer participation based on WCDB Residential retrofit kits measure record (2004-2013). Assume kits save 27.6% (reduced to be conservative).

| Results | |
|---|---|
| Average Water Savings (mgd) | |
| 0.005751 | |
| Lifetime Savings - Present Value ($) | |
| Utility | $90,465 |
| Community | $310,044 |
| Lifetime Costs - Present Value ($) | |
| Utility | $65,222 |
| Community | $65,222 |
| Benefit to Cost Ratio | |
| Utility | 1.39 |
| Community | 4.75 |
| Cost of Savings per Unit Volume ($/mg) | |
| Utility | $1,479 |

| End Use Savings Per Replacement | % Savings per Account |
|---|---|
| SF Lavatory Faucets | 6.9% |
| SF Showers | 6.9% |
| MF Lavatory Faucets | 6.9% |
| MF Showers | 6.9% |

| Targets | |
|---|---|
| Target Method | Percentage |
| % of Accts Targeted / yr | 2.500% |
| Only Effects New Accts | ☐ |

**Costs** — View: Summary

| | Utility | Customer | Total |
|---|---|---|---|
| 2015 | $22,093 | $0 | $22,093 |
| 2016 | $22,228 | $0 | $22,228 |
| 2017 | $22,364 | $0 | $22,364 |
| 2018 | $0 | $0 | $0 |
| 2019 | $0 | $0 | $0 |
| 2020 | $0 | $0 | $0 |
| 2021 | $0 | $0 | $0 |
| 2022 | $0 | $0 | $0 |
| 2023 | $0 | $0 | $0 |
| 2024 | $0 | $0 | $0 |
| 2025 | $0 | $0 | $0 |
| 2026 | $0 | $0 | $0 |
| 2027 | $0 | $0 | $0 |
| 2028 | $0 | $0 | $0 |
| 2029 | $0 | $0 | $0 |
| 2030 | $0 | $0 | $0 |
| 2031 | $0 | $0 | $0 |
| 2032 | $0 | $0 | $0 |
| 2033 | $0 | $0 | $0 |
| 2034 | $0 | $0 | $0 |
| 2035 | $0 | $0 | $0 |

**Targets** — View: Accounts

| | SF | MF | Total |
|---|---|---|---|
| 2015 | 477 | 68 | 546 |
| 2016 | 479 | 69 | 548 |
| 2017 | 481 | 70 | 551 |
| 2018 | 0 | 0 | 0 |
| 2019 | 0 | 0 | 0 |
| 2020 | 0 | 0 | 0 |
| 2021 | 0 | 0 | 0 |
| 2022 | 0 | 0 | 0 |
| 2023 | 0 | 0 | 0 |
| 2024 | 0 | 0 | 0 |
| 2025 | 0 | 0 | 0 |
| 2026 | 0 | 0 | 0 |
| 2027 | 0 | 0 | 0 |
| 2028 | 0 | 0 | 0 |
| 2029 | 0 | 0 | 0 |
| 2030 | 0 | 0 | 0 |
| 2031 | 0 | 0 | 0 |
| 2032 | 0 | 0 | 0 |
| 2033 | 0 | 0 | 0 |
| 2034 | 0 | 0 | 0 |
| 2035 | 0 | 0 | 0 |

**Water Savings (mgd)**

| | Total Savings (mgd) |
|---|---|
| 2015 | 0.002245 |
| 2016 | 0.004446 |
| 2017 | 0.006600 |
| 2018 | 0.006507 |
| 2019 | 0.006414 |
| 2020 | 0.006322 |
| 2021 | 0.006266 |
| 2022 | 0.006210 |
| 2023 | 0.006154 |
| 2024 | 0.006097 |
| 2025 | 0.006040 |
| 2026 | 0.005976 |
| 2027 | 0.005915 |
| 2028 | 0.005858 |
| 2029 | 0.005804 |
| 2030 | 0.005753 |
| 2031 | 0.005710 |
| 2032 | 0.005668 |
| 2033 | 0.005629 |
| 2034 | 0.005592 |
| 2035 | 0.005556 |

**Residential Ultra High Efficiency**

| Overview | |
|---|---|
| Name | Residential Ultra High Efficiency T |
| Abbr | 9 |
| Category | Default |
| Measure Type | Standard Measure |

| Time Period | |
|---|---|
| First Year | 2015 |
| Last Year | 2020 |
| Measure Length | 6 |

| Measure Life | |
|---|---|
| Permanent | ☑ |

| Fixture Costs | Utility | Customer | Fix/Acct |
|---|---|---|---|
| SF | $150.00 | $150.00 | 2 |
| MF | $150.00 | $150.00 | 4 |

| Administration Costs | |
|---|---|
| Markup Percentage | 35% |

**Description**

Provide a rebate or voucher for the installation of an ultra high efficiency toilet (UHET). Toilets flushing less than 1.0 gpf and phase out inclusion of 1.28 gpf (dual flush) technology. Rebate amounts would reflect the incremental purchase cost and have been at least $150 for UHET. Phase out HETs over time to sunset by 2020.

| Customer Classes | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| | ☑ | ☑ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

| End Uses | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| Toilets | ☑ | ☑ | | | | | | |
| Urinals | | | | | | | | |
| Lavatory Faucets | ☐ | ☐ | | | | | | |
| Showers | ☐ | ☐ | | | | | | |
| Dishwashers | ☐ | ☐ | | | | | | |
| Clothes Washers | ☐ | ☐ | | | | | | |
| Process | | | | | | | | |
| Kitchen Spray Rinse | | | | | | | | |
| Internal Leakage | ☐ | ☐ | | | | | | |
| Baths | ☐ | ☐ | | | | | | |
| Other | ☐ | ☐ | | | | | | |
| Irrigation | ☐ | ☐ | | | | | | |
| Pools | ☐ | ☐ | | | | | | |
| Wash Down | ☐ | ☐ | | | | | | |
| Car Washing | ☐ | ☐ | | | | | | |
| External Leakage | ☐ | ☐ | | | | | | |
| Indoor | | | | | | | | |
| Outdoor | | | | | | | | |
| Cooling | | | | | | | | |
| tory/Kitchen Faucets | ☐ | ☐ | | | | | | |

**Comments**

Water savings calculated from fixture models based on flush volume HET vs. 1.6 gpf. Baseline study reports that 90% of toilets are 1.6 gpf. There are not many UHET models right now, but more are entering the market annually.
Consider: implementing a Retrofit on Resale.
Consider: Graduated rebate levels. Use averages in the model. Phase out $50 on HET and focus on $150 on UHET. Tie the HET Time of Sale connected to the 2019 sunset of that ordinance with the sunset of the HET rebate.

| Results | |
|---|---|
| Average Water Savings (mgd) | |
| 0.007561 | |
| Lifetime Savings - Present Value ($) | |
| Utility | $116,911 |
| Community | $116,911 |
| Lifetime Costs - Present Value ($) | |
| Utility | $308,293 |
| Community | $536,658 |
| Benefit to Cost Ratio | |
| Utility | 0.38 |
| Community | 0.22 |
| Cost of Savings per Unit Volume ($/mg) | |
| Utility | $5,316 |

| End Use Savings Per Replacement | % Savings per Account |
|---|---|
| SF Toilets | 37.5% |
| MF Toilets | 37.5% |

| Targets | |
|---|---|
| Target Method | Percentage |
| % of Accts Targeted / yr | 0.500% |
| Only Effects New Accts | ☐ |

**Costs** — View: Utility Details

| | Fixture Costs | Admin Costs | Util Total |
|---|---|---|---|
| 2015 | $39,688 | $13,891 | $53,578 |
| 2016 | $39,902 | $13,966 | $53,868 |
| 2017 | $40,116 | $14,041 | $54,157 |
| 2018 | $40,331 | $14,116 | $54,446 |
| 2019 | $40,545 | $14,191 | $54,735 |
| 2020 | $40,759 | $14,266 | $55,025 |
| 2021 | $0 | $0 | $0 |
| 2022 | $0 | $0 | $0 |
| 2023 | $0 | $0 | $0 |
| 2024 | $0 | $0 | $0 |
| 2025 | $0 | $0 | $0 |
| 2026 | $0 | $0 | $0 |
| 2027 | $0 | $0 | $0 |
| 2028 | $0 | $0 | $0 |
| 2029 | $0 | $0 | $0 |
| 2030 | $0 | $0 | $0 |
| 2031 | $0 | $0 | $0 |
| 2032 | $0 | $0 | $0 |
| 2033 | $0 | $0 | $0 |
| 2034 | $0 | $0 | $0 |
| 2035 | $0 | $0 | $0 |

**Targets** — View: Fixtures

| | SF | MF | Total |
|---|---|---|---|
| 2015 | 210 | 55 | 265 |
| 2016 | 211 | 55 | 266 |
| 2017 | 212 | 56 | 267 |
| 2018 | 212 | 56 | 269 |
| 2019 | 213 | 57 | 270 |
| 2020 | 214 | 58 | 272 |
| 2021 | 0 | 0 | 0 |
| 2022 | 0 | 0 | 0 |
| 2023 | 0 | 0 | 0 |
| 2024 | 0 | 0 | 0 |
| 2025 | 0 | 0 | 0 |
| 2026 | 0 | 0 | 0 |
| 2027 | 0 | 0 | 0 |
| 2028 | 0 | 0 | 0 |
| 2029 | 0 | 0 | 0 |
| 2030 | 0 | 0 | 0 |
| 2031 | 0 | 0 | 0 |
| 2032 | 0 | 0 | 0 |
| 2033 | 0 | 0 | 0 |
| 2034 | 0 | 0 | 0 |
| 2035 | 0 | 0 | 0 |

**Water Savings (mgd)**

| | Total Savings (mgd) |
|---|---|
| 2015 | 0.001592 |
| 2016 | 0.003154 |
| 2017 | 0.004682 |
| 2018 | 0.006176 |
| 2019 | 0.007637 |
| 2020 | 0.009065 |
| 2021 | 0.008984 |
| 2022 | 0.008904 |
| 2023 | 0.008823 |
| 2024 | 0.008741 |
| 2025 | 0.008660 |
| 2026 | 0.008567 |
| 2027 | 0.008479 |
| 2028 | 0.008397 |
| 2029 | 0.008320 |
| 2030 | 0.008247 |
| 2031 | 0.008184 |
| 2032 | 0.008125 |
| 2033 | 0.008069 |
| 2034 | 0.008015 |
| 2035 | 0.007964 |



**High Efficiency Clothes Washer**

| Overview | |
|---|---|
| Name | High Efficiency Clothes Washer Re |
| Abbr | 10 |
| Category | Default |
| Measure Type | Standard Measure |

| Time Period | |
|---|---|
| First Year | 2015 |
| Last Year | 2026 |
| Measure Length | 12 |

| Measure Life | |
|---|---|
| Permanent | ☑ |

| Fixture Costs | Utility | Customer | Fix/Acct |
|---|---|---|---|
| SF | $200.00 | $400.00 | 1 |
| MF | $200.00 | $400.00 | 1 |

| Administration Costs | |
|---|---|
| Markup Percentage | 40% |

**Description**

Provide a rebate for efficient washing machines to single family homes and in-unit condo/apartment complexes that do NOT have common laundry rooms. It is assumed that the rebates would remain consistent with relevant state and federal regulations (Department of Energy, Energy Star) and only offer the best available technology. This program would be similar to the City's current program. Rebate would be modified to increase incentive for the most efficient washers. Consider alternative delivery/financing mechanisms.

| Customer Classes | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| | ☑ | ☑ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

| End Uses | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| Toilets | ☐ | ☐ | | | | | | |
| Urinals | | | | | | | | |
| Lavatory Faucets | ☐ | ☐ | | | | | | |
| Showers | ☐ | ☐ | | | | | | |
| Dishwashers | ☐ | ☐ | | | | | | |
| Clothes Washers | ☑ | ☑ | | | | | | |
| Process | | | | | | | | |
| Kitchen Spray Rinse | | | | | | | | |
| Internal Leakage | ☐ | ☐ | | | | | | |
| Baths | ☐ | ☐ | | | | | | |
| Other | ☐ | ☐ | | | | | | |
| Irrigation | ☐ | ☐ | | | | | | |
| Pools | ☐ | ☐ | | | | | | |
| Wash Down | ☐ | ☐ | | | | | | |
| Car Washing | ☐ | ☐ | | | | | | |
| External Leakage | ☐ | ☐ | | | | | | |
| Indoor | | | | | | | | |
| Outdoor | | | | | | | | |
| Cooling | | | | | | | | |
| tory/Kitchen Faucets | ☐ | ☐ | | | | | | |

**Comments**

Water savings is based on difference between a 34 gallon per load machine compared to a 12 gallon per load CEE Tier 3 machine. Assumes PG&E program is ongoing. Water savings is calculated from fixture models based on washer volume. Allows participants to replace medium efficiency machines with high-efficiency ones. Customer pays incremental purchase and installation costs after rebate amount. Utility cost is based on the City's current rebate value doubled to increase participation.

| Results | |
|---|---|
| Average Water Savings (mgd) | |
| 0.077760 | |
| Lifetime Savings - Present Value ($) | |
| Utility | $1,168,045 |
| Community | $4,058,236 |
| Lifetime Costs - Present Value ($) | |
| Utility | $1,666,452 |
| Community | $4,047,097 |
| Benefit to Cost Ratio | |
| Utility | 0.70 |
| Community | 1.00 |
| Cost of Savings per Unit Volume ($/mg) | |
| Utility | $2,794 |

| End Use Savings Per Replacement | % Savings per Account |
|---|---|
| SF Clothes Washers | 53.3% |
| MF Clothes Washers | 53.3% |

| Targets | |
|---|---|
| Target Method | Percentage |
| % of Accts Targeted / yr | 2.500% |
| Only Effects New Accts | ☐ |

**Costs**

View: Utility Details

| | Fixture Costs | Admin Costs | Util Total |
|---|---|---|---|
| 2015 | $109,114 | $43,645 | $152,759 |
| 2016 | $109,633 | $43,853 | $153,486 |
| 2017 | $110,151 | $44,061 | $154,212 |
| 2018 | $110,670 | $44,268 | $154,938 |
| 2019 | $111,189 | $44,476 | $155,665 |
| 2020 | $111,708 | $44,683 | $156,391 |
| 2021 | $112,192 | $44,877 | $157,069 |
| 2022 | $112,676 | $45,070 | $157,747 |
| 2023 | $113,160 | $45,264 | $158,424 |
| 2024 | $113,644 | $45,458 | $159,102 |
| 2025 | $114,128 | $45,651 | $159,780 |
| 2026 | $114,685 | $45,874 | $160,559 |
| 2027 | $0 | $0 | $0 |
| 2028 | $0 | $0 | $0 |
| 2029 | $0 | $0 | $0 |
| 2030 | $0 | $0 | $0 |
| 2031 | $0 | $0 | $0 |
| 2032 | $0 | $0 | $0 |
| 2033 | $0 | $0 | $0 |
| 2034 | $0 | $0 | $0 |
| 2035 | $0 | $0 | $0 |

**Targets**

View: Fixtures

| | SF | MF | Total |
|---|---|---|---|
| 2015 | 477 | 68 | 546 |
| 2016 | 479 | 69 | 548 |
| 2017 | 481 | 70 | 551 |
| 2018 | 483 | 71 | 553 |
| 2019 | 485 | 71 | 556 |
| 2020 | 486 | 72 | 559 |
| 2021 | 488 | 73 | 561 |
| 2022 | 490 | 73 | 563 |
| 2023 | 492 | 73 | 566 |
| 2024 | 494 | 74 | 568 |
| 2025 | 496 | 74 | 571 |
| 2026 | 498 | 75 | 573 |
| 2027 | 0 | 0 | 0 |
| 2028 | 0 | 0 | 0 |
| 2029 | 0 | 0 | 0 |
| 2030 | 0 | 0 | 0 |
| 2031 | 0 | 0 | 0 |
| 2032 | 0 | 0 | 0 |
| 2033 | 0 | 0 | 0 |
| 2034 | 0 | 0 | 0 |
| 2035 | 0 | 0 | 0 |

**Water Savings (mgd)**

| | Total Savings (mgd) |
|---|---|
| 2015 | 0.009766 |
| 2016 | 0.019343 |
| 2017 | 0.028708 |
| 2018 | 0.037867 |
| 2019 | 0.046817 |
| 2020 | 0.055560 |
| 2021 | 0.064449 |
| 2022 | 0.073211 |
| 2023 | 0.081845 |
| 2024 | 0.090347 |
| 2025 | 0.098717 |
| 2026 | 0.106819 |
| 2027 | 0.105710 |
| 2028 | 0.104668 |
| 2029 | 0.103686 |
| 2030 | 0.102758 |
| 2031 | 0.101967 |
| 2032 | 0.101217 |
| 2033 | 0.100504 |
| 2034 | 0.099825 |
| 2035 | 0.099177 |

**High Efficiency Clothes Washer - New**

| Overview | |
|---|---|
| Name | High Efficiency Clothes Washer - N |
| Abbr | 11 |
| Category | Default |
| Measure Type | Standard Measure |

| Time Period | |
|---|---|
| First Year | 2021 |
| Last Year | 2035 |
| Measure Length | 15 |

| Measure Life | |
|---|---|
| Permanent | ☑ |

| Fixture Costs | Utility | Customer | Fix/Acct |
|---|---|---|---|
| SF | $50.00 | $600.00 | 1 |
| MF | $50.00 | $600.00 | 1 |
| COM | $50.00 | $1,200.00 | 10 |

| Administration Costs | |
|---|---|
| Markup Percentage | 40% |

**Description**

Require developers to install an efficient clothes washer (meeting certain water efficiency standards, such as gallons/load). Building Department would be requested to ensure that an efficient washer was installed before new home or building occupancy. Verify that the Utility can enforce conditions of water service that may include efficiency standards for washing machines. Pattern after the North Marin Water District Program.

**Customer Classes**

| SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|
| ☑ | ☑ | ☑ | ☐ | ☐ | ☐ | ☐ | ☐ |

**End Uses**

| | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| Toilets | ☐ | ☐ | ☐ | | | | | |
| Urinals | | | ☐ | | | | | |
| Lavatory Faucets | ☐ | ☐ | ☐ | | | | | |
| Showers | ☐ | ☐ | ☐ | | | | | |
| Dishwashers | ☐ | ☐ | ☐ | | | | | |
| Clothes Washers | ☑ | ☑ | ☑ | | | | | |
| Process | | | ☐ | | | | | |
| Kitchen Spray Rinse | | | ☐ | | | | | |
| Internal Leakage | ☐ | ☐ | ☐ | | | | | |
| Baths | ☐ | ☐ | | | | | | |
| Other | ☐ | ☐ | ☐ | | | | | |
| Irrigation | ☐ | ☐ | ☐ | | | | | |
| Pools | ☐ | ☐ | | | | | | |
| Wash Down | ☐ | ☐ | | | | | | |
| Car Washing | ☐ | ☐ | | | | | | |
| External Leakage | ☐ | ☐ | ☐ | | | | | |
| Indoor | | | | | | | | |
| Outdoor | | | | | | | | |
| Cooling | | | ☐ | | | | | |
| tory/Kitchen Faucets | ☐ | ☐ | ☐ | | | | | |

**Comments**

Water savings is based on difference between a 34 gallon per load machine compared to a 12 gallon per load CEE Tier 3 machine. Water savings based on new machines selected and paid for by developer (bearing the customer costs). Utility costs based on cost of inspection - City estimates the administrative costs of having a HECW code requirement as part of construction projects would be about $10,000 per year. This is based on 75-100 projects that would need plan review, customer contacts to explain requirements, inspections at the end of all projects, and all necessary interactions with Planning Department through the computer or by other means.

**Results**

| Average Water Savings (mgd) | |
|---|---|
| 0.012936 | |
| **Lifetime Savings - Present Value ($)** | |
| Utility | $179,990 |
| Community | $657,587 |
| **Lifetime Costs - Present Value ($)** | |
| Utility | $135,761 |
| Community | $1,771,938 |
| **Benefit to Cost Ratio** | |
| Utility | 1.33 |
| Community | 0.37 |
| **Cost of Savings per Unit Volume ($/mg)** | |
| Utility | $1,368 |

**End Use Savings Per Replacement**

| | % Savings per Account |
|---|---|
| SF Clothes Washers | 53.3% |
| MF Clothes Washers | 53.3% |
| COM Clothes Washers | 53.3% |

**Targets**

| | |
|---|---|
| Target Method | Percentage |
| % of Accts Targeted / yr | 100.000% |
| Only Effects New Accts | ☑ |

**Costs** — View: Summary

| | Utility | Customer | Total |
|---|---|---|---|
| 2015 | $0 | $0 | $0 |
| 2016 | $0 | $0 | $0 |
| 2017 | $0 | $0 | $0 |
| 2018 | $0 | $0 | $0 |
| 2019 | $0 | $0 | $0 |
| 2020 | $0 | $0 | $0 |
| 2021 | $10,035 | $113,944 | $123,979 |
| 2022 | $10,035 | $113,944 | $123,979 |
| 2023 | $10,035 | $113,944 | $123,979 |
| 2024 | $10,035 | $113,944 | $123,979 |
| 2025 | $10,035 | $113,944 | $123,979 |
| 2026 | $12,972 | $155,540 | $168,511 |
| 2027 | $12,972 | $155,540 | $168,511 |
| 2028 | $12,972 | $155,540 | $168,511 |
| 2029 | $12,972 | $155,540 | $168,511 |
| 2030 | $12,972 | $155,540 | $168,511 |
| 2031 | $13,475 | $172,034 | $185,509 |
| 2032 | $13,475 | $172,034 | $185,509 |
| 2033 | $13,475 | $172,034 | $185,509 |
| 2034 | $13,475 | $172,034 | $185,509 |
| 2035 | $13,475 | $172,034 | $185,509 |

**Targets** — View: Accounts

| | SF | MF | COM | Total |
|---|---|---|---|---|
| 2015 | 0 | 0 | 0 | 0 |
| 2016 | 0 | 0 | 0 | 0 |
| 2017 | 0 | 0 | 0 | 0 |
| 2018 | 0 | 0 | 0 | 0 |
| 2019 | 0 | 0 | 0 | 0 |
| 2020 | 0 | 0 | 0 | 0 |
| 2021 | 80 | 17 | 5 | 101 |
| 2022 | 80 | 17 | 5 | 101 |
| 2023 | 80 | 17 | 5 | 101 |
| 2024 | 80 | 17 | 5 | 101 |
| 2025 | 80 | 17 | 5 | 101 |
| 2026 | 81 | 30 | 7 | 119 |
| 2027 | 81 | 30 | 7 | 119 |
| 2028 | 81 | 30 | 7 | 119 |
| 2029 | 81 | 30 | 7 | 119 |
| 2030 | 81 | 30 | 7 | 119 |
| 2031 | 75 | 23 | 9 | 108 |
| 2032 | 75 | 23 | 9 | 108 |
| 2033 | 75 | 23 | 9 | 108 |
| 2034 | 75 | 23 | 9 | 108 |
| 2035 | 75 | 23 | 9 | 108 |

**Water Savings (mgd)**

| | Total Savings (mgd) |
|---|---|
| 2015 | 0.000000 |
| 2016 | 0.000000 |
| 2017 | 0.000000 |
| 2018 | 0.000000 |
| 2019 | 0.000000 |
| 2020 | 0.000000 |
| 2021 | 0.002097 |
| 2022 | 0.004156 |
| 2023 | 0.006178 |
| 2024 | 0.008162 |
| 2025 | 0.010109 |
| 2026 | 0.012870 |
| 2027 | 0.015576 |
| 2028 | 0.018230 |
| 2029 | 0.020838 |
| 2030 | 0.023402 |
| 2031 | 0.025638 |
| 2032 | 0.027848 |
| 2033 | 0.030033 |
| 2034 | 0.032195 |
| 2035 | 0.034334 |



**Hot Water On Demand - New Development**

| Overview | |
|---|---|
| Name | Hot Water On Demand - New Dev |
| Abbr | 12 |
| Category | Default |
| Measure Type | Standard Measure |

| Time Period | |
|---|---|
| First Year | 2021 |
| Last Year | 2035 |
| Measure Length | 15 |

| Measure Life | |
|---|---|
| Permanent | ☑ |

| Fixture Costs | Utility | Customer | Fix/Acct |
|---|---|---|---|
| SF | $25.00 | $600.00 | 3 |
| MF | $25.00 | $2,767.72 | 14 |
| COM | $25.00 | $2,940.19 | 15 |

| Administration Costs | |
|---|---|
| Markup Percentage | 50% |

**Description**

Work with developers and permitted remodels (of certain size or type) to equip new homes or buildings with efficient hot water on-demand systems such as structured plumbing systems. These systems use a pump placed under the sink to recycle water sitting in the hot water pipes to the water heater or to move the water heater into the center of the house and/or reduce hot water waiting times by having an on-demand pump on a recirculation line.

| Customer Classes | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| | ☑ | ☑ | ☑ | ☐ | ☐ | ☐ | ☐ | ☐ |

| End Uses | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| Toilets | ☐ | ☐ | ☐ | | | | | |
| Urinals | | | ☐ | | | | | |
| Lavatory Faucets | ☑ | ☑ | ☑ | | | | | |
| Showers | ☑ | ☑ | ☑ | | | | | |
| Dishwashers | ☐ | ☐ | ☐ | | | | | |
| Clothes Washers | ☐ | ☐ | ☐ | | | | | |
| Process | | | ☐ | | | | | |
| Kitchen Spray Rinse | | | ☐ | | | | | |
| Internal Leakage | ☐ | ☐ | ☐ | | | | | |
| Baths | ☐ | ☐ | | | | | | |
| Other | ☐ | ☐ | ☐ | | | | | |
| Irrigation | ☐ | ☐ | ☐ | | | | | |
| Pools | ☐ | ☐ | | | | | | |
| Wash Down | ☐ | ☐ | | | | | | |
| Car Washing | ☐ | ☐ | | | | | | |
| External Leakage | ☐ | ☐ | ☐ | | | | | |
| Indoor | | | | | | | | |
| Outdoor | | | | | | | | |
| Cooling | | | ☐ | | | | | |
| tory/Kitchen Faucets | ☐ | ☐ | ☐ | | | | | |

| Results | |
|---|---|
| Average Water Savings (mgd) | |
| 0.004647 | |
| Lifetime Savings - Present Value ($) | |
| Utility | $64,691 |
| Community | $223,009 |
| Lifetime Costs - Present Value ($) | |
| Utility | $279,776 |
| Community | $15,345,798 |
| Benefit to Cost Ratio | |
| Utility | 0.23 |
| Community | 0.01 |
| Cost of Savings per Unit Volume ($/mg) | |
| Utility | $7,849 |

| End Use Savings Per Replacement | % Savings per Account |
|---|---|
| SF Lavatory Faucets | 11.6% |
| MF Lavatory Faucets | 11.6% |
| COM Lavatory Faucets | 11.6% |
| SF Showers | 11.6% |
| MF Showers | 11.6% |
| COM Showers | 11.6% |

| Targets | |
|---|---|
| Target Method | Percentage |
| % of Accts Targeted / yr | 100.000% |
| Only Effects New Accts | ☑ |

**Comments**

Customer costs funded by developer and based on installation costs. Utility cost based on inspection cost. Target about 60 new SF homes per year for a total of 840 new homes inside the city by year 2030. Also an additional 2510 multi-family dwelling units by 2030. The number of fixtures per account is based on the number of bath and kitchen units. For MF accounts it's based on the ratio of dwelling units to accounts and assumes one bath unit and kitchen.

Water savings based on Jim Lutz paper and information from Gary Klein and David Grieshop. See spreadsheet titled "Hot Water On Demand Water Savings Estimate_2013", includes 1750 sq. ft. house, saves 1571 gallons per year or 4.3 gpd/acct and a total of 99.5 gpd per SF home, equates to ~4.3% savings per home. Based on a review of Single Family Home use for City of Santa Cruz customers at 30.6 gpd for faucet and 37.5 gpd for showers per household results in an equivalent savings of 12% on shower and faucet end use. Overall an estimated 7.45 gpd savings or 12% by MWM.

**Costs** — View: Summary

| | Utility | Customer | Total |
|---|---|---|---|
| 2015 | $0 | $0 | $0 |
| 2016 | $0 | $0 | $0 |
| 2017 | $0 | $0 | $0 |
| 2018 | $0 | $0 | $0 |
| 2019 | $0 | $0 | $0 |
| 2020 | $0 | $0 | $0 |
| 2021 | $20,454 | $1,003,809 | $1,024,263 |
| 2022 | $20,454 | $1,003,809 | $1,024,263 |
| 2023 | $20,454 | $1,003,809 | $1,024,263 |
| 2024 | $20,454 | $1,003,809 | $1,024,263 |
| 2025 | $20,454 | $1,003,809 | $1,024,263 |
| 2026 | $28,861 | $1,620,580 | $1,649,441 |
| 2027 | $28,861 | $1,620,580 | $1,649,441 |
| 2028 | $28,861 | $1,620,580 | $1,649,441 |
| 2029 | $28,861 | $1,620,580 | $1,649,441 |
| 2030 | $28,861 | $1,620,580 | $1,649,441 |
| 2031 | $25,673 | $1,430,279 | $1,455,952 |
| 2032 | $25,673 | $1,430,279 | $1,455,952 |
| 2033 | $25,673 | $1,430,279 | $1,455,952 |
| 2034 | $25,673 | $1,430,279 | $1,455,952 |
| 2035 | $25,673 | $1,430,279 | $1,455,952 |

**Targets** — View: Accounts

| | SF | MF | COM | Total |
|---|---|---|---|---|
| 2015 | 0 | 0 | 0 | 0 |
| 2016 | 0 | 0 | 0 | 0 |
| 2017 | 0 | 0 | 0 | 0 |
| 2018 | 0 | 0 | 0 | 0 |
| 2019 | 0 | 0 | 0 | 0 |
| 2020 | 0 | 0 | 0 | 0 |
| 2021 | 80 | 17 | 5 | 101 |
| 2022 | 80 | 17 | 5 | 101 |
| 2023 | 80 | 17 | 5 | 101 |
| 2024 | 80 | 17 | 5 | 101 |
| 2025 | 80 | 17 | 5 | 101 |
| 2026 | 81 | 30 | 7 | 119 |
| 2027 | 81 | 30 | 7 | 119 |
| 2028 | 81 | 30 | 7 | 119 |
| 2029 | 81 | 30 | 7 | 119 |
| 2030 | 81 | 30 | 7 | 119 |
| 2031 | 75 | 23 | 9 | 108 |
| 2032 | 75 | 23 | 9 | 108 |
| 2033 | 75 | 23 | 9 | 108 |
| 2034 | 75 | 23 | 9 | 108 |
| 2035 | 75 | 23 | 9 | 108 |

**Water Savings (mgd)**

| | Total Savings (mgd) |
|---|---|
| 2015 | 0.000000 |
| 2016 | 0.000000 |
| 2017 | 0.000000 |
| 2018 | 0.000000 |
| 2019 | 0.000000 |
| 2020 | 0.000000 |
| 2021 | 0.000764 |
| 2022 | 0.001513 |
| 2023 | 0.002249 |
| 2024 | 0.002972 |
| 2025 | 0.003680 |
| 2026 | 0.004665 |
| 2027 | 0.005630 |
| 2028 | 0.006577 |
| 2029 | 0.007506 |
| 2030 | 0.008420 |
| 2031 | 0.009199 |
| 2032 | 0.009969 |
| 2033 | 0.010730 |
| 2034 | 0.011482 |
| 2035 | 0.012227 |

**Toilet Retrofit at Time of Sale**

| Overview | |
|---|---|
| Name | Toilet Retrofit at Time of Sale |
| Abbr | 13 |
| Category | Default |
| Measure Type | Standard Measure |

| Time Period | |
|---|---|
| First Year | 2015 |
| Last Year | 2019 |
| Measure Length | 5 |

| Measure Life | |
|---|---|
| Permanent | ☑ |

| Fixture Costs | Utility | Customer | Fix/Acct |
|---|---|---|---|
| SF | $37.50 | $80.25 | 2 |
| MF | $37.50 | $75.00 | 4 |
| COM | $125.00 | $500.00 | 10 |

| Administration Costs | |
|---|---|
| Markup Percentage | 50% |

**Description**

Work with the real estate industry to require a certificate of compliance be submitted to the Utility that verifies that a plumber has inspected the property and efficient fixtures were either already there or were installed at time of sale (TOS).

| Customer Classes | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| | ☑ | ☑ | ☑ | ☐ | ☐ | ☐ | ☐ | ☐ |

| End Uses | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| Toilets | ☑ | ☑ | ☑ | | | | | |
| Urinals | | | ☐ | | | | | |
| Lavatory Faucets | ☐ | ☐ | ☐ | | | | | |
| Showers | ☐ | ☐ | ☐ | | | | | |
| Dishwashers | ☐ | ☐ | ☐ | | | | | |
| Clothes Washers | ☐ | ☐ | ☐ | | | | | |
| Process | | | ☐ | | | | | |
| Kitchen Spray Rinse | | | ☐ | | | | | |
| Internal Leakage | ☐ | ☐ | ☐ | | | | | |
| Baths | ☐ | ☐ | | | | | | |
| Other | ☐ | ☐ | ☐ | | | | | |
| Irrigation | ☐ | ☐ | ☐ | | | | | |
| Pools | ☐ | ☐ | | | | | | |
| Wash Down | ☐ | ☐ | | | | | | |
| Car Washing | ☐ | ☐ | | | | | | |
| External Leakage | ☐ | ☐ | ☐ | | | | | |
| Indoor | | | | | | | | |
| Outdoor | | | | | | | | |
| Cooling | | | ☐ | | | | | |
| tory/Kitchen Faucets | ☐ | ☐ | ☐ | | | | | |

**Comments**

Water savings assumes City's ordinance will sunset when Statewide Retrofit on Resale SB 407 goes active 2017 for residential and 2019 for commercial properties. Savings based on replacing a 3.5 gpf with a 1.28 gpf HET. Utility cost based on inspection costs. Customer costs based on purchase and installation costs. Long term housing turnover is about 2.7% per year. Commercial property turns over less frequently than residential. Fewer than 1 fixture per property is now being replaced under this ordinance. Will upgrade standard to become HET.

| Results | |
|---|---|
| Average Water Savings (mgd) | |
| 0.023134 | |
| Lifetime Savings - Present Value ($) | |
| Utility | $359,499 |
| Community | $359,499 |
| Lifetime Costs - Present Value ($) | |
| Utility | $268,930 |
| Community | $832,001 |
| Benefit to Cost Ratio | |
| Utility | 1.34 |
| Community | 0.43 |
| Cost of Savings per Unit Volume ($/mg) | |
| Utility | $1,516 |

| End Use Savings Per Replacement | % Savings per Account |
|---|---|
| SF Toilets | 63.0% |
| MF Toilets | 63.0% |
| COM Toilets | 63.0% |

| Targets | |
|---|---|
| Target Method | Percentage |
| % of Accts Targeted / yr | 0.850% |
| Only Effects New Accts | ☐ |

**Costs** — View: Summary

| | Utility | Customer | Total |
|---|---|---|---|
| 2015 | $55,676 | $116,610 | $172,286 |
| 2016 | $55,947 | $117,158 | $173,105 |
| 2017 | $56,218 | $117,706 | $173,924 |
| 2018 | $56,490 | $118,254 | $174,744 |
| 2019 | $56,761 | $118,802 | $175,563 |
| 2020 | $0 | $0 | $0 |
| 2021 | $0 | $0 | $0 |
| 2022 | $0 | $0 | $0 |
| 2023 | $0 | $0 | $0 |
| 2024 | $0 | $0 | $0 |
| 2025 | $0 | $0 | $0 |
| 2026 | $0 | $0 | $0 |
| 2027 | $0 | $0 | $0 |
| 2028 | $0 | $0 | $0 |
| 2029 | $0 | $0 | $0 |
| 2030 | $0 | $0 | $0 |
| 2031 | $0 | $0 | $0 |
| 2032 | $0 | $0 | $0 |
| 2033 | $0 | $0 | $0 |
| 2034 | $0 | $0 | $0 |
| 2035 | $0 | $0 | $0 |

**Targets** — View: Accounts

| | SF | MF | COM | Total |
|---|---|---|---|---|
| 2015 | 162 | 23 | 16 | 202 |
| 2016 | 163 | 23 | 16 | 203 |
| 2017 | 164 | 24 | 16 | 204 |
| 2018 | 164 | 24 | 16 | 205 |
| 2019 | 165 | 24 | 16 | 206 |
| 2020 | 0 | 0 | 0 | 0 |
| 2021 | 0 | 0 | 0 | 0 |
| 2022 | 0 | 0 | 0 | 0 |
| 2023 | 0 | 0 | 0 | 0 |
| 2024 | 0 | 0 | 0 | 0 |
| 2025 | 0 | 0 | 0 | 0 |
| 2026 | 0 | 0 | 0 | 0 |
| 2027 | 0 | 0 | 0 | 0 |
| 2028 | 0 | 0 | 0 | 0 |
| 2029 | 0 | 0 | 0 | 0 |
| 2030 | 0 | 0 | 0 | 0 |
| 2031 | 0 | 0 | 0 | 0 |
| 2032 | 0 | 0 | 0 | 0 |
| 2033 | 0 | 0 | 0 | 0 |
| 2034 | 0 | 0 | 0 | 0 |
| 2035 | 0 | 0 | 0 | 0 |

**Water Savings (mgd)**

| | Total Savings (mgd) |
|---|---|
| 2015 | 0.005652 |
| 2016 | 0.011199 |
| 2017 | 0.016633 |
| 2018 | 0.021955 |
| 2019 | 0.027166 |
| 2020 | 0.026803 |
| 2021 | 0.026583 |
| 2022 | 0.026363 |
| 2023 | 0.026143 |
| 2024 | 0.025924 |
| 2025 | 0.025704 |
| 2026 | 0.025458 |
| 2027 | 0.025226 |
| 2028 | 0.025007 |
| 2029 | 0.024799 |
| 2030 | 0.024603 |
| 2031 | 0.024432 |
| 2032 | 0.024269 |
| 2033 | 0.024114 |
| 2034 | 0.023965 |
| 2035 | 0.023823 |

**CII MF Common Laundry Room**

| Overview | |
|---|---|
| Name | CII MF Common Laundry Room Hi |
| Abbr | 14 |
| Category | Default |
| Measure Type | Standard Measure |

| Time Period | |
|---|---|
| First Year | 2015 |
| Last Year | 2024 |
| Measure Length | 10 |

| Measure Life | |
|---|---|
| Permanent | ☑ |

| Fixture Costs | Utility | Customer | Fix/Acct |
|---|---|---|---|
| MF | $400.00 | $500.00 | 2 |
| COM | $400.00 | $500.00 | 4 |

| Administration Costs | |
|---|---|
| Markup Percentage | 35% |

**Description**

Provide a $400 rebate for the installation of a high efficiency commercial washer (HEW) in CII and MF common area laundry. Rebate amounts would reflect the incremental purchase cost. Program will be shorter lived as it is intended to be a market transformation measure and eventually would be stopped as efficient units reach saturation. Currently, eligible for City's program, this is planned as an expanded measure.

**Customer Classes**

| SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|
| ☐ | ☑ | ☑ | ☐ | ☐ | ☐ | ☐ | ☐ |

**End Uses**

| | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| Toilets | | ☐ | ☐ | | | | | |
| Urinals | | | ☐ | | | | | |
| Lavatory Faucets | | ☐ | ☐ | | | | | |
| Showers | | ☐ | ☐ | | | | | |
| Dishwashers | | ☐ | ☐ | | | | | |
| Clothes Washers | | ☑ | ☑ | | | | | |
| Process | | | ☐ | | | | | |
| Kitchen Spray Rinse | | | ☐ | | | | | |
| Internal Leakage | | ☐ | ☐ | | | | | |
| Baths | | ☐ | | | | | | |
| Other | | ☐ | ☐ | | | | | |
| Irrigation | | ☐ | ☐ | | | | | |
| Pools | | ☐ | | | | | | |
| Wash Down | | ☐ | | | | | | |
| Car Washing | | ☐ | | | | | | |
| External Leakage | | ☐ | ☐ | | | | | |
| Indoor | | | | | | | | |
| Outdoor | | | | | | | | |
| Cooling | | | ☐ | | | | | |
| tory/Kitchen Faucets | | ☐ | ☐ | | | | | |

**Comments**

Water savings is based on difference between a 34 gallon per load machine compared to a 12 gallon per load CEE Tier 3 machine. Utility costs assume high-efficiency machine that's more expensive than a SF residential one. Customer costs based on installation costs. Engineering estimate of average savings, assume water factor is 25% less for replacement. Want on-site laundries for CII (hotels), spas, UCSC laundry, see page 49 of baseline survey. Start by considering a combination of a mandate and City funded clothes washer program for common laundry rooms that would accelerate retirement of old inefficient equipment for the next 5-10 years when codes will transform market.

**Results**

| Average Water Savings (mgd) | |
|---|---|
| | 0.007058 |
| **Lifetime Savings - Present Value ($)** | |
| Utility | $106,946 |
| Community | $427,131 |
| **Lifetime Costs - Present Value ($)** | |
| Utility | $230,548 |
| Community | $444,018 |
| **Benefit to Cost Ratio** | |
| Utility | 0.46 |
| Community | 0.96 |
| **Cost of Savings per Unit Volume ($/mg)** | |
| Utility | $4,258 |

**End Use Savings Per Replacement**

| | % Savings per Account |
|---|---|
| MF Clothes Washers | 53.3% |
| COM Clothes Washers | 53.3% |

**Targets**

| Target Method | Percentage |
|---|---|
| % of Accts Targeted / yr | 0.350% |
| Only Effects New Accts | ☐ |

**Costs**

View: Utility Details

| | Fixture Costs | Admin Costs | Util Total |
|---|---|---|---|
| 2015 | $18,306 | $6,407 | $24,713 |
| 2016 | $18,442 | $6,455 | $24,897 |
| 2017 | $18,579 | $6,503 | $25,082 |
| 2018 | $18,716 | $6,550 | $25,266 |
| 2019 | $18,852 | $6,598 | $25,451 |
| 2020 | $18,989 | $6,646 | $25,635 |
| 2021 | $19,063 | $6,672 | $25,735 |
| 2022 | $19,138 | $6,698 | $25,836 |
| 2023 | $19,212 | $6,724 | $25,936 |
| 2024 | $19,286 | $6,750 | $26,036 |
| 2025 | $0 | $0 | $0 |
| 2026 | $0 | $0 | $0 |
| 2027 | $0 | $0 | $0 |
| 2028 | $0 | $0 | $0 |
| 2029 | $0 | $0 | $0 |
| 2030 | $0 | $0 | $0 |
| 2031 | $0 | $0 | $0 |
| 2032 | $0 | $0 | $0 |
| 2033 | $0 | $0 | $0 |
| 2034 | $0 | $0 | $0 |
| 2035 | $0 | $0 | $0 |

**Targets**

View: Fixtures

| | MF | COM | Total |
|---|---|---|---|
| 2015 | 19 | 27 | 46 |
| 2016 | 19 | 27 | 46 |
| 2017 | 20 | 27 | 46 |
| 2018 | 20 | 27 | 47 |
| 2019 | 20 | 27 | 47 |
| 2020 | 20 | 27 | 47 |
| 2021 | 20 | 27 | 48 |
| 2022 | 20 | 27 | 48 |
| 2023 | 21 | 27 | 48 |
| 2024 | 21 | 28 | 48 |
| 2025 | 0 | 0 | 0 |
| 2026 | 0 | 0 | 0 |
| 2027 | 0 | 0 | 0 |
| 2028 | 0 | 0 | 0 |
| 2029 | 0 | 0 | 0 |
| 2030 | 0 | 0 | 0 |
| 2031 | 0 | 0 | 0 |
| 2032 | 0 | 0 | 0 |
| 2033 | 0 | 0 | 0 |
| 2034 | 0 | 0 | 0 |
| 2035 | 0 | 0 | 0 |

**Water Savings (mgd)**

| | Total Savings (mgd) |
|---|---|
| 2015 | 0.000999 |
| 2016 | 0.001978 |
| 2017 | 0.002933 |
| 2018 | 0.003868 |
| 2019 | 0.004781 |
| 2020 | 0.005674 |
| 2021 | 0.006586 |
| 2022 | 0.007487 |
| 2023 | 0.008375 |
| 2024 | 0.009251 |
| 2025 | 0.009170 |
| 2026 | 0.009070 |
| 2027 | 0.008977 |
| 2028 | 0.008888 |
| 2029 | 0.008804 |
| 2030 | 0.008724 |
| 2031 | 0.008656 |
| 2032 | 0.008592 |
| 2033 | 0.008530 |
| 2034 | 0.008470 |
| 2035 | 0.008413 |

**CII Incentives**

| Overview | |
|---|---|
| Name | CII Incentives |
| Abbr | 15 |
| Category | Default |
| Measure Type | Standard Measure |

| Time Period | |
|---|---|
| First Year | 2021 |
| Last Year | 2026 |
| Measure Length | 6 |

| Measure Life | |
|---|---|
| Permanent | ☑ |

| Fixture Costs | Utility | Customer | Fix/Acct |
|---|---|---|---|
| MF | $500.00 | $1,500.00 | 1 |
| COM | $500.00 | $1,500.00 | 2 |

| Administration Costs | |
|---|---|
| Markup Percentage | 50% |

**Description**

After the free water use survey has been completed at site, the Utility will analyze the recommendations on the findings report that is provided and determine if site qualifies for a financial incentive. Financial incentives will be provided after analyzing the cost-benefit ratio of each proposed project. Incentives are tailored to each individual site as each site has varying water savings potentials. Incentives will be granted at the sole discretion of the Utility while funding lasts.

| Customer Classes | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| | ☐ | ☑ | ☑ | ☐ | ☐ | ☐ | ☐ | ☐ |

| End Uses | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| Toilets | | ☑ | ☑ | | | | | |
| Urinals | | | ☐ | | | | | |
| Lavatory Faucets | | ☑ | ☑ | | | | | |
| Showers | | ☑ | ☑ | | | | | |
| Dishwashers | | ☑ | ☑ | | | | | |
| Clothes Washers | | ☑ | ☑ | | | | | |
| Process | | | ☐ | | | | | |
| Kitchen Spray Rinse | | | ☐ | | | | | |
| Internal Leakage | | ☑ | ☑ | | | | | |
| Baths | | ☐ | | | | | | |
| Other | | ☐ | ☐ | | | | | |
| Irrigation | | ☑ | ☑ | | | | | |
| Pools | | ☐ | | | | | | |
| Wash Down | | ☐ | | | | | | |
| Car Washing | | ☐ | | | | | | |
| External Leakage | | ☑ | ☑ | | | | | |
| Indoor | | | | | | | | |
| Outdoor | | | | | | | | |
| Cooling | | | ☐ | | | | | |
| tory/Kitchen Faucets | | ☑ | ☑ | | | | | |

**Comments**

Water savings based on engineering estimate of average savings for MF CII Facilities receiving an incentive. Assume targeting larger accounts with use above 5,000 gpd or the top 3% (about 200 accounts). Utility costs set-up similar to SNWA and EBMUD. Large accounts have moved down in use - efficiency has happened. Utility costs based on paying for $200 to help replace CII toilet. Currently, running about $22 per 1000 gals per year. Basis for cost sharing. Assume utility cost may triple as more expensive rebates are requested. Customer costs based on labor installation costs. This is a designer rebate or grant program that depends on viable projects documented in survey.

| Results | |
|---|---|
| Average Water Savings (mgd) | |
| 0.031363 | |
| Lifetime Savings - Present Value ($) | |
| Utility | $449,234 |
| Community | $1,482,337 |
| Lifetime Costs - Present Value ($) | |
| Utility | $128,134 |
| Community | $384,401 |
| Benefit to Cost Ratio | |
| Utility | 3.51 |
| Community | 3.86 |
| Cost of Savings per Unit Volume ($/mg) | |
| Utility | $533 |

| End Use Savings Per Replacement | % Savings per Account |
|---|---|
| MF Toilets | 55.6% |
| COM Toilets | 71.4% |
| MF Lavatory Faucets | 55.6% |
| COM Lavatory Faucets | 71.4% |
| MF Showers | 55.6% |
| COM Showers | 71.4% |
| MF Dishwashers | 55.6% |
| COM Dishwashers | 71.4% |
| MF Clothes Washers | 55.6% |
| COM Clothes Washers | 71.4% |
| MF Internal Leakage | 55.6% |
| COM Internal Leakage | 71.4% |
| MF Irrigation | 55.6% |
| COM Irrigation | 71.4% |
| MF External Leakage | 55.6% |
| COM External Leakage | 71.4% |
| Non-Lavatory/Kitchen Fa | 55.6% |
| Non-Lavatory/Kitchen Fa | 71.4% |

| Targets | |
|---|---|
| Target Method | Percentage |
| % of Accts Targeted / yr | 0.500% |
| Only Effects New Accts | ☐ |

**Costs** — View: Summary

| | Utility | Customer | Total |
|---|---|---|---|
| 2015 | $0 | $0 | $0 |
| 2016 | $0 | $0 | $0 |
| 2017 | $0 | $0 | $0 |
| 2018 | $0 | $0 | $0 |
| 2019 | $0 | $0 | $0 |
| 2020 | $0 | $0 | $0 |
| 2021 | $25,531 | $51,062 | $76,593 |
| 2022 | $25,631 | $51,261 | $76,892 |
| 2023 | $25,730 | $51,460 | $77,190 |
| 2024 | $25,830 | $51,659 | $77,489 |
| 2025 | $25,929 | $51,858 | $77,787 |
| 2026 | $26,098 | $52,195 | $78,293 |
| 2027 | $0 | $0 | $0 |
| 2028 | $0 | $0 | $0 |
| 2029 | $0 | $0 | $0 |
| 2030 | $0 | $0 | $0 |
| 2031 | $0 | $0 | $0 |
| 2032 | $0 | $0 | $0 |
| 2033 | $0 | $0 | $0 |
| 2034 | $0 | $0 | $0 |
| 2035 | $0 | $0 | $0 |

**Targets** — View: Accounts

| | MF | COM | Total |
|---|---|---|---|
| 2015 | 0 | 0 | 0 |
| 2016 | 0 | 0 | 0 |
| 2017 | 0 | 0 | 0 |
| 2018 | 0 | 0 | 0 |
| 2019 | 0 | 0 | 0 |
| 2020 | 0 | 0 | 0 |
| 2021 | 15 | 10 | 24 |
| 2022 | 15 | 10 | 24 |
| 2023 | 15 | 10 | 24 |
| 2024 | 15 | 10 | 25 |
| 2025 | 15 | 10 | 25 |
| 2026 | 15 | 10 | 25 |
| 2027 | 0 | 0 | 0 |
| 2028 | 0 | 0 | 0 |
| 2029 | 0 | 0 | 0 |
| 2030 | 0 | 0 | 0 |
| 2031 | 0 | 0 | 0 |
| 2032 | 0 | 0 | 0 |
| 2033 | 0 | 0 | 0 |
| 2034 | 0 | 0 | 0 |
| 2035 | 0 | 0 | 0 |

**Water Savings (mgd)**

| | Total Savings (mgd) |
|---|---|
| 2015 | 0.000000 |
| 2016 | 0.000000 |
| 2017 | 0.000000 |
| 2018 | 0.000000 |
| 2019 | 0.000000 |
| 2020 | 0.000000 |
| 2021 | 0.009326 |
| 2022 | 0.018534 |
| 2023 | 0.027627 |
| 2024 | 0.036605 |
| 2025 | 0.045468 |
| 2026 | 0.054144 |
| 2027 | 0.053614 |
| 2028 | 0.053111 |
| 2029 | 0.052634 |
| 2030 | 0.052179 |
| 2031 | 0.051791 |
| 2032 | 0.051420 |
| 2033 | 0.051064 |
| 2034 | 0.050722 |
| 2035 | 0.050393 |



**Pre-Rinse Spray Nozzle Installation**

| Overview | |
|---|---|
| Name | Pre-Rinse Spray Nozzle Installatio |
| Abbr | 16 |
| Category | Default |
| Measure Type | Standard Measure |

| Time Period | |
|---|---|
| First Year | 2015 |
| Last Year | 2016 |
| Measure Length | 2 |

| Measure Life | |
|---|---|
| Permanent | ☑ |

| Fixture Costs | Utility | Customer | Fix/Acct |
|---|---|---|---|
| COM | $100.00 | $0.00 | 1 |

| Administration Costs | |
|---|---|
| Markup Percentage | 40% |

**Description**

Provide free 1.3 gpm (or lower) spray nozzles and possibly free installation for the rinse and clean operation in restaurants and other commercial kitchens. Thousands have been replaced in California going door to door, very cost-effective because saves hot water. Project completed in 2014.

| Customer Classes | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| | ☐ | ☐ | ☑ | ☐ | ☐ | ☐ | ☐ | ☐ |

| End Uses | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| Toilets | | | ☐ | | | | | |
| Urinals | | | ☐ | | | | | |
| Lavatory Faucets | | | ☐ | | | | | |
| Showers | | | ☐ | | | | | |
| Dishwashers | | | ☐ | | | | | |
| Clothes Washers | | | ☐ | | | | | |
| Process | | | ☐ | | | | | |
| Kitchen Spray Rinse | | | ☑ | | | | | |
| Internal Leakage | | | ☐ | | | | | |
| Baths | | | | | | | | |
| Other | | | ☐ | | | | | |
| Irrigation | | | ☐ | | | | | |
| Pools | | | | | | | | |
| Wash Down | | | | | | | | |
| Car Washing | | | | | | | | |
| External Leakage | | | ☐ | | | | | |
| Indoor | | | | | | | | |
| Outdoor | | | | | | | | |
| Cooling | | | ☐ | | | | | |
| tory/Kitchen Faucets | | | ☐ | | | | | |

**Comments**

Water savings based on back calculation from the City's baseline survey; use 1.3 gpm Fisher. Scaled up end-use savings to allow for more savings on the average account. Only 2 year program. Using 7.2 scaling factor for the "average" CII customer does not have high enough demand for this end use, which therefore is estimated at 360% for this end use for restaurant customers only. Utility costs are based on $50 for valve, $50 for installation including door to distribution. Plan on about 200 sites with up to 300 valves in the service area. Renew every ten years.

| Results | |
|---|---|
| Average Water Savings (mgd) | |
| 0.025722 | |
| Lifetime Savings - Present Value ($) | |
| Utility | $405,820 |
| Community | $3,820,600 |
| Lifetime Costs - Present Value ($) | |
| Utility | $30,202 |
| Community | $30,202 |
| Benefit to Cost Ratio | |
| Utility | 13.44 |
| Community | 126.50 |
| Cost of Savings per Unit Volume ($/mg) | |
| Utility | $153 |

| End Use Savings Per Replacement | % Savings per Account |
|---|---|
| COM Kitchen Spray Rins | 360.0% |

| Targets | |
|---|---|
| Target Method | Percentage |
| % of Accts Targeted / yr | 5.710% |
| Only Effects New Accts | ☐ |

**Costs** — View: Summary

| | Utility | Customer | Total |
|---|---|---|---|
| 2015 | $15,236 | $0 | $15,236 |
| 2016 | $15,303 | $0 | $15,303 |
| 2017 | $0 | $0 | $0 |
| 2018 | $0 | $0 | $0 |
| 2019 | $0 | $0 | $0 |
| 2020 | $0 | $0 | $0 |
| 2021 | $0 | $0 | $0 |
| 2022 | $0 | $0 | $0 |
| 2023 | $0 | $0 | $0 |
| 2024 | $0 | $0 | $0 |
| 2025 | $0 | $0 | $0 |
| 2026 | $0 | $0 | $0 |
| 2027 | $0 | $0 | $0 |
| 2028 | $0 | $0 | $0 |
| 2029 | $0 | $0 | $0 |
| 2030 | $0 | $0 | $0 |
| 2031 | $0 | $0 | $0 |
| 2032 | $0 | $0 | $0 |
| 2033 | $0 | $0 | $0 |
| 2034 | $0 | $0 | $0 |
| 2035 | $0 | $0 | $0 |

**Targets** — View: Accounts

| | COM | Total |
|---|---|---|
| 2015 | 109 | 109 |
| 2016 | 109 | 109 |
| 2017 | 0 | 0 |
| 2018 | 0 | 0 |
| 2019 | 0 | 0 |
| 2020 | 0 | 0 |
| 2021 | 0 | 0 |
| 2022 | 0 | 0 |
| 2023 | 0 | 0 |
| 2024 | 0 | 0 |
| 2025 | 0 | 0 |
| 2026 | 0 | 0 |
| 2027 | 0 | 0 |
| 2028 | 0 | 0 |
| 2029 | 0 | 0 |
| 2030 | 0 | 0 |
| 2031 | 0 | 0 |
| 2032 | 0 | 0 |
| 2033 | 0 | 0 |
| 2034 | 0 | 0 |
| 2035 | 0 | 0 |

**Water Savings (mgd)**

| | Total Savings (mgd) |
|---|---|
| 2015 | 0.014123 |
| 2016 | 0.028031 |
| 2017 | 0.027754 |
| 2018 | 0.027485 |
| 2019 | 0.027224 |
| 2020 | 0.026969 |
| 2021 | 0.026818 |
| 2022 | 0.026673 |
| 2023 | 0.026531 |
| 2024 | 0.026395 |
| 2025 | 0.026262 |
| 2026 | 0.026130 |
| 2027 | 0.026002 |
| 2028 | 0.025877 |
| 2029 | 0.025756 |
| 2030 | 0.025638 |
| 2031 | 0.025522 |
| 2032 | 0.025408 |
| 2033 | 0.025298 |
| 2034 | 0.025190 |
| 2035 | 0.025084 |

**CII Surveys**

| Overview | |
|---|---|
| Name | CII Surveys |
| Abbr | 17 |
| Category | Default |
| Measure Type | Standard Measure |

| Time Period | |
|---|---|
| First Year | 2021 |
| Last Year | 2026 |
| Measure Length | 6 |

| Measure Life | |
|---|---|
| Permanent | ☑ |

| Fixture Costs | Utility | Customer | Fix/Acct |
|---|---|---|---|
| MF | $4,000.00 | $500.00 | 1 |
| COM | $4,000.00 | $500.00 | 2 |

| Administration Costs | |
|---|---|
| Markup Percentage | 50% |

**Description**

Offer top water customers from each category a professional water survey that would evaluate ways for the business to save water and money. The surveys would be for large accounts (accounts that use more than 5,000 gallons of water per day or the top 3%) such as hotels, restaurants, stores and schools. Emphasis will be on supporting the top 25 users for each customer category.

**Customer Classes**

| SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|
| ☐ | ☑ | ☑ | ☐ | ☐ | ☐ | ☐ | ☐ |

**End Uses**

| | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| Toilets | | ☑ | ☑ | | | | | |
| Urinals | | | ☐ | | | | | |
| Lavatory Faucets | | ☑ | ☑ | | | | | |
| Showers | | ☑ | ☑ | | | | | |
| Dishwashers | | ☑ | ☑ | | | | | |
| Clothes Washers | | ☑ | ☑ | | | | | |
| Process | | | ☐ | | | | | |
| Kitchen Spray Rinse | | | ☐ | | | | | |
| Internal Leakage | | ☑ | ☑ | | | | | |
| Baths | | ☐ | | | | | | |
| Other | | ☐ | ☐ | | | | | |
| Irrigation | | ☑ | ☑ | | | | | |
| Pools | | ☐ | | | | | | |
| Wash Down | | ☐ | | | | | | |
| Car Washing | | ☐ | | | | | | |
| External Leakage | | ☑ | ☑ | | | | | |
| Indoor | | | | | | | | |
| Outdoor | | | | | | | | |
| Cooling | | | ☐ | | | | | |
| tory/Kitchen Faucets | | ☑ | ☑ | | | | | |

**Comments**

Water savings based on CUWCC Cost and Savings Study (2005) report of potential savings ranging from 11 to 29%, assuming all projects are implemented. Assume 30% potential and 35% compliance, CUWCC Cost and Savings Study, 2005, page 2-66-68. Assume 10% due to survey only, rest of savings comes from participation in an incentive program. Assume shared savings between survey and incentives for overall 20% per facility. Targeting large accounts. Utility costs based on CUWCC Cost and Savings Study (2005) report of cost range from $600 to $8,000. Customer costs based on installation costs. Large CII users are already receiving landscape water use reports and surveys.

**Results**

| Average Water Savings (mgd) | |
|---|---|
| | 0.032952 |
| **Lifetime Savings - Present Value ($)** | |
| Utility | $472,192 |
| Community | $1,475,766 |
| **Lifetime Costs - Present Value ($)** | |
| Utility | $1,025,069 |
| Community | $1,110,492 |
| **Benefit to Cost Ratio** | |
| Utility | 0.46 |
| Community | 1.33 |
| **Cost of Savings per Unit Volume ($/mg)** | |
| Utility | $4,056 |

**End Use Savings Per Replacement**

| | % Savings per Account |
|---|---|
| MF Toilets | 71.4% |
| COM Toilets | 55.6% |
| MF Lavatory Faucets | 71.4% |
| COM Lavatory Faucets | 55.6% |
| MF Showers | 71.4% |
| COM Showers | 55.6% |
| MF Dishwashers | 71.4% |
| COM Dishwashers | 55.6% |
| MF Clothes Washers | 71.4% |
| COM Clothes Washers | 55.6% |
| MF Internal Leakage | 71.4% |
| COM Internal Leakage | 55.6% |
| MF Irrigation | 71.4% |
| COM Irrigation | 55.6% |
| MF External Leakage | 71.4% |
| COM External Leakage | 55.6% |
| lon-Lavatory/Kitchen Fa | 71.4% |
| Non-Lavatory/Kitchen Fa | 55.6% |

| Targets | |
|---|---|
| Target Method | Percentage |
| % of Accts Targeted / yr | 0.500% |
| Only Effects New Accts | ☐ |

**Costs** — View: Summary

| | Utility | Customer | Total |
|---|---|---|---|
| 2015 | $0 | $0 | $0 |
| 2016 | $0 | $0 | $0 |
| 2017 | $0 | $0 | $0 |
| 2018 | $0 | $0 | $0 |
| 2019 | $0 | $0 | $0 |
| 2020 | $0 | $0 | $0 |
| 2021 | $204,249 | $17,021 | $221,270 |
| 2022 | $205,045 | $17,087 | $222,132 |
| 2023 | $205,841 | $17,153 | $222,994 |
| 2024 | $206,636 | $17,220 | $223,856 |
| 2025 | $207,432 | $17,286 | $224,718 |
| 2026 | $208,780 | $17,398 | $226,179 |
| 2027 | $0 | $0 | $0 |
| 2028 | $0 | $0 | $0 |
| 2029 | $0 | $0 | $0 |
| 2030 | $0 | $0 | $0 |
| 2031 | $0 | $0 | $0 |
| 2032 | $0 | $0 | $0 |
| 2033 | $0 | $0 | $0 |
| 2034 | $0 | $0 | $0 |
| 2035 | $0 | $0 | $0 |

**Targets** — View: Accounts

| | MF | COM | Total |
|---|---|---|---|
| 2015 | 0 | 0 | 0 |
| 2016 | 0 | 0 | 0 |
| 2017 | 0 | 0 | 0 |
| 2018 | 0 | 0 | 0 |
| 2019 | 0 | 0 | 0 |
| 2020 | 0 | 0 | 0 |
| 2021 | 15 | 10 | 24 |
| 2022 | 15 | 10 | 24 |
| 2023 | 15 | 10 | 24 |
| 2024 | 15 | 10 | 25 |
| 2025 | 15 | 10 | 25 |
| 2026 | 15 | 10 | 25 |
| 2027 | 0 | 0 | 0 |
| 2028 | 0 | 0 | 0 |
| 2029 | 0 | 0 | 0 |
| 2030 | 0 | 0 | 0 |
| 2031 | 0 | 0 | 0 |
| 2032 | 0 | 0 | 0 |
| 2033 | 0 | 0 | 0 |
| 2034 | 0 | 0 | 0 |
| 2035 | 0 | 0 | 0 |

**Water Savings (mgd)**

| | Total Savings (mgd) |
|---|---|
| 2015 | 0.000000 |
| 2016 | 0.000000 |
| 2017 | 0.000000 |
| 2018 | 0.000000 |
| 2019 | 0.000000 |
| 2020 | 0.000000 |
| 2021 | 0.009853 |
| 2022 | 0.019574 |
| 2023 | 0.029163 |
| 2024 | 0.038619 |
| 2025 | 0.047944 |
| 2026 | 0.057043 |
| 2027 | 0.056422 |
| 2028 | 0.055836 |
| 2029 | 0.055280 |
| 2030 | 0.054753 |
| 2031 | 0.054310 |
| 2032 | 0.053887 |
| 2033 | 0.053483 |
| 2034 | 0.053095 |
| 2035 | 0.052723 |

**High Efficiency Urinal Program**

| Overview | |
|---|---|
| Name | High Efficiency Urinal Program |
| Abbr | 18 |
| Category | Default |
| Measure Type | Standard Measure |

| Time Period | |
|---|---|
| First Year | 2015 |
| Last Year | 2018 |
| Measure Length | 4 |

| Measure Life | |
|---|---|
| Permanent | ☑ |

| Fixture Costs | Utility | Customer | Fix/Acct |
|---|---|---|---|
| COM | $300.00 | $200.00 | 2 |
| MUN | $300.00 | $200.00 | 2 |
| IND | $300.00 | $200.00 | 2 |

| Administration Costs | |
|---|---|
| Markup Percentage | 35% |

**Description**

Provide a rebate or voucher for the installation of high efficiency urinals (HEU). Recent CEC requirements denote flushing as low as 0.125 gpf (1 pint).

| Customer Classes | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| | ☐ | ☐ | ☑ | ☑ | ☑ | ☐ | ☐ | ☐ |

| End Uses | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| Toilets | | | ☐ | ☐ | ☐ | | | |
| Urinals | | | ☑ | ☑ | ☑ | | | |
| Lavatory Faucets | | | ☐ | ☐ | ☐ | | | |
| Showers | | | ☐ | ☐ | ☐ | | | |
| Dishwashers | | | ☐ | ☐ | ☐ | | | |
| Clothes Washers | | | ☐ | ☐ | ☐ | | | |
| Process | | | ☐ | | ☐ | | | |
| Kitchen Spray Rinse | | | ☐ | ☐ | | | | |
| Internal Leakage | | | ☐ | ☐ | ☐ | | | |
| Baths | | | | | | | | |
| Other | | | ☐ | ☐ | ☐ | | | |
| Irrigation | | | ☐ | ☐ | ☐ | | | |
| Pools | | | | | | | | |
| Wash Down | | | | | | | | |
| Car Washing | | | | | | | | |
| External Leakage | | | ☐ | ☐ | ☐ | | | |
| Indoor | | | | | | | | |
| Outdoor | | | | | | | | |
| Cooling | | | ☐ | ☐ | ☐ | | | |
| tory/Kitchen Faucets | | | ☐ | ☐ | ☐ | | | |

**Comments**

Water savings assumes 50% of urinal replacements use 1 gpf and up, and 50% are 0.5 and .25 gpf urinals being replaced with 0.125 gpf pint urinals. Baseline Survey found lower saturation in restaurants and office buildings. Schools were 100% high efficiency. Utility costs based on fixture cost. Customer costs based on installation costs. Comprehensive City, school, and other government buildings urinal replacement with 0.125 gpf or less. City could potentially fund 100% of costs.

| Results | |
|---|---|
| Average Water Savings (mgd) | |
| 0.008515 | |
| Lifetime Savings - Present Value ($) | |
| Utility | $132,704 |
| Community | $132,704 |
| Lifetime Costs - Present Value ($) | |
| Utility | $340,958 |
| Community | $509,333 |
| Benefit to Cost Ratio | |
| Utility | 0.39 |
| Community | 0.26 |
| Cost of Savings per Unit Volume ($/mg) | |
| Utility | $5,220 |

| End Use Savings Per Replacement | % Savings per Account |
|---|---|
| COM Urinals | 80.0% |
| MUN Urinals | 80.0% |
| IND Urinals | 80.0% |

| Targets | |
|---|---|
| Target Method | Percentage |
| % of Accts Targeted / yr | 5.000% |
| Only Effects New Accts | ☐ |

**Costs**

View: Utility Details

| | Fixture Costs | Admin Costs | Util Total |
|---|---|---|---|
| 2015 | $64,887 | $22,710 | $87,597 |
| 2016 | $65,143 | $22,800 | $87,943 |
| 2017 | $65,399 | $22,890 | $88,288 |
| 2018 | $65,655 | $22,979 | $88,634 |
| 2019 | $0 | $0 | $0 |
| 2020 | $0 | $0 | $0 |
| 2021 | $0 | $0 | $0 |
| 2022 | $0 | $0 | $0 |
| 2023 | $0 | $0 | $0 |
| 2024 | $0 | $0 | $0 |
| 2025 | $0 | $0 | $0 |
| 2026 | $0 | $0 | $0 |
| 2027 | $0 | $0 | $0 |
| 2028 | $0 | $0 | $0 |
| 2029 | $0 | $0 | $0 |
| 2030 | $0 | $0 | $0 |
| 2031 | $0 | $0 | $0 |
| 2032 | $0 | $0 | $0 |
| 2033 | $0 | $0 | $0 |
| 2034 | $0 | $0 | $0 |
| 2035 | $0 | $0 | $0 |

**Targets**

View: Fixtures

| | COM | MUN | IND | Total |
|---|---|---|---|---|
| 2015 | 191 | 22 | 4 | 216 |
| 2016 | 191 | 22 | 4 | 217 |
| 2017 | 192 | 22 | 4 | 218 |
| 2018 | 193 | 22 | 4 | 219 |
| 2019 | 0 | 0 | 0 | 0 |
| 2020 | 0 | 0 | 0 | 0 |
| 2021 | 0 | 0 | 0 | 0 |
| 2022 | 0 | 0 | 0 | 0 |
| 2023 | 0 | 0 | 0 | 0 |
| 2024 | 0 | 0 | 0 | 0 |
| 2025 | 0 | 0 | 0 | 0 |
| 2026 | 0 | 0 | 0 | 0 |
| 2027 | 0 | 0 | 0 | 0 |
| 2028 | 0 | 0 | 0 | 0 |
| 2029 | 0 | 0 | 0 | 0 |
| 2030 | 0 | 0 | 0 | 0 |
| 2031 | 0 | 0 | 0 | 0 |
| 2032 | 0 | 0 | 0 | 0 |
| 2033 | 0 | 0 | 0 | 0 |
| 2034 | 0 | 0 | 0 | 0 |
| 2035 | 0 | 0 | 0 | 0 |

**Water Savings (mgd)**

| | Total Savings (mgd) |
|---|---|
| 2015 | 0.002435 |
| 2016 | 0.004837 |
| 2017 | 0.007206 |
| 2018 | 0.009544 |
| 2019 | 0.009463 |
| 2020 | 0.009385 |
| 2021 | 0.009339 |
| 2022 | 0.009295 |
| 2023 | 0.009253 |
| 2024 | 0.009212 |
| 2025 | 0.009171 |
| 2026 | 0.009132 |
| 2027 | 0.009093 |
| 2028 | 0.009055 |
| 2029 | 0.009018 |
| 2030 | 0.008983 |
| 2031 | 0.008947 |
| 2032 | 0.008913 |
| 2033 | 0.008879 |
| 2034 | 0.008846 |
| 2035 | 0.008814 |

**Public Restroom Faucet Retrofit**

| Overview | |
|---|---|
| Name | Public Restroom Faucet Retrofit - |
| Abbr | 19 |
| Category | Default |
| Measure Type | Standard Measure |

| Time Period | |
|---|---|
| First Year | 2021 |
| Last Year | 2023 |
| Measure Length | 3 |

| Measure Life | |
|---|---|
| Permanent | ☑ |

| Fixture Costs | Utility | Customer | Fix/Acct |
|---|---|---|---|
| MUN | $300.00 | $200.00 | 4 |

| Administration Costs | |
|---|---|
| Markup Percentage | 35% |

**Description**

Direct install of high efficiency (0.5 gpm) sensor faucet fixtures in all or selected high-use institutional buildings.

| Customer Classes | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| | ☐ | ☐ | ☐ | ☑ | ☐ | ☐ | ☐ | ☐ |

| End Uses | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| Toilets | | | | ☐ | | | | |
| Urinals | | | | ☐ | | | | |
| Lavatory Faucets | | | | ☑ | | | | |
| Showers | | | | ☐ | | | | |
| Dishwashers | | | | ☐ | | | | |
| Clothes Washers | | | | ☐ | | | | |
| Process | | | | | | | | |
| Kitchen Spray Rinse | | | | ☐ | | | | |
| Internal Leakage | | | | ☐ | | | | |
| Baths | | | | | | | | |
| Other | | | | ☐ | | | | |
| Irrigation | | | | ☐ | | | | |
| Pools | | | | | | | | |
| Wash Down | | | | | | | | |
| Car Washing | | | | | | | | |
| External Leakage | | | | ☐ | | | | |
| Indoor | | | | | | | | |
| Outdoor | | | | | | | | |
| Cooling | | | | ☐ | | | | |
| tory/Kitchen Faucets | | | | ☐ | | | | |

**Comments**

Water savings based on reduction in flow rate from existing 2 gpm to 0.5 gpm or 75% reduction. Page 51 of Baseline Study. 2.2-1.5 gpm is basis. Measured by WaterWise. Customer costs based on installation costs. Utility costs based on a rebate for full fixture costs. No official limit on total number per site, but assume up to 6 per site. Schools and public beach restrooms.

| Results | |
|---|---|
| Average Water Savings (mgd) | |
| 0.000554 | |
| Lifetime Savings - Present Value ($) | |
| Utility | $8,077 |
| Community | $16,588 |
| Lifetime Costs - Present Value ($) | |
| Utility | $99,747 |
| Community | $149,005 |
| Benefit to Cost Ratio | |
| Utility | 0.08 |
| Community | 0.11 |
| Cost of Savings per Unit Volume ($/mg) | |
| Utility | $23,467 |

| End Use Savings Per Replacement | % Savings per Account |
|---|---|
| MUN Lavatory Faucets | 75.0% |

| Targets | |
|---|---|
| Target Method | Percentage |
| % of Accts Targeted / yr | 11.000% |
| Only Effects New Accts | ☐ |

**Costs** — View: Summary

| | Utility | Customer | Total |
|---|---|---|---|
| 2015 | $0 | $0 | $0 |
| 2016 | $0 | $0 | $0 |
| 2017 | $0 | $0 | $0 |
| 2018 | $0 | $0 | $0 |
| 2019 | $0 | $0 | $0 |
| 2020 | $0 | $0 | $0 |
| 2021 | $38,848 | $19,184 | $58,032 |
| 2022 | $38,848 | $19,184 | $58,032 |
| 2023 | $38,848 | $19,184 | $58,032 |
| 2024 | $0 | $0 | $0 |
| 2025 | $0 | $0 | $0 |
| 2026 | $0 | $0 | $0 |
| 2027 | $0 | $0 | $0 |
| 2028 | $0 | $0 | $0 |
| 2029 | $0 | $0 | $0 |
| 2030 | $0 | $0 | $0 |
| 2031 | $0 | $0 | $0 |
| 2032 | $0 | $0 | $0 |
| 2033 | $0 | $0 | $0 |
| 2034 | $0 | $0 | $0 |
| 2035 | $0 | $0 | $0 |

**Targets** — View: Accounts

| | MUN | Total |
|---|---|---|
| 2015 | 0 | 0 |
| 2016 | 0 | 0 |
| 2017 | 0 | 0 |
| 2018 | 0 | 0 |
| 2019 | 0 | 0 |
| 2020 | 0 | 0 |
| 2021 | 24 | 24 |
| 2022 | 24 | 24 |
| 2023 | 24 | 24 |
| 2024 | 0 | 0 |
| 2025 | 0 | 0 |
| 2026 | 0 | 0 |
| 2027 | 0 | 0 |
| 2028 | 0 | 0 |
| 2029 | 0 | 0 |
| 2030 | 0 | 0 |
| 2031 | 0 | 0 |
| 2032 | 0 | 0 |
| 2033 | 0 | 0 |
| 2034 | 0 | 0 |
| 2035 | 0 | 0 |

**Water Savings (mgd)**

| | Total Savings (mgd) |
|---|---|
| 2015 | 0.000000 |
| 2016 | 0.000000 |
| 2017 | 0.000000 |
| 2018 | 0.000000 |
| 2019 | 0.000000 |
| 2020 | 0.000000 |
| 2021 | 0.000287 |
| 2022 | 0.000571 |
| 2023 | 0.000852 |
| 2024 | 0.000848 |
| 2025 | 0.000844 |
| 2026 | 0.000841 |
| 2027 | 0.000837 |
| 2028 | 0.000833 |
| 2029 | 0.000829 |
| 2030 | 0.000825 |
| 2031 | 0.000822 |
| 2032 | 0.000818 |
| 2033 | 0.000814 |
| 2034 | 0.000810 |
| 2035 | 0.000807 |

**Public Restroom Faucet Retrofit**

| Overview | |
|---|---|
| Name | Public Restroom Faucet Retrofit - |
| Abbr | 20 |
| Category | Default |
| Measure Type | Standard Measure |

| Time Period | |
|---|---|
| First Year | 2021 |
| Last Year | 2030 |
| Measure Length | 10 |

| Measure Life | |
|---|---|
| Permanent | ☑ |

| Fixture Costs | Utility | Customer | Fix/Acct |
|---|---|---|---|
| COM | $300.00 | $100.00 | 4 |

| Administration Costs | |
|---|---|
| Markup Percentage | 35% |

**Description**

Rebate Program for installation of high efficiency (0.5 gpm) sensor faucet fixtures in all or selected high-use commercial buildings.

| Customer Classes | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| | ☐ | ☐ | ☑ | ☐ | ☐ | ☐ | ☐ | ☐ |

| End Uses | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| Toilets | | | ☐ | | | | | |
| Urinals | | | ☐ | | | | | |
| Lavatory Faucets | | | ☑ | | | | | |
| Showers | | | ☐ | | | | | |
| Dishwashers | | | ☐ | | | | | |
| Clothes Washers | | | ☐ | | | | | |
| Process | | | ☐ | | | | | |
| Kitchen Spray Rinse | | | ☐ | | | | | |
| Internal Leakage | | | ☐ | | | | | |
| Baths | | | | | | | | |
| Other | | | ☐ | | | | | |
| Irrigation | | | ☐ | | | | | |
| Pools | | | | | | | | |
| Wash Down | | | | | | | | |
| Car Washing | | | | | | | | |
| External Leakage | | | ☐ | | | | | |
| Indoor | | | | | | | | |
| Outdoor | | | | | | | | |
| Cooling | | | ☐ | | | | | |
| tory/Kitchen Faucets | | | ☐ | | | | | |

**Comments**

Water savings based on reduction in flow rate from existing 2 gpm to 0.5 gpm or 75% reduction. Page 51 of Baseline Study. 2.2-1.5 gpm is basis. Measured by WaterWise. Customer costs based on installation costs. Utility costs based on a rebate for full fixture costs. No official limit on total number per site, but assume up to 6 per site. Large restaurants, spas, etc.

| Results | |
|---|---|
| Average Water Savings (mgd) | |
| 0.011851 | |
| Lifetime Savings - Present Value ($) | |
| Utility | $167,271 |
| Community | $386,622 |
| Lifetime Costs - Present Value ($) | |
| Utility | $889,040 |
| Community | $1,108,555 |
| Benefit to Cost Ratio | |
| Utility | 0.19 |
| Community | 0.35 |
| Cost of Savings per Unit Volume ($/mg) | |
| Utility | $9,780 |

| End Use Savings Per Replacement | % Savings per Account |
|---|---|
| COM Lavatory Faucets | 75.0% |

| Targets | |
|---|---|
| Target Method | Percentage |
| % of Accts Targeted / yr | 3.500% |
| Only Effects New Accts | ☐ |

**Costs** — View: Summary

| | Utility | Customer | Total |
|---|---|---|---|
| 2015 | $0 | $0 | $0 |
| 2016 | $0 | $0 | $0 |
| 2017 | $0 | $0 | $0 |
| 2018 | $0 | $0 | $0 |
| 2019 | $0 | $0 | $0 |
| 2020 | $0 | $0 | $0 |
| 2021 | $110,722 | $27,339 | $138,061 |
| 2022 | $110,986 | $27,404 | $138,390 |
| 2023 | $111,250 | $27,469 | $138,719 |
| 2024 | $111,514 | $27,534 | $139,048 |
| 2025 | $111,778 | $27,599 | $139,377 |
| 2026 | $112,197 | $27,703 | $139,900 |
| 2027 | $112,616 | $27,806 | $140,423 |
| 2028 | $113,035 | $27,910 | $140,945 |
| 2029 | $113,455 | $28,013 | $141,468 |
| 2030 | $113,874 | $28,117 | $141,991 |
| 2031 | $0 | $0 | $0 |
| 2032 | $0 | $0 | $0 |
| 2033 | $0 | $0 | $0 |
| 2034 | $0 | $0 | $0 |
| 2035 | $0 | $0 | $0 |

**Targets** — View: Accounts

| | COM | Total |
|---|---|---|
| 2015 | 0 | 0 |
| 2016 | 0 | 0 |
| 2017 | 0 | 0 |
| 2018 | 0 | 0 |
| 2019 | 0 | 0 |
| 2020 | 0 | 0 |
| 2021 | 68 | 68 |
| 2022 | 69 | 69 |
| 2023 | 69 | 69 |
| 2024 | 69 | 69 |
| 2025 | 69 | 69 |
| 2026 | 69 | 69 |
| 2027 | 70 | 70 |
| 2028 | 70 | 70 |
| 2029 | 70 | 70 |
| 2030 | 70 | 70 |
| 2031 | 0 | 0 |
| 2032 | 0 | 0 |
| 2033 | 0 | 0 |
| 2034 | 0 | 0 |
| 2035 | 0 | 0 |

**Water Savings (mgd)**

| | Total Savings (mgd) |
|---|---|
| 2015 | 0.000000 |
| 2016 | 0.000000 |
| 2017 | 0.000000 |
| 2018 | 0.000000 |
| 2019 | 0.000000 |
| 2020 | 0.000000 |
| 2021 | 0.002451 |
| 2022 | 0.004881 |
| 2023 | 0.007291 |
| 2024 | 0.009683 |
| 2025 | 0.012057 |
| 2026 | 0.014416 |
| 2027 | 0.016762 |
| 2028 | 0.019096 |
| 2029 | 0.021419 |
| 2030 | 0.023731 |
| 2031 | 0.023623 |
| 2032 | 0.023518 |
| 2033 | 0.023415 |
| 2034 | 0.023315 |
| 2035 | 0.023218 |

**School Retrofit**

| Overview | |
|---|---|
| Name | School Retrofit |
| Abbr | 21 |
| Category | Default |
| Measure Type | Standard Measure |

| Time Period | |
|---|---|
| First Year | 2021 |
| Last Year | 2030 |
| Measure Length | 10 |

| Measure Life | |
|---|---|
| Permanent | ☐ |
| Years | 27 |
| Repeat | ☐ |

| Fixture Costs | Utility | Customer | Fix/Acct |
|---|---|---|---|
| MUN | $2,500.00 | $2,500.00 | 1 |

| Administration Costs | |
|---|---|
| Markup Percentage | 35% |

**Description**

School retrofit program wherein school receives a grant to replace fixtures and upgrade irrigation systems. Expand current City Program, pattern after EBMUD and MWD programs. Promote to schools for cash flow upfront. Review Generation Water program.

| Customer Classes | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| | ☐ | ☐ | ☐ | ☑ | ☐ | ☐ | ☐ | ☐ |

| End Uses | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| Toilets | | | | ☑ | | | | |
| Urinals | | | | ☑ | | | | |
| Lavatory Faucets | | | | ☑ | | | | |
| Showers | | | | ☑ | | | | |
| Dishwashers | | | | ☐ | | | | |
| Clothes Washers | | | | ☐ | | | | |
| Process | | | | | | | | |
| Kitchen Spray Rinse | | | | ☐ | | | | |
| Internal Leakage | | | | ☑ | | | | |
| Baths | | | | | | | | |
| Other | | | | ☐ | | | | |
| Irrigation | | | | ☑ | | | | |
| Pools | | | | | | | | |
| Wash Down | | | | | | | | |
| Car Washing | | | | | | | | |
| External Leakage | | | | ☑ | | | | |
| Indoor | | | | | | | | |
| Outdoor | | | | | | | | |
| Cooling | | | | ☐ | | | | |
| tory/Kitchen Faucets | | | | ☐ | | | | |

**Comments**

Water savings based on doing two schools per year and assuming a reduction in use of 25% below a current use of 3,000 gpd. Costs assume $5,000 split 50:50 between customer and City. Might have to couple with survey of school sites first, and a landscape survey.

| Results | |
|---|---|
| Average Water Savings (mgd) | |
| 0.004042 | |
| Lifetime Savings - Present Value ($) | |
| Utility | $56,200 |
| Community | $56,200 |
| Lifetime Costs - Present Value ($) | |
| Utility | $58,362 |
| Community | $101,593 |
| Benefit to Cost Ratio | |
| Utility | 0.96 |
| Community | 0.55 |
| Cost of Savings per Unit Volume ($/mg) | |
| Utility | $1,883 |

| End Use Savings Per Replacement | % Savings per Account |
|---|---|
| MUN Toilets | 88.2% |
| MUN Urinals | 88.2% |
| MUN Lavatory Faucets | 88.2% |
| MUN Showers | 88.2% |
| MUN Internal Leakage | 88.2% |
| MUN Irrigation | 88.2% |
| MUN External Leakage | 88.2% |

| Targets | |
|---|---|
| Target Method | Percentage |
| % of Accts Targeted / yr | 1.000% |
| Only Effects New Accts | ☐ |

**Costs** — View: Summary

| | Utility | Customer | Total |
|---|---|---|---|
| 2015 | $0 | $0 | $0 |
| 2016 | $0 | $0 | $0 |
| 2017 | $0 | $0 | $0 |
| 2018 | $0 | $0 | $0 |
| 2019 | $0 | $0 | $0 |
| 2020 | $0 | $0 | $0 |
| 2021 | $7,358 | $5,450 | $12,808 |
| 2022 | $7,358 | $5,450 | $12,808 |
| 2023 | $7,358 | $5,450 | $12,808 |
| 2024 | $7,358 | $5,450 | $12,808 |
| 2025 | $7,358 | $5,450 | $12,808 |
| 2026 | $7,358 | $5,450 | $12,808 |
| 2027 | $7,358 | $5,450 | $12,808 |
| 2028 | $7,358 | $5,450 | $12,808 |
| 2029 | $7,358 | $5,450 | $12,808 |
| 2030 | $7,358 | $5,450 | $12,808 |
| 2031 | $0 | $0 | $0 |
| 2032 | $0 | $0 | $0 |
| 2033 | $0 | $0 | $0 |
| 2034 | $0 | $0 | $0 |
| 2035 | $0 | $0 | $0 |

**Targets** — View: Accounts

| | MUN | Total |
|---|---|---|
| 2015 | 0 | 0 |
| 2016 | 0 | 0 |
| 2017 | 0 | 0 |
| 2018 | 0 | 0 |
| 2019 | 0 | 0 |
| 2020 | 0 | 0 |
| 2021 | 2 | 2 |
| 2022 | 2 | 2 |
| 2023 | 2 | 2 |
| 2024 | 2 | 2 |
| 2025 | 2 | 2 |
| 2026 | 2 | 2 |
| 2027 | 2 | 2 |
| 2028 | 2 | 2 |
| 2029 | 2 | 2 |
| 2030 | 2 | 2 |
| 2031 | 0 | 0 |
| 2032 | 0 | 0 |
| 2033 | 0 | 0 |
| 2034 | 0 | 0 |
| 2035 | 0 | 0 |

**Water Savings (mgd)**

| | Total Savings (mgd) |
|---|---|
| 2015 | 0.000000 |
| 2016 | 0.000000 |
| 2017 | 0.000000 |
| 2018 | 0.000000 |
| 2019 | 0.000000 |
| 2020 | 0.000000 |
| 2021 | 0.000841 |
| 2022 | 0.001675 |
| 2023 | 0.002502 |
| 2024 | 0.003321 |
| 2025 | 0.004132 |
| 2026 | 0.004936 |
| 2027 | 0.005732 |
| 2028 | 0.006521 |
| 2029 | 0.007303 |
| 2030 | 0.008077 |
| 2031 | 0.008041 |
| 2032 | 0.008004 |
| 2033 | 0.007967 |
| 2034 | 0.007931 |
| 2035 | 0.007895 |

**Water Efficient Landscape Ordinance**

## Overview

| | |
|---|---|
| Name | Water Efficient Landscape Ordinance |
| Abbr | 22 |
| Category | Default |
| Measure Type | Standard Measure |

## Time Period

| | |
|---|---|
| First Year | 2015 |
| Last Year | 2035 |
| Measure Length | 21 |

## Measure Life

| | |
|---|---|
| Permanent | ☐ |
| Years | 27 |
| Repeat | ☐ |

## Fixture Costs

| | Utility | Customer | Fix/Acct |
|---|---|---|---|
| SF | $0.00 | $0.00 | 0 |
| MF | $50.00 | $1,000.00 | 1 |
| COM | $100.00 | $2,500.00 | 1 |
| MUN | $100.00 | $2,500.00 | 1 |
| IND | $100.00 | $2,500.00 | 1 |

## Administration Costs

| | |
|---|---|
| Markup Percentage | 35% |

## Description

Include less irrigation demand for new accounts due to more efficient landscape designs because of City Code (implementation of Statewide Model Landscape Ordinance). Update City Code to keep pace with new state regulations and technology for irrigation controllers and irrigation equipment. Updated MWELO based on changes Dec 1, 2015. City changes are pending as of January 31, 2016.

## Customer Classes

| SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|
| ☑ | ☑ | ☑ | ☑ | ☑ | ☐ | ☐ | ☐ |

## End Uses

| | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| Toilets | ☐ | ☐ | ☐ | ☐ | ☐ | | | |
| Urinals | | | ☐ | ☐ | ☐ | | | |
| Lavatory Faucets | ☐ | ☐ | ☐ | ☐ | ☐ | | | |
| Showers | ☐ | ☐ | ☐ | ☐ | ☐ | | | |
| Dishwashers | ☐ | ☐ | ☐ | ☐ | ☐ | | | |
| Clothes Washers | ☐ | ☐ | ☐ | ☐ | ☐ | | | |
| Process | | | ☐ | | ☐ | | | |
| Kitchen Spray Rinse | | | ☐ | ☐ | | | | |
| Internal Leakage | ☐ | ☐ | ☐ | ☐ | ☐ | | | |
| Baths | ☐ | ☐ | | | | | | |
| Other | ☐ | ☐ | ☐ | ☐ | ☐ | | | |
| Irrigation | ☑ | ☑ | ☑ | ☑ | ☑ | | | |
| Pools | ☐ | ☐ | | | | | | |
| Wash Down | ☐ | ☐ | | | | | | |
| Car Washing | ☐ | ☐ | | | | | | |
| External Leakage | ☐ | ☐ | ☐ | ☐ | ☐ | | | |
| Indoor | | | | | | | | |
| Outdoor | | | | | | | | |
| Cooling | | | ☐ | ☐ | ☐ | | | |
| tory/Kitchen Faucets | ☐ | ☐ | ☐ | ☐ | ☐ | | | |

## Comments

Water savings based on native landscaping (Xeriscape) over efficiently irrigated turf grass per City Code Chapter 16.16.
http://www.cityofsantacruz.com
Utility costs based on application and inspection. Customer costs based on Xeriscape replacing turf. Based on ordinance limit of 2,500 square feet. Assumed increased by 10% savings and added in single family homes to new Ordiance.

## Results

| | |
|---|---|
| Average Water Savings (mgd) | |
| 0.010291 | |
| Lifetime Savings - Present Value ($) | |
| Utility | $149,120 |
| Community | $149,120 |
| Lifetime Costs - Present Value ($) | |
| Utility | $47,531 |
| Community | $816,763 |
| Benefit to Cost Ratio | |
| Utility | 3.14 |
| Community | 0.18 |
| Cost of Savings per Unit Volume ($/mg) | |
| Utility | $602 |

## End Use Savings Per Replacement

| | % Savings per Account |
|---|---|
| MF Irrigation | 35.0% |
| COM Irrigation | 35.0% |
| MUN Irrigation | 35.0% |
| IND Irrigation | 35.0% |
| SF Irrigation | 0.0% |

## Targets

| | |
|---|---|
| Target Method | Percentage |
| % of Accts Targeted / yr | 100.000% |
| Only Effects New Accts | ☑ |

## Costs

View: Summary

| | Utility | Customer | Total |
|---|---|---|---|
| 2015 | $3,306 | $53,245 | $56,551 |
| 2016 | $3,306 | $53,245 | $56,551 |
| 2017 | $3,306 | $53,245 | $56,551 |
| 2018 | $3,306 | $53,245 | $56,551 |
| 2019 | $3,306 | $53,245 | $56,551 |
| 2020 | $3,306 | $53,245 | $56,551 |
| 2021 | $1,841 | $29,782 | $31,623 |
| 2022 | $1,841 | $29,782 | $31,623 |
| 2023 | $1,841 | $29,782 | $31,623 |
| 2024 | $1,841 | $29,782 | $31,623 |
| 2025 | $1,841 | $29,782 | $31,623 |
| 2026 | $3,067 | $49,253 | $52,320 |
| 2027 | $3,067 | $49,253 | $52,320 |
| 2028 | $3,067 | $49,253 | $52,320 |
| 2029 | $3,067 | $49,253 | $52,320 |
| 2030 | $3,067 | $49,253 | $52,320 |
| 2031 | $2,853 | $47,046 | $49,899 |
| 2032 | $2,853 | $47,046 | $49,899 |
| 2033 | $2,853 | $47,046 | $49,899 |
| 2034 | $2,853 | $47,046 | $49,899 |
| 2035 | $2,853 | $47,046 | $49,899 |

## Targets

View: Accounts

| | SF | MF | COM | MUN | IND | Total |
|---|---|---|---|---|---|---|
| 2015 | 72 | 32 | 8 | 0 | 0 | 112 |
| 2016 | 72 | 32 | 8 | 0 | 0 | 112 |
| 2017 | 72 | 32 | 8 | 0 | 0 | 112 |
| 2018 | 72 | 32 | 8 | 0 | 0 | 112 |
| 2019 | 72 | 32 | 8 | 0 | 0 | 112 |
| 2020 | 72 | 32 | 8 | 0 | 0 | 112 |
| 2021 | 80 | 17 | 5 | 0 | 0 | 102 |
| 2022 | 80 | 17 | 5 | 0 | 0 | 102 |
| 2023 | 80 | 17 | 5 | 0 | 0 | 102 |
| 2024 | 80 | 17 | 5 | 0 | 0 | 102 |
| 2025 | 80 | 17 | 5 | 0 | 0 | 102 |
| 2026 | 81 | 30 | 7 | 0 | 0 | 119 |
| 2027 | 81 | 30 | 7 | 0 | 0 | 119 |
| 2028 | 81 | 30 | 7 | 0 | 0 | 119 |
| 2029 | 81 | 30 | 7 | 0 | 0 | 119 |
| 2030 | 81 | 30 | 7 | 0 | 0 | 119 |
| 2031 | 75 | 23 | 9 | 0 | 0 | 108 |
| 2032 | 75 | 23 | 9 | 0 | 0 | 108 |
| 2033 | 75 | 23 | 9 | 0 | 0 | 108 |
| 2034 | 75 | 23 | 9 | 0 | 0 | 108 |
| 2035 | 75 | 23 | 9 | 0 | 0 | 108 |

## Water Savings (mgd)

| | Total Savings (mgd) |
|---|---|
| 2015 | 0.001258 |
| 2016 | 0.002477 |
| 2017 | 0.003655 |
| 2018 | 0.004795 |
| 2019 | 0.005897 |
| 2020 | 0.006962 |
| 2021 | 0.007582 |
| 2022 | 0.008191 |
| 2023 | 0.008789 |
| 2024 | 0.009376 |
| 2025 | 0.009952 |
| 2026 | 0.010882 |
| 2027 | 0.011797 |
| 2028 | 0.012696 |
| 2029 | 0.013582 |
| 2030 | 0.014454 |
| 2031 | 0.015230 |
| 2032 | 0.015998 |
| 2033 | 0.016759 |
| 2034 | 0.017513 |
| 2035 | 0.018260 |

**Single Family Residential Turf Removal**

| Overview | |
|---|---|
| Name | Single Family Residential Turf Rem |
| Abbr | 23 |
| Category | Default |
| Measure Type | Standard Measure |

| Time Period | |
|---|---|
| First Year | 2015 |
| Last Year | 2035 |
| Measure Length | 21 |

| Measure Life | |
|---|---|
| Permanent | ☑ |

| Fixture Costs | Utility | Customer | Fix/Acct |
|---|---|---|---|
| SF | $1,000.00 | $2,000.00 | 1 |

| Administration Costs | |
|---|---|
| Markup Percentage | 25% |

**Description**

Provide a per-square-foot incentive to remove turf and replace with low-water-use plants or permeable hardscape. Pattern after the City's current program. Rebate is currently $0.50 per square foot removed and capped at $500 for single family residence. Increase rebate to $1 per square foot or more and raise maximum to $1,000 or more to increase participation.

**Customer Classes**

| SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|
| ☑ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

**End Uses**

| | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| Toilets | ☐ | | | | | | | |
| Urinals | | | | | | | | |
| Lavatory Faucets | ☐ | | | | | | | |
| Showers | ☐ | | | | | | | |
| Dishwashers | ☐ | | | | | | | |
| Clothes Washers | ☐ | | | | | | | |
| Process | | | | | | | | |
| Kitchen Spray Rinse | | | | | | | | |
| Internal Leakage | ☐ | | | | | | | |
| Baths | ☐ | | | | | | | |
| Other | ☐ | | | | | | | |
| Irrigation | ☑ | | | | | | | |
| Pools | ☐ | | | | | | | |
| Wash Down | ☐ | | | | | | | |
| Car Washing | ☐ | | | | | | | |
| External Leakage | ☐ | | | | | | | |
| Indoor | | | | | | | | |
| Outdoor | | | | | | | | |
| Cooling | | | | | | | | |
| tory/Kitchen Faucets | ☐ | | | | | | | |

**Comments**

Estimated water savings are 19 gallons per square foot. CUWCC Cost and Savings Study (2005) reports up to 39% savings in summer. Assume 50% of landscaping removed and replaced with low water use that uses 50% less water so overall irrigation savings may be on the order of 35% (documented up to maximum of 38%). Note some system efficiency/residual overwatering may still occur. Costs assume $3/per square foot. Net cost to customer is $2/square foot for 1,000 square feet.

**Results**

| Average Water Savings (mgd) | |
|---|---|
| 0.006175 | |
| Lifetime Savings - Present Value ($) | |
| Utility | $88,847 |
| Community | $88,847 |
| Lifetime Costs - Present Value ($) | |
| Utility | $1,049,373 |
| Community | $2,728,369 |
| Benefit to Cost Ratio | |
| Utility | 0.08 |
| Community | 0.03 |
| Cost of Savings per Unit Volume ($/mg) | |
| Utility | $22,157 |

**End Use Savings Per Replacement**

| | % Savings per Account |
|---|---|
| SF Irrigation | 35.0% |

**Targets**

| | |
|---|---|
| Target Method | Percentage |
| % of Accts Targeted / yr | 0.250% |
| Only Effects New Accts | ☐ |

**Costs**

View: Utility Details

| | Fixture Costs | Admin Costs | Util Total |
|---|---|---|---|
| 2015 | $47,742 | $11,935 | $59,677 |
| 2016 | $47,921 | $11,980 | $59,902 |
| 2017 | $48,101 | $12,025 | $60,126 |
| 2018 | $48,281 | $12,070 | $60,351 |
| 2019 | $48,460 | $12,115 | $60,576 |
| 2020 | $48,640 | $12,160 | $60,800 |
| 2021 | $48,839 | $12,210 | $61,049 |
| 2022 | $49,038 | $12,260 | $61,298 |
| 2023 | $49,237 | $12,309 | $61,546 |
| 2024 | $49,436 | $12,359 | $61,795 |
| 2025 | $49,635 | $12,409 | $62,044 |
| 2026 | $49,838 | $12,460 | $62,298 |
| 2027 | $50,041 | $12,510 | $62,552 |
| 2028 | $50,244 | $12,561 | $62,805 |
| 2029 | $50,447 | $12,612 | $63,059 |
| 2030 | $50,651 | $12,663 | $63,313 |
| 2031 | $50,838 | $12,710 | $63,548 |
| 2032 | $51,026 | $12,757 | $63,783 |
| 2033 | $51,214 | $12,803 | $64,017 |
| 2034 | $51,402 | $12,850 | $64,252 |
| 2035 | $51,589 | $12,897 | $64,487 |

**Targets**

View: Accounts

| | SF | Total |
|---|---|---|
| 2015 | 48 | 48 |
| 2016 | 48 | 48 |
| 2017 | 48 | 48 |
| 2018 | 48 | 48 |
| 2019 | 48 | 48 |
| 2020 | 49 | 49 |
| 2021 | 49 | 49 |
| 2022 | 49 | 49 |
| 2023 | 49 | 49 |
| 2024 | 49 | 49 |
| 2025 | 50 | 50 |
| 2026 | 50 | 50 |
| 2027 | 50 | 50 |
| 2028 | 50 | 50 |
| 2029 | 50 | 50 |
| 2030 | 51 | 51 |
| 2031 | 51 | 51 |
| 2032 | 51 | 51 |
| 2033 | 51 | 51 |
| 2034 | 51 | 51 |
| 2035 | 52 | 52 |

**Water Savings (mgd)**

| | Total Savings (mgd) |
|---|---|
| 2015 | 0.000612 |
| 2016 | 0.001214 |
| 2017 | 0.001806 |
| 2018 | 0.002387 |
| 2019 | 0.002957 |
| 2020 | 0.003517 |
| 2021 | 0.004080 |
| 2022 | 0.004636 |
| 2023 | 0.005185 |
| 2024 | 0.005728 |
| 2025 | 0.006263 |
| 2026 | 0.006791 |
| 2027 | 0.007316 |
| 2028 | 0.007838 |
| 2029 | 0.008357 |
| 2030 | 0.008875 |
| 2031 | 0.009392 |
| 2032 | 0.009908 |
| 2033 | 0.010423 |
| 2034 | 0.010936 |
| 2035 | 0.011449 |

**Multifamily Residential/CII Turf Removal**

| Overview | |
|---|---|
| Name | Multifamily Residential/CII Turf Removal |
| Abbr | 24 |
| Category | Default |
| Measure Type | Standard Measure |

| Time Period | |
|---|---|
| First Year | 2015 |
| Last Year | 2035 |
| Measure Length | 21 |

| Measure Life | |
|---|---|
| Permanent | ☑ |

**Fixture Costs**

| | Utility | Customer | Fix/Acct |
|---|---|---|---|
| MF | $2,000.00 | $8,000.00 | 1 |
| COM | $5,000.00 | $10,000.00 | 1 |
| MUN | $5,000.00 | $10,000.00 | 1 |
| IRR | $5,000.00 | $10,000.00 | 1 |

| Administration Costs | |
|---|---|
| Markup Percentage | 25% |

**Description**

Provide a per-square-foot incentive to remove turf and replace with low-water-use plants or hardscape. Pattern after the City's current program. Rebate is currently $0.50 per square foot removed and capped at $2,500 for multi-family or commercial residences. Increase rebate to $1 per square foot or more and raise maximum amount to $5,000 or more to increase participation.

**Customer Classes**

| SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|
| ☐ | ☑ | ☑ | ☑ | ☐ | ☐ | ☑ | ☐ |

**End Uses**

| | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| Toilets | | ☐ | ☐ | ☐ | | | | |
| Urinals | | | ☐ | ☐ | | | | |
| Lavatory Faucets | | ☐ | ☐ | ☐ | | | | |
| Showers | | ☐ | ☐ | ☐ | | | | |
| Dishwashers | | ☐ | ☐ | ☐ | | | | |
| Clothes Washers | | ☐ | ☐ | ☐ | | | | |
| Process | | | ☐ | | | | | |
| Kitchen Spray Rinse | | | ☐ | ☐ | | | | |
| Internal Leakage | | ☐ | ☐ | ☐ | | | | |
| Baths | | ☐ | | | | | | |
| Other | | ☐ | ☐ | ☐ | | | | |
| Irrigation | | ☑ | ☑ | ☑ | | | ☑ | |
| Pools | | ☐ | | | | | | |
| Wash Down | | ☐ | | | | | | |
| Car Washing | | ☐ | | | | | | |
| External Leakage | | ☐ | ☐ | ☐ | | | ☐ | |
| Indoor | | | | | | | | |
| Outdoor | | | | | | | | |
| Cooling | | | ☐ | ☐ | | | | |
| tory/Kitchen Faucets | | ☐ | ☐ | ☐ | | | | |

**Comments**

Estimated water savings are 19 gallons per square foot from high water use plants (turf grass) at Plant Factor (PF) 0.8 compared to low water use plants at PF of 0.4. Evapotranspiration (ETo) for Santa Cruz is relatively low at 36 inches per year. Assume 50% square footage is replaced. Costs assume $3/per square foot. Net cost to customer is $2/square foot for 1,000 square feet.

**Results**

| Average Water Savings (mgd) | |
|---|---|
| 0.003519 | |
| **Lifetime Savings - Present Value ($)** | |
| Utility | $50,616 |
| Community | $50,616 |
| **Lifetime Costs - Present Value ($)** | |
| Utility | $868,786 |
| Community | $2,661,845 |
| **Benefit to Cost Ratio** | |
| Utility | 0.06 |
| Community | 0.02 |
| **Cost of Savings per Unit Volume ($/mg)** | |
| Utility | $32,186 |

**End Use Savings Per Replacement**

| | % Savings per Account |
|---|---|
| MF Irrigation | 35.0% |
| COM Irrigation | 35.0% |
| MUN Irrigation | 5.0% |
| IRR Irrigation | 5.0% |

**Targets**

| | |
|---|---|
| Target Method | Percentage |
| % of Accts Targeted / yr | 0.200% |
| Only Effects New Accts | ☐ |

**Costs**

View: Utility Details

| | Fixture Costs | Admin Costs | Util Total |
|---|---|---|---|
| 2015 | $37,233 | $9,308 | $46,541 |
| 2016 | $37,729 | $9,432 | $47,162 |
| 2017 | $38,226 | $9,556 | $47,782 |
| 2018 | $38,722 | $9,681 | $48,403 |
| 2019 | $39,219 | $9,805 | $49,023 |
| 2020 | $39,715 | $9,929 | $49,644 |
| 2021 | $39,975 | $9,994 | $49,968 |
| 2022 | $40,234 | $10,059 | $50,293 |
| 2023 | $40,494 | $10,123 | $50,617 |
| 2024 | $40,753 | $10,188 | $50,941 |
| 2025 | $41,012 | $10,253 | $51,266 |
| 2026 | $41,451 | $10,363 | $51,814 |
| 2027 | $41,890 | $10,472 | $52,362 |
| 2028 | $42,328 | $10,582 | $52,910 |
| 2029 | $42,767 | $10,692 | $53,459 |
| 2030 | $43,205 | $10,801 | $54,007 |
| 2031 | $43,604 | $10,901 | $54,506 |
| 2032 | $44,003 | $11,001 | $55,004 |
| 2033 | $44,402 | $11,101 | $55,503 |
| 2034 | $44,801 | $11,200 | $56,002 |
| 2035 | $45,200 | $11,300 | $56,501 |

**Targets**

View: Accounts

| | MF | COM | MUN | IRR | Total |
|---|---|---|---|---|---|
| 2015 | 5 | 4 | 0 | 1 | 11 |
| 2016 | 6 | 4 | 0 | 1 | 11 |
| 2017 | 6 | 4 | 0 | 1 | 11 |
| 2018 | 6 | 4 | 0 | 1 | 11 |
| 2019 | 6 | 4 | 0 | 1 | 11 |
| 2020 | 6 | 4 | 0 | 1 | 11 |
| 2021 | 6 | 4 | 0 | 1 | 11 |
| 2022 | 6 | 4 | 0 | 1 | 12 |
| 2023 | 6 | 4 | 0 | 1 | 12 |
| 2024 | 6 | 4 | 0 | 1 | 12 |
| 2025 | 6 | 4 | 0 | 1 | 12 |
| 2026 | 6 | 4 | 0 | 1 | 12 |
| 2027 | 6 | 4 | 0 | 2 | 12 |
| 2028 | 6 | 4 | 0 | 2 | 12 |
| 2029 | 6 | 4 | 0 | 2 | 12 |
| 2030 | 6 | 4 | 0 | 2 | 12 |
| 2031 | 6 | 4 | 0 | 2 | 12 |
| 2032 | 6 | 4 | 0 | 2 | 13 |
| 2033 | 6 | 4 | 0 | 2 | 13 |
| 2034 | 6 | 4 | 0 | 2 | 13 |
| 2035 | 6 | 4 | 0 | 2 | 13 |

**Water Savings (mgd)**

| | Total Savings (mgd) |
|---|---|
| 2015 | 0.000347 |
| 2016 | 0.000689 |
| 2017 | 0.001023 |
| 2018 | 0.001350 |
| 2019 | 0.001672 |
| 2020 | 0.001986 |
| 2021 | 0.002309 |
| 2022 | 0.002629 |
| 2023 | 0.002945 |
| 2024 | 0.003258 |
| 2025 | 0.003568 |
| 2026 | 0.003869 |
| 2027 | 0.004170 |
| 2028 | 0.004469 |
| 2029 | 0.004766 |
| 2030 | 0.005063 |
| 2031 | 0.005362 |
| 2032 | 0.005661 |
| 2033 | 0.005958 |
| 2034 | 0.006255 |
| 2035 | 0.006551 |



**Expand Large Landscape Survey/Water**

| Overview | |
|---|---|
| Name | Expand Large Landscape Survey/V |
| Abbr | 25 |
| Category | Default |
| Measure Type | Standard Measure |

| Time Period | |
|---|---|
| First Year | 2018 |
| Last Year | 2035 |
| Measure Length | 18 |

| Measure Life | |
|---|---|
| Permanent | ☐ |
| Years | 10 |
| Repeat | ☐ |

| Fixture Costs | Utility | Customer | Fix/Acct |
|---|---|---|---|
| IRR | $1,500.00 | $1,500.00 | 1 |

| Administration Costs | |
|---|---|
| Markup Percentage | 45% |

**Description**

Outdoor water audits offered for existing large landscape customers. Normally those with high water use are targeted and provided a customized report on how to save water. All large multifamily residential, CII, and public irrigators of large landscapes would be eligible for free landscape water audits upon request. Tied to the Water Budget Program.

| Customer Classes | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☑ | ☐ |

| End Uses | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| Toilets | | | | | | | | |
| Urinals | | | | | | | | |
| Lavatory Faucets | | | | | | | | |
| Showers | | | | | | | | |
| Dishwashers | | | | | | | | |
| Clothes Washers | | | | | | | | |
| Process | | | | | | | | |
| Kitchen Spray Rinse | | | | | | | | |
| Internal Leakage | | | | | | | | |
| Baths | | | | | | | | |
| Other | | | | | | | | |
| Irrigation | | | | | | | ☑ | |
| Pools | | | | | | | | |
| Wash Down | | | | | | | | |
| Car Washing | | | | | | | | |
| External Leakage | | | | | | | ☐ | |
| Indoor | | | | | | | | |
| Outdoor | | | | | | | | |
| Cooling | | | | | | | | |
| tory/Kitchen Faucets | | | | | | | | |

**Comments**

1 acre and above get offered survey and water budget due to ordinance. Option to do it on their own. Water savings based on relatively cool climate and not much turf irrigation. See notes on water budget based billing. Utility costs based on $1400 per audit per contract. Customer costs assume customer makes some changes to system to try and meet budget. 10-15 audits per year on 250 participating accounts.

| Results | |
|---|---|
| Average Water Savings (mgd) | 0.003167 |
| Lifetime Savings - Present Value ($) | |
| Utility | $45,029 |
| Community | $45,029 |
| Lifetime Costs - Present Value ($) | |
| Utility | $508,859 |
| Community | $859,797 |
| Benefit to Cost Ratio | |
| Utility | 0.09 |
| Community | 0.05 |
| Cost of Savings per Unit Volume ($/mg) | |
| Utility | $20,948 |

| End Use Savings Per Replacement | % Savings per Account |
|---|---|
| IRR Irrigation | 6.6% |

| Targets | |
|---|---|
| Target Method | Percentage |
| % of Accts Targeted / yr | 2.200% |
| Only Effects New Accts | ☐ |

**Costs**

View: Summary

| | Utility | Customer | Total |
|---|---|---|---|
| 2015 | $0 | $0 | $0 |
| 2016 | $0 | $0 | $0 |
| 2017 | $0 | $0 | $0 |
| 2018 | $28,438 | $19,612 | $48,050 |
| 2019 | $29,798 | $20,551 | $50,349 |
| 2020 | $31,159 | $21,489 | $52,648 |
| 2021 | $31,848 | $21,964 | $53,813 |
| 2022 | $32,538 | $22,440 | $54,977 |
| 2023 | $33,227 | $22,915 | $56,142 |
| 2024 | $33,916 | $23,390 | $57,306 |
| 2025 | $34,605 | $23,866 | $58,471 |
| 2026 | $35,773 | $24,671 | $60,444 |
| 2027 | $36,941 | $25,477 | $62,418 |
| 2028 | $38,109 | $26,282 | $64,391 |
| 2029 | $39,277 | $27,087 | $66,364 |
| 2030 | $40,445 | $27,893 | $68,337 |
| 2031 | $41,459 | $28,593 | $70,052 |
| 2032 | $42,474 | $29,292 | $71,766 |
| 2033 | $43,489 | $29,992 | $73,481 |
| 2034 | $44,503 | $30,692 | $75,195 |
| 2035 | $45,518 | $31,392 | $76,910 |

**Targets**

View: Accounts

| | IRR | Total |
|---|---|---|
| 2015 | 0 | 0 |
| 2016 | 0 | 0 |
| 2017 | 0 | 0 |
| 2018 | 13 | 13 |
| 2019 | 14 | 14 |
| 2020 | 14 | 14 |
| 2021 | 15 | 15 |
| 2022 | 15 | 15 |
| 2023 | 15 | 15 |
| 2024 | 16 | 16 |
| 2025 | 16 | 16 |
| 2026 | 16 | 16 |
| 2027 | 17 | 17 |
| 2028 | 18 | 18 |
| 2029 | 18 | 18 |
| 2030 | 19 | 19 |
| 2031 | 19 | 19 |
| 2032 | 20 | 20 |
| 2033 | 20 | 20 |
| 2034 | 20 | 20 |
| 2035 | 21 | 21 |

**Water Savings (mgd)**

| | Total Savings (mgd) |
|---|---|
| 2015 | 0.000000 |
| 2016 | 0.000000 |
| 2017 | 0.000000 |
| 2018 | 0.000466 |
| 2019 | 0.000927 |
| 2020 | 0.001383 |
| 2021 | 0.001856 |
| 2022 | 0.002329 |
| 2023 | 0.002803 |
| 2024 | 0.003278 |
| 2025 | 0.003752 |
| 2026 | 0.004232 |
| 2027 | 0.004719 |
| 2028 | 0.004807 |
| 2029 | 0.004890 |
| 2030 | 0.004969 |
| 2031 | 0.005049 |
| 2032 | 0.005132 |
| 2033 | 0.005217 |
| 2034 | 0.005304 |
| 2035 | 0.005392 |



**Sprinkler Nozzle Rebates**

| Overview | |
|---|---|
| Name | Sprinkler Nozzle Rebates |
| Abbr | 26 |
| Category | Default |
| Measure Type | Standard Measure |

| Time Period | |
|---|---|
| First Year | 2018 |
| Last Year | 2035 |
| Measure Length | 18 |

| Measure Life | |
|---|---|
| Permanent | ☐ |
| Years | 20 |
| Repeat | ☐ |

| Fixture Costs | Utility | Customer | Fix/Acct |
|---|---|---|---|
| SF | $6.00 | $4.00 | 25 |
| MF | $6.00 | $4.00 | 50 |
| COM | $6.00 | $4.00 | 100 |

| Administration Costs | |
|---|---|
| Markup Percentage | 25% |

**Description**

Provide rebates to replace standard spray sprinkler nozzles with rotating nozzles that have lower application rates. Nozzles cost about $6 each. Consider online application processing through options like www.freesprinklernozzles.com.

| Customer Classes | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| | ☑ | ☑ | ☑ | ☐ | ☐ | ☐ | ☐ | ☐ |

| End Uses | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| Toilets | ☐ | ☐ | ☐ | | | | | |
| Urinals | | | ☐ | | | | | |
| Lavatory Faucets | ☐ | ☐ | ☐ | | | | | |
| Showers | ☐ | ☐ | ☐ | | | | | |
| Dishwashers | ☐ | ☐ | ☐ | | | | | |
| Clothes Washers | ☐ | ☐ | ☐ | | | | | |
| Process | | | ☐ | | | | | |
| Kitchen Spray Rinse | | | ☐ | | | | | |
| Internal Leakage | ☐ | ☐ | ☐ | | | | | |
| Baths | ☐ | ☐ | | | | | | |
| Other | ☐ | ☐ | ☐ | | | | | |
| Irrigation | ☑ | ☑ | ☑ | | | | | |
| Pools | ☐ | ☐ | | | | | | |
| Wash Down | ☐ | ☐ | | | | | | |
| Car Washing | ☐ | ☐ | | | | | | |
| External Leakage | ☐ | ☐ | ☐ | | | | | |
| Indoor | | | | | | | | |
| Outdoor | | | | | | | | |
| Cooling | | | ☐ | | | | | |
| tory/Kitchen Faucets | ☐ | ☐ | ☐ | | | | | |

**Comments**

Water savings assume improvement in distribution uniformity saves 10% of irrigation. Reference CUWCC Potential Best Management Practice Report on Rotating Nozzles. Utility costs assume cost is $6/nozzle with rebate amount of $2 per nozzle with the following nozzles distributed: SF = 25; MF = 50; COM = 100. Customer pays the remainder of the device cost plus installation. No nozzle minimum.

| Results | |
|---|---|
| Average Water Savings (mgd) | 0.004259 |
| Lifetime Savings - Present Value ($) | |
| Utility | $59,780 |
| Community | $59,780 |
| Lifetime Costs - Present Value ($) | |
| Utility | $445,715 |
| Community | $683,430 |
| Benefit to Cost Ratio | |
| Utility | 0.13 |
| Community | 0.09 |
| Cost of Savings per Unit Volume ($/mg) | |
| Utility | $13,643 |

| End Use Savings Per Replacement | % Savings per Account |
|---|---|
| SF Irrigation | 10.0% |
| MF Irrigation | 10.0% |
| COM Irrigation | 10.0% |

| Targets | |
|---|---|
| Target Method | Percentage |
| % of Accts Targeted / yr | 0.500% |
| Only Effects New Accts | ☐ |

**Costs** — View: Summary

| | Utility | Customer | Total |
|---|---|---|---|
| 2015 | $0 | $0 | $0 |
| 2016 | $0 | $0 | $0 |
| 2017 | $0 | $0 | $0 |
| 2018 | $30,638 | $16,340 | $46,978 |
| 2019 | $30,797 | $16,425 | $47,222 |
| 2020 | $30,956 | $16,510 | $47,466 |
| 2021 | $31,080 | $16,576 | $47,656 |
| 2022 | $31,205 | $16,642 | $47,847 |
| 2023 | $31,329 | $16,709 | $48,038 |
| 2024 | $31,453 | $16,775 | $48,228 |
| 2025 | $31,578 | $16,841 | $48,419 |
| 2026 | $31,738 | $16,927 | $48,665 |
| 2027 | $31,898 | $17,013 | $48,911 |
| 2028 | $32,059 | $17,098 | $49,157 |
| 2029 | $32,219 | $17,184 | $49,403 |
| 2030 | $32,380 | $17,269 | $49,649 |
| 2031 | $32,529 | $17,349 | $49,878 |
| 2032 | $32,678 | $17,428 | $50,106 |
| 2033 | $32,827 | $17,508 | $50,335 |
| 2034 | $32,977 | $17,587 | $50,564 |
| 2035 | $33,126 | $17,667 | $50,793 |

**Targets** — View: Accounts

| | SF | MF | COM | Total |
|---|---|---|---|---|
| 2015 | 0 | 0 | 0 | 0 |
| 2016 | 0 | 0 | 0 | 0 |
| 2017 | 0 | 0 | 0 | 0 |
| 2018 | 97 | 14 | 10 | 120 |
| 2019 | 97 | 14 | 10 | 121 |
| 2020 | 97 | 14 | 10 | 121 |
| 2021 | 98 | 15 | 10 | 122 |
| 2022 | 98 | 15 | 10 | 122 |
| 2023 | 98 | 15 | 10 | 123 |
| 2024 | 99 | 15 | 10 | 123 |
| 2025 | 99 | 15 | 10 | 124 |
| 2026 | 100 | 15 | 10 | 125 |
| 2027 | 100 | 15 | 10 | 125 |
| 2028 | 100 | 15 | 10 | 126 |
| 2029 | 101 | 15 | 10 | 126 |
| 2030 | 101 | 16 | 10 | 127 |
| 2031 | 102 | 16 | 10 | 127 |
| 2032 | 102 | 16 | 10 | 128 |
| 2033 | 102 | 16 | 10 | 129 |
| 2034 | 103 | 16 | 10 | 129 |
| 2035 | 103 | 16 | 10 | 130 |

**Water Savings (mgd)**

| | Total Savings (mgd) |
|---|---|
| 2015 | 0.000000 |
| 2016 | 0.000000 |
| 2017 | 0.000000 |
| 2018 | 0.000560 |
| 2019 | 0.001110 |
| 2020 | 0.001649 |
| 2021 | 0.002187 |
| 2022 | 0.002719 |
| 2023 | 0.003244 |
| 2024 | 0.003762 |
| 2025 | 0.004274 |
| 2026 | 0.004777 |
| 2027 | 0.005277 |
| 2028 | 0.005772 |
| 2029 | 0.006265 |
| 2030 | 0.006755 |
| 2031 | 0.007245 |
| 2032 | 0.007733 |
| 2033 | 0.008220 |
| 2034 | 0.008705 |
| 2035 | 0.009188 |



**Gray Water Retrofit**

| Overview | |
|---|---|
| Name | Gray Water Retrofit |
| Abbr | 27 |
| Category | Default |
| Measure Type | Standard Measure |

| Time Period | |
|---|---|
| First Year | 2015 |
| Last Year | 2035 |
| Measure Length | 21 |

| Measure Life | |
|---|---|
| Permanent | ☑ |

| Fixture Costs | Utility | Customer | Fix/Acct |
|---|---|---|---|
| SF | $175.00 | $300.00 | 1 |

| Administration Costs | |
|---|---|
| Markup Percentage | 45% |

**Description**

Provide a workshop to support a Gray Water Challenge similar to 2013 event that was modeled after Sonoma County program. Offer rebate to assist covering certain percentage of the cost to single family homeowners per year to install gray water systems. Package from local hardware stores containing the primary components would be supported by City rebate.

| Customer Classes | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| | ☑ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

| End Uses | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| Toilets | ☐ | | | | | | | |
| Urinals | | | | | | | | |
| Lavatory Faucets | ☐ | | | | | | | |
| Showers | ☐ | | | | | | | |
| Dishwashers | ☐ | | | | | | | |
| Clothes Washers | ☐ | | | | | | | |
| Process | | | | | | | | |
| Kitchen Spray Rinse | | | | | | | | |
| Internal Leakage | ☐ | | | | | | | |
| Baths | ☐ | | | | | | | |
| Other | ☐ | | | | | | | |
| Irrigation | ☑ | | | | | | | |
| Pools | ☐ | | | | | | | |
| Wash Down | ☐ | | | | | | | |
| Car Washing | ☐ | | | | | | | |
| External Leakage | ☐ | | | | | | | |
| Indoor | | | | | | | | |
| Outdoor | | | | | | | | |
| Cooling | | | | | | | | |
| tory/Kitchen Faucets | ☐ | | | | | | | |

**Comments**

Water savings assume single fixture type system used to replace a portion of garden watering on new or existing homes. System costs ~$450 and City pays ~ 1/3. Customer pays for installation. In the summer washing machine use of ~25 gpd would cover about 25% or summer use (2x annual average). Based on continuation of our 2013 Gray Water Challenge.

| Results | |
|---|---|
| Average Water Savings (mgd) | |
| | 0.000353 |
| Lifetime Savings - Present Value ($) | |
| Utility | $5,077 |
| Community | $5,077 |
| Lifetime Costs - Present Value ($) | |
| Utility | $42,605 |
| Community | $92,974 |
| Benefit to Cost Ratio | |
| Utility | 0.12 |
| Community | 0.05 |
| Cost of Savings per Unit Volume ($/mg) | |
| Utility | $15,742 |

| End Use Savings Per Replacement | % Savings per Account |
|---|---|
| SF Irrigation | 10.0% |

| Targets | |
|---|---|
| Target Method | Percentage |
| % of Accts Targeted / yr | 0.050% |
| Only Effects New Accts | ☐ |

**Costs** — View: Summary

| | Utility | Customer | Total |
|---|---|---|---|
| 2015 | $2,423 | $2,865 | $5,287 |
| 2016 | $2,432 | $2,875 | $5,307 |
| 2017 | $2,441 | $2,886 | $5,327 |
| 2018 | $2,450 | $2,897 | $5,347 |
| 2019 | $2,459 | $2,908 | $5,367 |
| 2020 | $2,468 | $2,918 | $5,387 |
| 2021 | $2,479 | $2,930 | $5,409 |
| 2022 | $2,489 | $2,942 | $5,431 |
| 2023 | $2,499 | $2,954 | $5,453 |
| 2024 | $2,509 | $2,966 | $5,475 |
| 2025 | $2,519 | $2,978 | $5,497 |
| 2026 | $2,529 | $2,990 | $5,520 |
| 2027 | $2,540 | $3,002 | $5,542 |
| 2028 | $2,550 | $3,015 | $5,565 |
| 2029 | $2,560 | $3,027 | $5,587 |
| 2030 | $2,571 | $3,039 | $5,610 |
| 2031 | $2,580 | $3,050 | $5,630 |
| 2032 | $2,590 | $3,062 | $5,651 |
| 2033 | $2,599 | $3,073 | $5,672 |
| 2034 | $2,609 | $3,084 | $5,693 |
| 2035 | $2,618 | $3,095 | $5,714 |

**Targets** — View: Accounts

| | SF | Total |
|---|---|---|
| 2015 | 10 | 10 |
| 2016 | 10 | 10 |
| 2017 | 10 | 10 |
| 2018 | 10 | 10 |
| 2019 | 10 | 10 |
| 2020 | 10 | 10 |
| 2021 | 10 | 10 |
| 2022 | 10 | 10 |
| 2023 | 10 | 10 |
| 2024 | 10 | 10 |
| 2025 | 10 | 10 |
| 2026 | 10 | 10 |
| 2027 | 10 | 10 |
| 2028 | 10 | 10 |
| 2029 | 10 | 10 |
| 2030 | 10 | 10 |
| 2031 | 10 | 10 |
| 2032 | 10 | 10 |
| 2033 | 10 | 10 |
| 2034 | 10 | 10 |
| 2035 | 10 | 10 |

**Water Savings (mgd)**

| | Total Savings (mgd) |
|---|---|
| 2015 | 0.000035 |
| 2016 | 0.000069 |
| 2017 | 0.000103 |
| 2018 | 0.000136 |
| 2019 | 0.000169 |
| 2020 | 0.000201 |
| 2021 | 0.000233 |
| 2022 | 0.000265 |
| 2023 | 0.000296 |
| 2024 | 0.000327 |
| 2025 | 0.000358 |
| 2026 | 0.000388 |
| 2027 | 0.000418 |
| 2028 | 0.000448 |
| 2029 | 0.000478 |
| 2030 | 0.000507 |
| 2031 | 0.000537 |
| 2032 | 0.000566 |
| 2033 | 0.000596 |
| 2034 | 0.000625 |
| 2035 | 0.000654 |

**Residential Rain Barrels**

| Overview | |
|---|---|
| Name | Residential Rain Barrels |
| Abbr | 28 |
| Category | Default |
| Measure Type | Standard Measure |

| Time Period | |
|---|---|
| First Year | 2015 |
| Last Year | 2035 |
| Measure Length | 21 |

| Measure Life | |
|---|---|
| Permanent | ☐ |
| Years | 20 |
| Repeat | ☐ |

| Fixture Costs | Utility | Customer | Fix/Acct |
|---|---|---|---|
| SF | $30.00 | $50.00 | 1 |

| Administration Costs | |
|---|---|
| Markup Percentage | 25% |

**Description**

Provide incentive for installation of rain barrels. This could involve rebates or bulk purchase and giveaways of barrels, plus workshops on proper installation and use of captured rain water for landscape irrigation. Pattern after Honolulu Board of Water Supply program.

| Customer Classes | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| | ☑ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

| End Uses | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| Toilets | ☐ | | | | | | | |
| Urinals | | | | | | | | |
| Lavatory Faucets | ☐ | | | | | | | |
| Showers | ☐ | | | | | | | |
| Dishwashers | ☐ | | | | | | | |
| Clothes Washers | ☐ | | | | | | | |
| Process | | | | | | | | |
| Kitchen Spray Rinse | | | | | | | | |
| Internal Leakage | ☐ | | | | | | | |
| Baths | ☐ | | | | | | | |
| Other | ☐ | | | | | | | |
| Irrigation | ☑ | | | | | | | |
| Pools | ☐ | | | | | | | |
| Wash Down | ☐ | | | | | | | |
| Car Washing | ☐ | | | | | | | |
| External Leakage | ☐ | | | | | | | |
| Indoor | | | | | | | | |
| Outdoor | | | | | | | | |
| Cooling | | | | | | | | |
| tory/Kitchen Faucets | ☐ | | | | | | | |

| Results | |
|---|---|
| Average Water Savings (mgd) | 0.005271 |
| Lifetime Savings - Present Value ($) | |
| Utility | $75,892 |
| Community | $75,892 |
| Lifetime Costs - Present Value ($) | |
| Utility | $188,887 |
| Community | $440,737 |
| Benefit to Cost Ratio | |
| Utility | 0.40 |
| Community | 0.17 |
| Cost of Savings per Unit Volume ($/mg) | |
| Utility | $4,672 |

| End Use Savings Per Replacement | % Savings per Account |
|---|---|
| SF Irrigation | 5.0% |

| Targets | |
|---|---|
| Target Method | Percentage |
| % of Accts Targeted / yr | 1.500% |
| Only Effects New Accts | ☐ |

**Comments**

Water savings assumes 4 effective fills per year for 20 years. 20 year useful life. 1.5% actual water savings from barrel and 3.5% from behavioral change. City pays for the difference plus shipping. Customer has to install.
If the rain barrel model were available for purchase locally, the City would probably stop selling them and offer a rebate instead due to storage and delivery challenges. We could also add a rebate anyway so people have more choice in models and sizes. Assume a 50 percent subsidy. Currently sell subsidized rain barrels to customers. May want to expand types. Probill Hardware now carries the bushman line. Education and promotion program. 3-4 effective fills. Discount starts at $100 per barrel.

**Costs** — View: Summary

| | Utility | Customer | Total |
|---|---|---|---|
| 2015 | $10,742 | $14,323 | $25,064 |
| 2016 | $10,782 | $14,376 | $25,159 |
| 2017 | $10,823 | $14,430 | $25,253 |
| 2018 | $10,863 | $14,484 | $25,347 |
| 2019 | $10,904 | $14,538 | $25,442 |
| 2020 | $10,944 | $14,592 | $25,536 |
| 2021 | $10,989 | $14,652 | $25,641 |
| 2022 | $11,034 | $14,711 | $25,745 |
| 2023 | $11,078 | $14,771 | $25,849 |
| 2024 | $11,123 | $14,831 | $25,954 |
| 2025 | $11,168 | $14,891 | $26,058 |
| 2026 | $11,214 | $14,951 | $26,165 |
| 2027 | $11,259 | $15,012 | $26,272 |
| 2028 | $11,305 | $15,073 | $26,378 |
| 2029 | $11,351 | $15,134 | $26,485 |
| 2030 | $11,396 | $15,195 | $26,592 |
| 2031 | $11,439 | $15,251 | $26,690 |
| 2032 | $11,481 | $15,308 | $26,789 |
| 2033 | $11,523 | $15,364 | $26,887 |
| 2034 | $11,565 | $15,420 | $26,986 |
| 2035 | $11,608 | $15,477 | $27,084 |

**Targets** — View: Accounts

| | SF | Total |
|---|---|---|
| 2015 | 286 | 286 |
| 2016 | 288 | 288 |
| 2017 | 289 | 289 |
| 2018 | 290 | 290 |
| 2019 | 291 | 291 |
| 2020 | 292 | 292 |
| 2021 | 293 | 293 |
| 2022 | 294 | 294 |
| 2023 | 295 | 295 |
| 2024 | 297 | 297 |
| 2025 | 298 | 298 |
| 2026 | 299 | 299 |
| 2027 | 300 | 300 |
| 2028 | 301 | 301 |
| 2029 | 303 | 303 |
| 2030 | 304 | 304 |
| 2031 | 305 | 305 |
| 2032 | 306 | 306 |
| 2033 | 307 | 307 |
| 2034 | 308 | 308 |
| 2035 | 310 | 310 |

**Water Savings (mgd)**

| | Total Savings (mgd) |
|---|---|
| 2015 | 0.000524 |
| 2016 | 0.001041 |
| 2017 | 0.001548 |
| 2018 | 0.002046 |
| 2019 | 0.002535 |
| 2020 | 0.003014 |
| 2021 | 0.003497 |
| 2022 | 0.003974 |
| 2023 | 0.004445 |
| 2024 | 0.004909 |
| 2025 | 0.005368 |
| 2026 | 0.005821 |
| 2027 | 0.006271 |
| 2028 | 0.006718 |
| 2029 | 0.007164 |
| 2030 | 0.007607 |
| 2031 | 0.008051 |
| 2032 | 0.008493 |
| 2033 | 0.008934 |
| 2034 | 0.009374 |
| 2035 | 0.009364 |

**Climate Appropriate Landscaping**

| Overview | |
|---|---|
| Name | Climate Appropriate Landscaping and Rainw |
| Abbr | 29 |
| Category | Default |
| Measure Type | Standard Measure |

| Time Period | |
|---|---|
| First Year | 2015 |
| Last Year | 2035 |
| Measure Length | 21 |

| Measure Life | |
|---|---|
| Permanent | ☑ |

| Fixture Costs | Utility | Customer | Fix/Acct |
|---|---|---|---|
| SF | $1,000.00 | $1,500.00 | 1 |
| MF | $2,000.00 | $2,500.00 | 1 |
| COM | $5,000.00 | $10,000.00 | 1 |
| MUN | $5,000.00 | $10,000.00 | 1 |

| Administration Costs | |
|---|---|
| Markup Percentage | 25% |

**Description**

Provide incentives for installation of climate appropriate landscaping and rainwater infiltration. This measure will provide rebates for HOAs, businesses, and institutions that increase their outdoor water use efficiency by replacing qualifying high water use landscape and/or upgrading to qualifying high efficiency irrigation equipment or climate appropriate landscape. To qualify, sites must participate in a pre-inspection prior to beginning their project or purchasing materials for which they would like to receive rebates. Single family homes, multifamily and business properties with qualifying irrigated landscape (i.e., irrigated turf or functional swimming pool) can receive rebates for replacing high water use landscape, such as irrigated turf grass, with a minimum of 50% plant coverage consisting of low water using plants from the Approved Plant List.

Recommendations from July 17, 2015 WSAC Agenda Item 6A "Summary of WSAC Work on Demand Management Options and Options for Integrating Demand Management into potential Water Supply Advisory Committee Recommendations and Agreement":

- Increase turf conversion rebate
- Require conversion of spray to drip for shrub irrigation
- Discourage runoff through rainwater infiltration features
- Support local initiatives for climate-appropriate landscaping
- Target landscaping narrower than 10 ft - no spray irrigation and/or next to hardscapes

| Customer Classes | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| | ☑ | ☑ | ☑ | ☑ | ☐ | ☐ | ☐ | ☐ |

| End Uses | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| Toilets | ☐ | ☐ | ☐ | ☐ | | | | |
| Urinals | | | ☐ | ☐ | | | | |
| Lavatory Faucets | ☐ | ☐ | ☐ | ☐ | | | | |
| Showers | ☐ | ☐ | ☐ | ☐ | | | | |
| Dishwashers | ☐ | ☐ | ☐ | ☐ | | | | |
| Clothes Washers | ☐ | ☐ | ☐ | ☐ | | | | |
| Process | | | ☐ | | | | | |
| Kitchen Spray Rinse | | | ☐ | ☐ | | | | |
| Internal Leakage | ☐ | ☐ | ☐ | ☐ | | | | |
| Baths | ☐ | ☐ | | | | | | |
| Other | ☐ | ☐ | ☐ | ☐ | | | | |
| Irrigation | ☑ | ☑ | ☑ | ☑ | | | | |
| Pools | ☐ | ☐ | | | | | | |
| Wash Down | ☐ | ☐ | | | | | | |
| Car Washing | ☐ | ☐ | | | | | | |
| External Leakage | ☐ | ☐ | ☐ | ☐ | | | | |
| Indoor | | | | | | | | |
| Outdoor | | | | | | | | |
| Cooling | | | ☐ | ☐ | | | | |
| tory/Kitchen Faucets | ☐ | ☐ | ☐ | ☐ | | | | |

| Results | |
|---|---|
| Average Water Savings (mgd) | |
| 0.012210 | |
| Lifetime Savings - Present Value ($) | |
| Utility | $175,704 |
| Community | $175,704 |
| Lifetime Costs - Present Value ($) | |
| Utility | $3,111,311 |
| Community | $7,115,560 |
| Benefit to Cost Ratio | |
| Utility | 0.06 |
| Community | 0.02 |
| Cost of Savings per Unit Volume ($/mg) | |
| Utility | $33,221 |

| End Use Savings Per Replacement | % Savings per Account |
|---|---|
| SF Irrigation | 25.0% |
| MF Irrigation | 25.0% |
| COM Irrigation | 25.0% |
| MUN Irrigation | 25.0% |

| Targets | |
|---|---|
| Target Method | Percentage |
| % of Accts Targeted / yr | 0.400% |
| Only Effects New Accts | ☐ |

**Comments**

Drought tolerant plants require little dry season irrigation. Native plants require no irrigation or fertilizer, and provide habitat for native insects and birds. Rainwater infiltration features such as swales or rain gardens capture water runoff from roofs and paved surfaces. Enhanced infiltration increases soil porosity, which provides moisture to trees and landscape plants during dry periods, reducing stress on trees during droughts. In some areas, rainwater that infiltrates the landscape recharges aquifers, adding to our water supply. For example, Kennedy/Jenks estimates that water infiltration modifications could add 300-500 acre feet per year to the aquifer beneath Scotts Valley. In areas with less permeable clay soils, rainwater infiltration slows runoff into local creeks, reducing stormwater erosion and increasing creek flows during dry months, enhancing biodiversity. Paving can be done with permeable materials and/or in conjunction with infiltration swales. Examine the implementation of these systems at schools as part of the Drought Response Outreach for Schools State program.

References:

Irrigation:

http://cuwcc.org/Portals/0/Document%20Library/Resources/Publications/Potential%20BMP%20Reports/2014%20Drip%20Irrigation%20PBMP.pdf

http://www.rainbird.com/documents/drip/LandscapedripConversionGuide.pdf

Infiltration: See Infiltration documents in the Infiltration folder on our Google Drive.

Water Transfers Santa Cruz County:

http://scceh.com/Home/Programs/WaterResources/IntegratedRegionalWaterManagement.aspx

Drought Response Outreach for Schools: http://ca.gov/drought/news/story-97.html

**Costs**

View: Summary

| | Utility | Customer | Total |
|---|---|---|---|
| 2015 | $175,841 | $226,796 | $402,637 |
| 2016 | $176,730 | $227,884 | $404,615 |
| 2017 | $177,620 | $228,972 | $406,592 |
| 2018 | $178,510 | $230,060 | $408,570 |
| 2019 | $179,399 | $231,148 | $410,547 |
| 2020 | $180,289 | $232,236 | $412,525 |
| 2021 | $180,975 | $233,072 | $414,048 |
| 2022 | $181,662 | $233,908 | $415,570 |
| 2023 | $182,348 | $234,744 | $417,092 |
| 2024 | $183,035 | $235,580 | $418,615 |
| 2025 | $183,721 | $236,416 | $420,137 |
| 2026 | $184,614 | $237,501 | $422,114 |
| 2027 | $185,506 | $238,585 | $424,092 |
| 2028 | $186,399 | $239,670 | $426,069 |
| 2029 | $187,291 | $240,755 | $428,046 |
| 2030 | $188,184 | $241,839 | $430,023 |
| 2031 | $189,027 | $242,898 | $431,925 |
| 2032 | $189,869 | $243,958 | $433,827 |
| 2033 | $190,712 | $245,017 | $435,729 |
| 2034 | $191,555 | $246,076 | $437,632 |
| 2035 | $192,398 | $247,136 | $439,534 |

**Targets**

View: Accounts

| | SF | MF | COM | MUN | Total |
|---|---|---|---|---|---|
| 2015 | 76 | 11 | 8 | 1 | 96 |
| 2016 | 77 | 11 | 8 | 1 | 96 |
| 2017 | 77 | 11 | 8 | 1 | 97 |
| 2018 | 77 | 11 | 8 | 1 | 97 |
| 2019 | 78 | 11 | 8 | 1 | 98 |
| 2020 | 78 | 12 | 8 | 1 | 98 |
| 2021 | 78 | 12 | 8 | 1 | 98 |
| 2022 | 78 | 12 | 8 | 1 | 99 |
| 2023 | 79 | 12 | 8 | 1 | 99 |
| 2024 | 79 | 12 | 8 | 1 | 100 |
| 2025 | 79 | 12 | 8 | 1 | 100 |
| 2026 | 80 | 12 | 8 | 1 | 101 |
| 2027 | 80 | 12 | 8 | 1 | 101 |
| 2028 | 80 | 12 | 8 | 1 | 101 |
| 2029 | 81 | 12 | 8 | 1 | 102 |
| 2030 | 81 | 12 | 8 | 1 | 102 |
| 2031 | 81 | 13 | 8 | 1 | 103 |
| 2032 | 82 | 13 | 8 | 1 | 103 |
| 2033 | 82 | 13 | 8 | 1 | 104 |
| 2034 | 82 | 13 | 8 | 1 | 104 |
| 2035 | 83 | 13 | 8 | 1 | 105 |

**Water Savings (mgd)**

| | Total Savings (mgd) |
|---|---|
| 2015 | 0.001214 |
| 2016 | 0.002408 |
| 2017 | 0.003577 |
| 2018 | 0.004725 |
| 2019 | 0.005849 |
| 2020 | 0.006951 |
| 2021 | 0.008067 |
| 2022 | 0.009170 |
| 2023 | 0.010259 |
| 2024 | 0.011335 |
| 2025 | 0.012397 |
| 2026 | 0.013439 |
| 2027 | 0.014474 |
| 2028 | 0.015503 |
| 2029 | 0.016527 |
| 2030 | 0.017545 |
| 2031 | 0.018566 |
| 2032 | 0.019584 |
| 2033 | 0.020598 |
| 2034 | 0.021609 |
| 2035 | 0.022617 |

**Single Family Multifamily Dishwasher**

| Overview | |
|---|---|
| Name | Single Family Multifamily Dishwas |
| Abbr | 31 |
| Category | Default |
| Measure Type | Standard Measure |

| Time Period | |
|---|---|
| First Year | 2018 |
| Last Year | 2022 |
| Measure Length | 5 |

| Measure Life | |
|---|---|
| Permanent | ☑ |

| Fixture Costs | Utility | Customer | Fix/Acct |
|---|---|---|---|
| SF | $50.00 | $350.00 | 1 |
| MF | $50.00 | $350.00 | 6 |

| Administration Costs | |
|---|---|
| Markup Percentage | 25% |

**Description**

Provide incentives for installation of water efficient dishwashers (Residential WF of 6.25 or less). Assume Department of Energy continues to regulate dishwashers to require state of the art technolgy, using less water over time.

| Customer Classes | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| | ☑ | ☑ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

| End Uses | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| Toilets | ☐ | ☐ | | | | | | |
| Urinals | | | | | | | | |
| Lavatory Faucets | ☐ | ☐ | | | | | | |
| Showers | ☐ | ☐ | | | | | | |
| Dishwashers | ☑ | ☑ | | | | | | |
| Clothes Washers | ☐ | ☐ | | | | | | |
| Process | | | | | | | | |
| Kitchen Spray Rinse | | | | | | | | |
| Internal Leakage | ☐ | ☐ | | | | | | |
| Baths | ☐ | ☐ | | | | | | |
| Other | ☐ | ☐ | | | | | | |
| Irrigation | ☐ | ☐ | | | | | | |
| Pools | ☐ | ☐ | | | | | | |
| Wash Down | ☐ | ☐ | | | | | | |
| Car Washing | ☐ | ☐ | | | | | | |
| External Leakage | ☐ | ☐ | | | | | | |
| Indoor | | | | | | | | |
| Outdoor | | | | | | | | |
| Cooling | | | | | | | | |
| tory/Kitchen Faucets | ☐ | ☐ | | | | | | |

| Results | |
|---|---|
| Average Water Savings (mgd) | |
| 0.000452 | |
| Lifetime Savings - Present Value ($) | |
| Utility | $6,772 |
| Community | $42,119 |
| Lifetime Costs - Present Value ($) | |
| Utility | $102,692 |
| Community | $677,766 |
| Benefit to Cost Ratio | |
| Utility | 0.07 |
| Community | 0.06 |
| Cost of Savings per Unit Volume ($/mg) | |
| Utility | $29,602 |

| End Use Savings Per Replacement | % Savings per Account |
|---|---|
| SF Dishwashers | 15.0% |
| MF Dishwashers | 15.0% |

| Targets | |
|---|---|
| Target Method | Percentage |
| % of Accts Targeted / yr | 1.000% |
| Only Effects New Accts | ☐ |

**Comments**

Recommendations from July 17, 2015 WSAC Agenda Item 6A "Summary of WSAC Work on Demand Management Options and Options for Integrating Demand Management into potential Water Supply Advisory Committee Recommendations and Agreement": Dishwashers have seen similar technological advances as clothes washers with some machines now offering 2.5 GPL. The old standard of 10-15 GPL has been updated to 5.5 GPL for an Energy Star certified product.
https://www.energystar.gov/products/certified-products/detail/dishwashers
Units cost between $500-$1000. Customer costs include installation.

**Costs** — View: Summary

| | Utility | Customer | Total |
|---|---|---|---|
| 2015 | $0 | $0 | $0 |
| 2016 | $0 | $0 | $0 |
| 2017 | $0 | $0 | $0 |
| 2018 | $22,652 | $126,849 | $149,501 |
| 2019 | $22,816 | $127,771 | $150,587 |
| 2020 | $22,981 | $128,693 | $151,673 |
| 2021 | $23,095 | $129,333 | $152,428 |
| 2022 | $23,209 | $129,973 | $153,182 |
| 2023 | $0 | $0 | $0 |
| 2024 | $0 | $0 | $0 |
| 2025 | $0 | $0 | $0 |
| 2026 | $0 | $0 | $0 |
| 2027 | $0 | $0 | $0 |
| 2028 | $0 | $0 | $0 |
| 2029 | $0 | $0 | $0 |
| 2030 | $0 | $0 | $0 |
| 2031 | $0 | $0 | $0 |
| 2032 | $0 | $0 | $0 |
| 2033 | $0 | $0 | $0 |
| 2034 | $0 | $0 | $0 |
| 2035 | $0 | $0 | $0 |

**Targets** — View: Accounts

| | SF | MF | Total |
|---|---|---|---|
| 2015 | 0 | 0 | 0 |
| 2016 | 0 | 0 | 0 |
| 2017 | 0 | 0 | 0 |
| 2018 | 193 | 28 | 221 |
| 2019 | 194 | 29 | 222 |
| 2020 | 195 | 29 | 223 |
| 2021 | 195 | 29 | 224 |
| 2022 | 196 | 29 | 225 |
| 2023 | 0 | 0 | 0 |
| 2024 | 0 | 0 | 0 |
| 2025 | 0 | 0 | 0 |
| 2026 | 0 | 0 | 0 |
| 2027 | 0 | 0 | 0 |
| 2028 | 0 | 0 | 0 |
| 2029 | 0 | 0 | 0 |
| 2030 | 0 | 0 | 0 |
| 2031 | 0 | 0 | 0 |
| 2032 | 0 | 0 | 0 |
| 2033 | 0 | 0 | 0 |
| 2034 | 0 | 0 | 0 |
| 2035 | 0 | 0 | 0 |

**Water Savings (mgd)**

| | Total Savings (mgd) |
|---|---|
| 2015 | 0.000000 |
| 2016 | 0.000000 |
| 2017 | 0.000000 |
| 2018 | 0.000129 |
| 2019 | 0.000255 |
| 2020 | 0.000378 |
| 2021 | 0.000501 |
| 2022 | 0.000623 |
| 2023 | 0.000617 |
| 2024 | 0.000612 |
| 2025 | 0.000606 |
| 2026 | 0.000600 |
| 2027 | 0.000594 |
| 2028 | 0.000589 |
| 2029 | 0.000583 |
| 2030 | 0.000578 |
| 2031 | 0.000574 |
| 2032 | 0.000570 |
| 2033 | 0.000567 |
| 2034 | 0.000563 |
| 2035 | 0.000559 |



**Hot Water Recirculation Systems**

| Overview | |
|---|---|
| Name | Hot Water Recirculation Systems |
| Abbr | 32 |
| Category | Default |
| Measure Type | Standard Measure |

| Time Period | |
|---|---|
| First Year | 2018 |
| Last Year | 2022 |
| Measure Length | 5 |

| Measure Life | |
|---|---|
| Permanent | ☐ |
| Years | 25 |
| Repeat | ☐ |

| Fixture Costs | Utility | Customer | Fix/Acct |
|---|---|---|---|
| SF | $300.00 | $700.00 | 1 |
| MF | $300.00 | $700.00 | 5 |
| COM | $300.00 | $700.00 | 5 |

| Administration Costs | |
|---|---|
| Markup Percentage | 25% |

**Description**

Provide incentives for the installation of a hot water recirculation system. Having hot water discharge promptly is important for energy and water use efficiency. A hot water recirculating system enables the cold water in the hot water pipes to be continually returned to the water heater and reheated before the hot water faucet is turned on. Rebates are available to the following water customer groups:
- single family dwellings, including townhomes and mobile homes
- apartment complexes
- commercial institutions
- commercially zoned businesses or institutions
• Maximum rebates allowable:
a) $300 per single family account
b) $3,000 per commercial, industrial or institutional account, such as laundromats and apartments, per year
• Some installations may be selected for a random inspection. At reasonable times and with reasonable notice, you agree to allow the City of Santa Cruz to inspect the system at the installation address for up to one year after purchase.

| Customer Classes | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| | ☑ | ☑ | ☑ | ☐ | ☐ | ☐ | ☐ | ☐ |

| End Uses | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| Toilets | ☐ | ☐ | ☐ | | | | | |
| Urinals | | | ☐ | | | | | |
| Lavatory Faucets | ☑ | ☑ | ☑ | | | | | |
| Showers | ☑ | ☑ | ☑ | | | | | |
| Dishwashers | ☐ | ☐ | ☐ | | | | | |
| Clothes Washers | ☐ | ☐ | ☐ | | | | | |
| Process | | | ☐ | | | | | |
| Kitchen Spray Rinse | | | ☐ | | | | | |
| Internal Leakage | ☐ | ☐ | ☐ | | | | | |
| Baths | ☐ | ☐ | | | | | | |
| Other | ☐ | ☐ | ☐ | | | | | |
| Irrigation | ☐ | ☐ | ☐ | | | | | |
| Pools | ☐ | ☐ | | | | | | |
| Wash Down | ☐ | ☐ | | | | | | |
| Car Washing | ☐ | ☐ | | | | | | |
| External Leakage | ☐ | ☐ | ☐ | | | | | |
| Indoor | | | | | | | | |
| Outdoor | | | | | | | | |
| Cooling | | | ☐ | | | | | |
| tory/Kitchen Faucets | ☐ | ☐ | ☐ | | | | | |

**Comments**

Recommendations from July 17, 2015 WSAC Agenda Item 6A "Summary of WSAC Work on Demand Management Options and Options for Integrating Demand Management into potential Water Supply Advisory Committee Recommendations and Agreement": Hot Water Demand Recirculation Systems are a tool that helps address the water loss we all Experience while waiting for hot water-for showers, hand washing and dishwashing. The simpler sytems are installed into existing plumbing and act by returning the cooled water back through the cold water line at the push of a button-even from the warmth of your bed. For a shower the wait can waste 2 gallons or more of water.
http://www.osti.gov/scitech/biblio/885864

| Results | |
|---|---|
| Average Water Savings (mgd) | |
| 0.003045 | |
| Lifetime Savings - Present Value ($) | |
| Utility | $45,599 |
| Community | $161,188 |
| Lifetime Costs - Present Value ($) | |
| Utility | $365,578 |
| Community | $1,047,989 |
| Benefit to Cost Ratio | |
| Utility | 0.12 |
| Community | 0.15 |
| Cost of Savings per Unit Volume ($/mg) | |
| Utility | $15,650 |

| End Use Savings Per Replacement | % Savings per Account |
|---|---|
| SF Lavatory Faucets | 11.6% |
| MF Lavatory Faucets | 11.6% |
| COM Lavatory Faucets | 11.6% |
| SF Showers | 11.6% |
| MF Showers | 11.6% |
| COM Showers | 11.6% |

| Targets | |
|---|---|
| Target Method | Percentage |
| % of Accts Targeted / yr | 0.500% |
| Only Effects New Accts | ☐ |

**Costs** — View: Summary

| | Utility | Customer | Total |
|---|---|---|---|
| 2015 | $0 | $0 | $0 |
| 2016 | $0 | $0 | $0 |
| 2017 | $0 | $0 | $0 |
| 2018 | $80,770 | $150,770 | $231,539 |
| 2019 | $81,283 | $151,728 | $233,010 |
| 2020 | $81,796 | $152,685 | $234,481 |
| 2021 | $82,150 | $153,347 | $235,497 |
| 2022 | $82,504 | $154,008 | $236,512 |
| 2023 | $0 | $0 | $0 |
| 2024 | $0 | $0 | $0 |
| 2025 | $0 | $0 | $0 |
| 2026 | $0 | $0 | $0 |
| 2027 | $0 | $0 | $0 |
| 2028 | $0 | $0 | $0 |
| 2029 | $0 | $0 | $0 |
| 2030 | $0 | $0 | $0 |
| 2031 | $0 | $0 | $0 |
| 2032 | $0 | $0 | $0 |
| 2033 | $0 | $0 | $0 |
| 2034 | $0 | $0 | $0 |
| 2035 | $0 | $0 | $0 |

**Targets** — View: Accounts

| | SF | MF | COM | Total |
|---|---|---|---|---|
| 2015 | 0 | 0 | 0 | 0 |
| 2016 | 0 | 0 | 0 | 0 |
| 2017 | 0 | 0 | 0 | 0 |
| 2018 | 97 | 14 | 10 | 120 |
| 2019 | 97 | 14 | 10 | 121 |
| 2020 | 97 | 14 | 10 | 121 |
| 2021 | 98 | 15 | 10 | 122 |
| 2022 | 98 | 15 | 10 | 122 |
| 2023 | 0 | 0 | 0 | 0 |
| 2024 | 0 | 0 | 0 | 0 |
| 2025 | 0 | 0 | 0 | 0 |
| 2026 | 0 | 0 | 0 | 0 |
| 2027 | 0 | 0 | 0 | 0 |
| 2028 | 0 | 0 | 0 | 0 |
| 2029 | 0 | 0 | 0 | 0 |
| 2030 | 0 | 0 | 0 | 0 |
| 2031 | 0 | 0 | 0 | 0 |
| 2032 | 0 | 0 | 0 | 0 |
| 2033 | 0 | 0 | 0 | 0 |
| 2034 | 0 | 0 | 0 | 0 |
| 2035 | 0 | 0 | 0 | 0 |

**Water Savings (mgd)**

| | Total Savings (mgd) |
|---|---|
| 2015 | 0.000000 |
| 2016 | 0.000000 |
| 2017 | 0.000000 |
| 2018 | 0.000865 |
| 2019 | 0.001712 |
| 2020 | 0.002541 |
| 2021 | 0.003369 |
| 2022 | 0.004186 |
| 2023 | 0.004151 |
| 2024 | 0.004115 |
| 2025 | 0.004079 |
| 2026 | 0.004039 |
| 2027 | 0.004001 |
| 2028 | 0.003965 |
| 2029 | 0.003931 |
| 2030 | 0.003899 |
| 2031 | 0.003871 |
| 2032 | 0.003845 |
| 2033 | 0.003819 |
| 2034 | 0.003795 |
| 2035 | 0.003772 |

**Rewarding Businesses For Adopting**

| Overview | |
|---|---|
| Name | Rewarding Businesses For Adoptin |
| Abbr | 33 |
| Category | Default |
| Measure Type | Standard Measure |

| Time Period | |
|---|---|
| First Year | 2020 |
| Last Year | 2035 |
| Measure Length | 16 |

| Measure Life | |
|---|---|
| Permanent | ☑ |

| Fixture Costs | Utility | Customer | Fix/Acct |
|---|---|---|---|
| COM | $500.00 | $5,000.00 | 1 |

| Administration Costs | |
|---|---|
| Markup Percentage | 25% |

**Description**

Recommendations from July 17, 2015 WSAC Agenda Item 6A "Summary of WSAC Work on Demand Management Options and Options for Integrating Demand Management into potential Water Supply Advisory Committee Recommendations and Agreement": Offer commercial customers who employ best practices increased supply reliability and lower price. For a business, the imposition of rationing during severe drought years hits the bottom line. This proposal suggests that the City's Water Shortage Contingency Plan be modified so that businesses who adopt best practices such as efficient plumbing fixtures, hotel laundry recycling, and climate-appropriate landscaping, would incur a lower level of curtailment in a severe drought. For example, in a Stage 4 drought, with a system-wide goal of 35% curtailment, the current plan is to ration businesses to 87% of their normal year water use. Under our recommendation, businesses adopting best practices would be expected to cut back to 95% of normal use. These businesses could also be rewarded with a lower rate for their water use. Target is to reach 20% of the accounts (400).

As with residential clothes washers, the City could facilitate the financing of landscape retrofits, hotel laundry recycling, compressed air pre-wash stations, etc.

References:

http://www.aquarecycle.com/WastewaterRecycle_8-13-14.pdf

| Customer Classes | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| | ☐ | ☐ | ☑ | ☐ | ☐ | ☐ | ☐ | ☐ |

| End Uses | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| Toilets | | | ☑ | | | | | |
| Urinals | | | ☑ | | | | | |
| Lavatory Faucets | | | ☑ | | | | | |
| Showers | | | ☑ | | | | | |
| Dishwashers | | | ☑ | | | | | |
| Clothes Washers | | | ☑ | | | | | |
| Process | | | ☑ | | | | | |
| Kitchen Spray Rinse | | | ☑ | | | | | |
| Internal Leakage | | | ☑ | | | | | |
| Baths | | | | | | | | |
| Other | | | ☐ | | | | | |
| Irrigation | | | ☑ | | | | | |
| Pools | | | | | | | | |
| Wash Down | | | | | | | | |
| Car Washing | | | | | | | | |
| External Leakage | | | ☑ | | | | | |
| Indoor | | | | | | | | |
| Outdoor | | | | | | | | |
| Cooling | | | ☑ | | | | | |
| tory/Kitchen Faucets | | | ☑ | | | | | |

**Comments**

Rewarding Businesses for Adopting Best Practices. Two ideas were set forth here by the working group. One involves granting relief to businesses that adopt best practices in future periods of water curtailment. This concept has already been instituted in the City's Water Shortage Contingency Plan and associated water shortage regulations and restrictions, beginning in Stage 4, through the granting of an exception. The Municipal Code allows for the Director to provide an exception under the following circumstances: A business customer has already implemented environmental sustainability measures that have reduced water consumption to the maximum extent feasible. As used in this subsection the term "environmental sustainability measures" refers to installation of high efficiency plumbing fixtures, devices, equipment, and appliances, recycled water systems, and landscaping consisting exclusively of low-water-using plant materials using drip or similar high efficiency, nonspray irrigation systems, or to buildings that are designed, built, and continuously operated according to Leadership in Energy and Environmental Design (LEED) certification standards.

The second idea involves the City facilitating/financing various promoting water efficiency improvements, such as hotel laundry recycling, as a way to reduce peak water use by reducing indoor usage in visitor serving facilities. This idea is consistent with both the Commercial Incentives measure proposed in the Conservation Plan, as well as with past programs the City has offered its commercial customers (LightWash and Smart Rebates programs) in the past.

| Results | |
|---|---|
| Average Water Savings (mgd) | |
| 0.004095 | |
| Lifetime Savings - Present Value ($) | |
| Utility | $57,463 |
| Community | $208,065 |
| Lifetime Costs - Present Value ($) | |
| Utility | $189,426 |
| Community | $1,704,833 |
| Benefit to Cost Ratio | |
| Utility | 0.30 |
| Community | 0.12 |
| Cost of Savings per Unit Volume ($/mg) | |
| Utility | $6,030 |

| End Use Savings Per Replacement | % Savings per Account |
|---|---|
| COM Toilets | 5.0% |
| COM Urinals | 5.0% |
| COM Lavatory Faucets | 3.0% |
| COM Showers | 3.0% |
| COM Dishwashers | 3.0% |
| COM Clothes Washers | 3.0% |
| COM Process | 3.0% |
| COM Kitchen Spray Rins | 5.0% |
| COM Internal Leakage | 3.0% |
| COM Irrigation | 3.0% |
| COM External Leakage | 3.0% |
| COM Cooling | 3.0% |
| Non-Lavatory/Kitchen Fa | 3.0% |

| Targets | |
|---|---|
| Target Method | Percentage |
| % of Accts Targeted / yr | 1.250% |
| Only Effects New Accts | ☐ |

**Costs** — View: Summary

| | Utility | Customer | Total |
|---|---|---|---|
| 2015 | $0 | $0 | $0 |
| 2016 | $0 | $0 | $0 |
| 2017 | $0 | $0 | $0 |
| 2018 | $0 | $0 | $0 |
| 2019 | $0 | $0 | $0 |
| 2020 | $15,220 | $121,757 | $136,977 |
| 2021 | $15,256 | $122,048 | $137,304 |
| 2022 | $15,292 | $122,339 | $137,632 |
| 2023 | $15,329 | $122,630 | $137,959 |
| 2024 | $15,365 | $122,921 | $138,286 |
| 2025 | $15,401 | $123,212 | $138,613 |
| 2026 | $15,459 | $123,674 | $139,133 |
| 2027 | $15,517 | $124,136 | $139,653 |
| 2028 | $15,575 | $124,598 | $140,173 |
| 2029 | $15,633 | $125,060 | $140,693 |
| 2030 | $15,690 | $125,522 | $141,212 |
| 2031 | $15,764 | $126,111 | $141,875 |
| 2032 | $15,837 | $126,700 | $142,537 |
| 2033 | $15,911 | $127,289 | $143,200 |
| 2034 | $15,985 | $127,878 | $143,862 |
| 2035 | $16,058 | $128,466 | $144,525 |

**Targets** — View: Accounts

| | COM | Total |
|---|---|---|
| 2015 | 0 | 0 |
| 2016 | 0 | 0 |
| 2017 | 0 | 0 |
| 2018 | 0 | 0 |
| 2019 | 0 | 0 |
| 2020 | 24 | 24 |
| 2021 | 24 | 24 |
| 2022 | 24 | 24 |
| 2023 | 25 | 25 |
| 2024 | 25 | 25 |
| 2025 | 25 | 25 |
| 2026 | 25 | 25 |
| 2027 | 25 | 25 |
| 2028 | 25 | 25 |
| 2029 | 25 | 25 |
| 2030 | 25 | 25 |
| 2031 | 25 | 25 |
| 2032 | 25 | 25 |
| 2033 | 25 | 25 |
| 2034 | 26 | 26 |
| 2035 | 26 | 26 |

**Water Savings (mgd)**

| | Total Savings (mgd) |
|---|---|
| 2015 | 0.000000 |
| 2016 | 0.000000 |
| 2017 | 0.000000 |
| 2018 | 0.000000 |
| 2019 | 0.000000 |
| 2020 | 0.000655 |
| 2021 | 0.001305 |
| 2022 | 0.001949 |
| 2023 | 0.002588 |
| 2024 | 0.003222 |
| 2025 | 0.003851 |
| 2026 | 0.004477 |
| 2027 | 0.005099 |
| 2028 | 0.005718 |
| 2029 | 0.006334 |
| 2030 | 0.006947 |
| 2031 | 0.007558 |
| 2032 | 0.008167 |
| 2033 | 0.008774 |
| 2034 | 0.009379 |
| 2035 | 0.009983 |

**Additional Building Code Requirements**

| Overview | |
|---|---|
| Name | Additional Building Code Requirements for New Develc |
| Abbr | 34 |
| Category | Default |
| Measure Type | Standard Measure |

| Time Period | |
|---|---|
| First Year | 2018 |
| Last Year | 2035 |
| Measure Length | 18 |

| Measure Life | |
|---|---|
| Permanent | ☑ |

| Fixture Costs | Utility | Customer | Fix/Acct |
|---|---|---|---|
| SF | $100.00 | $500.00 | 1 |
| MF | $100.00 | $1,000.00 | 1 |
| COM | $200.00 | $5,000.00 | 1 |
| MUN | $200.00 | $5,000.00 | 1 |
| IND | $200.00 | $5,000.00 | 1 |

| Administration Costs | |
|---|---|
| Markup Percentage | 25% |

**Description**

**NEW CALGREEN INCLUDED, FUTURE CALGREEN UPDATES 2017, 2021.**
**Recommendations from July 17, 2015 WSAC Agenda Item 6A "Summary of WSAC Work on Demand Management Options and Options for Integrating Demand Management into potential Water Supply Advisory Committee Recommendations and Agreement":**
**Convene a working group of planners, builders, conservation groups, and Water Dept personnel to evaluate possible additions to current codes and fee structures that would encourage water conservation. Some examples include:**
**a. Requiring high efficiency washers in new development**
**b. Require hot water on demand/structured plumbing in new development**
**Currently there is a spurt of innovation in water efficiency. A working group could evaluate innovative measures for cost effectiveness and recommend them for inclusion in local code. Some possible measures:**
**a) Require .25 gal/flush urinals in new development.**
**b) Require efficient dishwashers in new development.**
**c) Require plumbing for gray water in new development.**
**d) Ordinance requiring fixture replacement in existing buildings (e.g. toilets).**
**e) Require efficient dish wash sprayers in restaurants.**
**f) Require replacement of all toilets using more than 1.6 gallons per flush in existing buildings.**
**g) Require low-flush urinals in existing buildings.**
**h) Require highest efficiency toilets & faucets in new construction & retrofit upon sale.**
**i) Require weather-based controllers in new landscapes.**

| Customer Classes | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| | ☑ | ☑ | ☑ | ☑ | ☑ | ☐ | ☐ | ☐ |

| End Uses | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| Toilets | ☑ | ☑ | ☑ | ☑ | ☑ | | | |
| Urinals | | | ☑ | ☑ | ☑ | | | |
| Lavatory Faucets | ☑ | ☑ | ☑ | ☑ | ☑ | | | |
| Showers | ☑ | ☑ | ☑ | ☑ | ☐ | | | |
| Dishwashers | ☑ | ☑ | ☑ | ☑ | ☐ | | | |
| Clothes Washers | ☑ | ☑ | ☑ | ☐ | ☐ | | | |
| Process | | | ☐ | ☐ | | | | |
| Kitchen Spray Rinse | | | ☑ | ☐ | | | | |
| Internal Leakage | ☐ | ☐ | ☐ | ☐ | ☐ | | | |
| Baths | ☐ | ☐ | | | | | | |
| Other | ☐ | ☐ | ☐ | ☐ | ☐ | | | |
| Irrigation | ☑ | ☑ | ☑ | ☑ | ☑ | | | |
| Pools | ☑ | ☑ | | | | | | |
| Wash Down | ☐ | ☐ | | | | | | |
| Car Washing | ☐ | ☐ | | | | | | |
| External Leakage | ☐ | ☐ | ☐ | ☐ | ☐ | | | |
| Indoor | | | | | | | | |
| Outdoor | | | | | | | | |
| Cooling | | | ☐ | ☐ | ☐ | | | |
| tory/Kitchen Faucets | ☐ | ☐ | ☐ | ☐ | ☐ | | | |

**Comments**

| Results | |
|---|---|
| Average Water Savings (mgd) | 0.000000 |
| Lifetime Savings - Present Value ($) | |
| Utility | $0 |
| Community | $0 |
| Lifetime Costs - Present Value ($) | |
| Utility | $0 |
| Community | $0 |
| Benefit to Cost Ratio | |
| Utility | 0.00 |
| Community | 0.00 |
| Cost of Savings per Unit Volume ($/mg) | |
| Utility | $0 |

| End Use Savings Per Replacement | % Savings per Account |
|---|---|
| SF Toilets | 10.0% |
| MF Toilets | 10.0% |
| COM Toilets | 10.0% |
| MUN Toilets | 10.0% |
| IND Toilets | 10.0% |
| COM Urinals | 10.0% |
| MUN Urinals | 10.0% |
| IND Urinals | 10.0% |
| SF Lavatory Faucets | 10.0% |
| MF Lavatory Faucets | 10.0% |
| COM Lavatory Faucets | 10.0% |
| MUN Lavatory Faucets | 10.0% |
| IND Lavatory Faucets | 10.0% |
| SF Showers | 10.0% |
| MF Showers | 10.0% |
| COM Showers | 10.0% |
| MUN Showers | 10.0% |
| SF Dishwashers | 10.0% |
| MF Dishwashers | 10.0% |
| COM Dishwashers | 10.0% |
| MUN Dishwashers | 10.0% |
| SF Clothes Washers | 10.0% |
| MF Clothes Washers | 10.0% |
| COM Clothes Washers | 10.0% |
| OM Kitchen Spray Rins | 10.0% |
| SF Irrigation | 10.0% |
| MF Irrigation | 10.0% |
| COM Irrigation | 10.0% |
| MUN Irrigation | 10.0% |
| IND Irrigation | 10.0% |
| SF Pools | 10.0% |
| MF Pools | 10.0% |

| Targets | |
|---|---|
| Target Method | Percentage |
| % of Accts Targeted / yr | 0.000% |
| Only Effects New Accts | ☑ |

**Costs** — View: Summary

| | Utility | Customer | Total |
|---|---|---|---|
| 2015 | $0 | $0 | $0 |
| 2016 | $0 | $0 | $0 |
| 2017 | $0 | $0 | $0 |
| 2018 | $0 | $0 | $0 |
| 2019 | $0 | $0 | $0 |
| 2020 | $0 | $0 | $0 |
| 2021 | $0 | $0 | $0 |
| 2022 | $0 | $0 | $0 |
| 2023 | $0 | $0 | $0 |
| 2024 | $0 | $0 | $0 |
| 2025 | $0 | $0 | $0 |
| 2026 | $0 | $0 | $0 |
| 2027 | $0 | $0 | $0 |
| 2028 | $0 | $0 | $0 |
| 2029 | $0 | $0 | $0 |
| 2030 | $0 | $0 | $0 |
| 2031 | $0 | $0 | $0 |
| 2032 | $0 | $0 | $0 |
| 2033 | $0 | $0 | $0 |
| 2034 | $0 | $0 | $0 |
| 2035 | $0 | $0 | $0 |

**Targets** — View: Accounts

| | SF | MF | COM | MUN | IND | Total |
|---|---|---|---|---|---|---|
| 2015 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2016 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2017 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2018 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2019 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2020 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2021 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2022 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2023 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2024 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2025 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2026 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2027 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2028 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2029 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2030 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2031 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2032 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2033 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2034 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2035 | 0 | 0 | 0 | 0 | 0 | 0 |

**Water Savings (mgd)**

| | Total Savings (mgd) |
|---|---|
| 2015 | 0.000000 |
| 2016 | 0.000000 |
| 2017 | 0.000000 |
| 2018 | 0.000000 |
| 2019 | 0.000000 |
| 2020 | 0.000000 |
| 2021 | 0.000000 |
| 2022 | 0.000000 |
| 2023 | 0.000000 |
| 2024 | 0.000000 |
| 2025 | 0.000000 |
| 2026 | 0.000000 |
| 2027 | 0.000000 |
| 2028 | 0.000000 |
| 2029 | 0.000000 |
| 2030 | 0.000000 |
| 2031 | 0.000000 |
| 2032 | 0.000000 |
| 2033 | 0.000000 |
| 2034 | 0.000000 |
| 2035 | 0.000000 |



**Innovation Incubator Program**

| Overview | |
|---|---|
| Name | Innovation Incubator Program |
| Abbr | 35 |
| Category | Default |
| Measure Type | Standard Measure |

| Time Period | |
|---|---|
| First Year | 2021 |
| Last Year | 2035 |
| Measure Length | 15 |

| Measure Life | |
|---|---|
| Permanent | ☑ |

| Fixture Costs | Utility | Customer | Fix/Acct |
|---|---|---|---|
| SF | $300.00 | $0.00 | 1 |
| MF | $300.00 | $0.00 | 1 |
| COM | $300.00 | $0.00 | 1 |
| MUN | $300.00 | $0.00 | 1 |

| Administration Costs | |
|---|---|
| Markup Percentage | 25% |

**Description**

Recommendations from July 17, 2015 WSAC Agenda Item 6A "Summary of WSAC Work on Demand Management Options and Options for Integrating Demand Management into potential Water Supply Advisory Committee Recommendations and Agreement":
Establish an Innovation Incubator Program. Santa Cruz can continue its leadership in water stewardship by creating a program that: supports innovations in:
• Supports innovative new technologies, customer financing programs, and customer outreach programs
• Supports pilot projects to facilitate popular adoption of: rainwater for toilets & washers composting toilets in institutional buildings onsite recycling of graywater rainwater irrigated lawns promotion of native plant landscapes onsite recycling of graywater
Modest grants would be offered to local businesses and/or collaboration with state and national organizations like California Urban Water Conservation Council, California Water Foundation, California Urban Water Agencies, University of California (Santa Cruz or Davis), Alliance for Water Efficiency, Water Research Foundation, US Bureau of Reclamation or other coalitions of utilities or research focused organizations.

| Customer Classes | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| | ☑ | ☑ | ☑ | ☑ | ☐ | ☐ | ☐ | ☐ |

| End Uses | SF | MF | COM | MUN | IND | UCSC | IRR | GOLF |
|---|---|---|---|---|---|---|---|---|
| Toilets | ☐ | ☐ | ☐ | ☐ | | | | |
| Urinals | | | ☐ | ☐ | | | | |
| Lavatory Faucets | ☐ | ☐ | ☐ | ☐ | | | | |
| Showers | ☐ | ☐ | ☐ | ☐ | | | | |
| Dishwashers | ☐ | ☐ | ☐ | ☐ | | | | |
| Clothes Washers | ☐ | ☐ | ☐ | ☐ | | | | |
| Process | | | ☑ | | | | | |
| Kitchen Spray Rinse | | | ☐ | ☐ | | | | |
| Internal Leakage | ☑ | ☑ | ☑ | ☑ | | | | |
| Baths | ☐ | ☐ | | | | | | |
| Other | ☐ | ☐ | ☐ | ☐ | | | | |
| Irrigation | ☑ | ☑ | ☑ | ☑ | | | | |
| Pools | ☐ | ☐ | | | | | | |
| Wash Down | ☐ | ☐ | | | | | | |
| Car Washing | ☐ | ☐ | | | | | | |
| External Leakage | ☑ | ☑ | ☑ | ☑ | | | | |
| Indoor | | | | | | | | |
| Outdoor | | | | | | | | |
| Cooling | | | ☑ | ☑ | | | | |
| tory/Kitchen Faucets | ☐ | ☐ | ☐ | ☐ | | | | |

**Comments**

The Innovation Incubator Program identifies and supports entrepreneurs in their development and distribution of innovative learning technologies related to water use efficiency. The program will provide mentorship for products and companies in their efforts to improve water use efficiency and education through the use of software, digital content and related technologies. The Innovation Incubator Program finalists will be selected from an applicant pool based on key selection criteria, including:
•Ability to positively impact end users of the product
•Ability to succeed in the water use efficiency tech market
•Level of originality and innovation

The Innovation Incubator Program is a 12-month program of activities, master classes and coaching sessions, mentoring support, and business-to-business meetings that will facilitate and accelerate the market entry of technologies addressing water management challenges.
The Program will aim to ensure more efficient and effective practices across the water industry and across water-using sectors.

Innovators taking part in the Innovation Incubator Program will have access to a range of benefits that will support them with the successful market entry of their technology.

| Results | |
|---|---|
| Average Water Savings (mgd) | |
| 0.001148 | |
| Lifetime Savings - Present Value ($) | |
| Utility | $15,845 |
| Community | $43,706 |
| Lifetime Costs - Present Value ($) | |
| Utility | $1,071,611 |
| Community | $1,071,611 |
| Benefit to Cost Ratio | |
| Utility | 0.01 |
| Community | 0.04 |
| Cost of Savings per Unit Volume ($/mg) | |
| Utility | $121,679 |

| End Use Savings Per Replacement | % Savings per Account |
|---|---|
| COM Process | 1.0% |
| SF Internal Leakage | 1.0% |
| MF Internal Leakage | 1.0% |
| COM Internal Leakage | 1.0% |
| MUN Internal Leakage | 1.0% |
| SF Irrigation | 1.0% |
| MF Irrigation | 1.0% |
| COM Irrigation | 1.0% |
| MUN Irrigation | 1.0% |
| SF External Leakage | 1.0% |
| MF External Leakage | 1.0% |
| COM External Leakage | 1.0% |
| MUN External Leakage | 1.0% |
| COM Cooling | 1.0% |
| MUN Cooling | 1.0% |

| Targets | |
|---|---|
| Target Method | Percentage |
| % of Accts Targeted / yr | 1.000% |
| Only Effects New Accts | ☐ |

**Costs**

View: Summary

| | Utility | Customer | Total |
|---|---|---|---|
| 2015 | $0 | $0 | $0 |
| 2016 | $0 | $0 | $0 |
| 2017 | $0 | $0 | $0 |
| 2018 | $0 | $0 | $0 |
| 2019 | $0 | $0 | $0 |
| 2020 | $0 | $0 | $0 |
| 2021 | $92,284 | $0 | $92,284 |
| 2022 | $92,665 | $0 | $92,665 |
| 2023 | $93,045 | $0 | $93,045 |
| 2024 | $93,426 | $0 | $93,426 |
| 2025 | $93,806 | $0 | $93,806 |
| 2026 | $94,252 | $0 | $94,252 |
| 2027 | $94,697 | $0 | $94,697 |
| 2028 | $95,143 | $0 | $95,143 |
| 2029 | $95,588 | $0 | $95,588 |
| 2030 | $96,034 | $0 | $96,034 |
| 2031 | $96,437 | $0 | $96,437 |
| 2032 | $96,841 | $0 | $96,841 |
| 2033 | $97,245 | $0 | $97,245 |
| 2034 | $97,649 | $0 | $97,649 |
| 2035 | $98,053 | $0 | $98,053 |

**Targets**

View: Accounts

| | SF | MF | COM | MUN | Total |
|---|---|---|---|---|---|
| 2015 | 0 | 0 | 0 | 0 | 0 |
| 2016 | 0 | 0 | 0 | 0 | 0 |
| 2017 | 0 | 0 | 0 | 0 | 0 |
| 2018 | 0 | 0 | 0 | 0 | 0 |
| 2019 | 0 | 0 | 0 | 0 | 0 |
| 2020 | 0 | 0 | 0 | 0 | 0 |
| 2021 | 195 | 29 | 20 | 2 | 246 |
| 2022 | 196 | 29 | 20 | 2 | 247 |
| 2023 | 197 | 29 | 20 | 2 | 248 |
| 2024 | 198 | 30 | 20 | 2 | 249 |
| 2025 | 199 | 30 | 20 | 2 | 250 |
| 2026 | 199 | 30 | 20 | 2 | 251 |
| 2027 | 200 | 30 | 20 | 2 | 253 |
| 2028 | 201 | 31 | 20 | 2 | 254 |
| 2029 | 202 | 31 | 20 | 2 | 255 |
| 2030 | 203 | 31 | 20 | 2 | 256 |
| 2031 | 203 | 31 | 20 | 2 | 257 |
| 2032 | 204 | 32 | 20 | 2 | 258 |
| 2033 | 205 | 32 | 20 | 2 | 259 |
| 2034 | 206 | 32 | 20 | 2 | 260 |
| 2035 | 206 | 32 | 21 | 2 | 261 |

**Water Savings (mgd)**

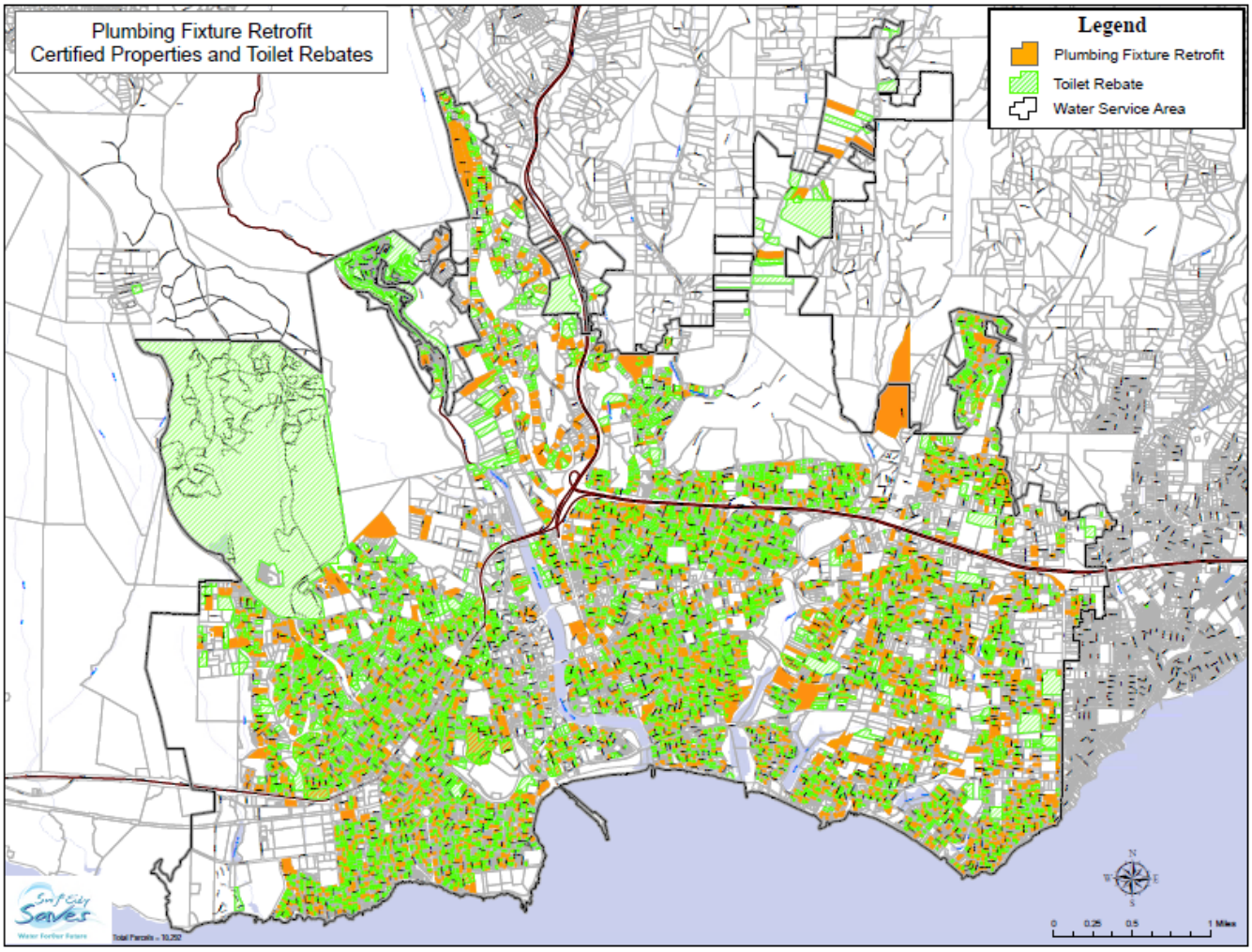
| | Total Savings (mgd) |
|---|---|
| 2015 | 0.000000 |
| 2016 | 0.000000 |
| 2017 | 0.000000 |
| 2018 | 0.000000 |
| 2019 | 0.000000 |
| 2020 | 0.000000 |
| 2021 | 0.000211 |
| 2022 | 0.000419 |
| 2023 | 0.000625 |
| 2024 | 0.000829 |
| 2025 | 0.001030 |
| 2026 | 0.001229 |
| 2027 | 0.001426 |
| 2028 | 0.001621 |
| 2029 | 0.001815 |
| 2030 | 0.002007 |
| 2031 | 0.002199 |
| 2032 | 0.002390 |
| 2033 | 0.002581 |
| 2034 | 0.002770 |
| 2035 | 0.002959 |

# APPENDIX D – WATER USE EFFICIENCY MEASURE IMPLEMENTATION MAPS

The City has created maps to illustrate their efforts for their water use efficiency measure.

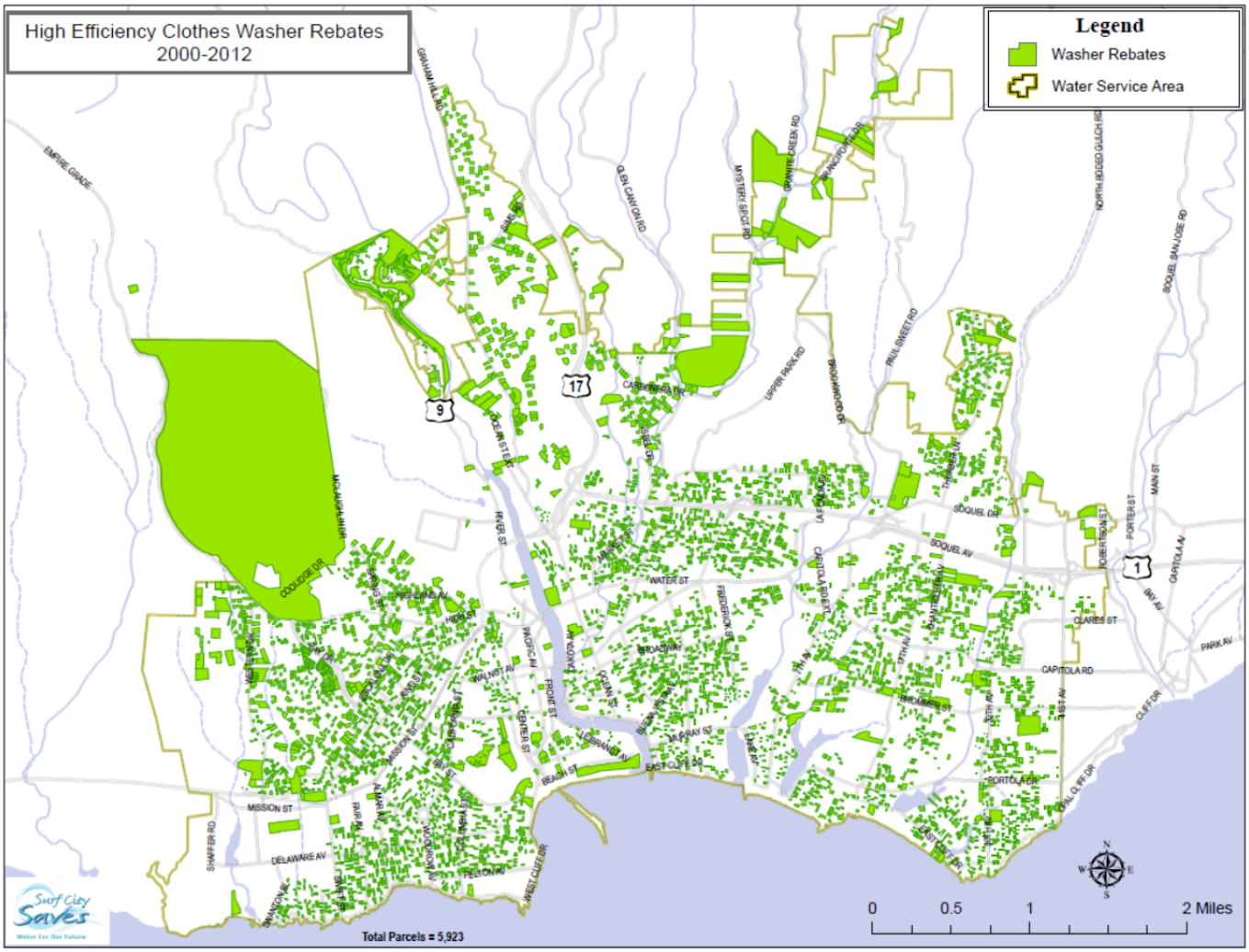
The following figure indicates the City's properties that have participated in a toilet rebate program or have been certified as complying with plumbing fixture retrofit regulations.

**Figure D-1. Plumbing Fixture Retrofit Certified Properties and Toilet Rebates**




The following figure presents an example of one map for all the properties that participated in their high efficiency clothes washer rebate incentive programs between 2000 and 2012. This map was created using Geographical Information System (GIS) mapping software and the database of customers that participated in the program.

**Figure D-2. Map of Incentives for High Efficiency Clothes Washers (Domestic and Commercial)**



CUWCC BMP Retail Coverage Report 2014

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## BMP 1.1 Operation Practices

ON TRACK

**6270 City of Santa Cruz Water Department**

| | | |
|---|---|---|
| **1. Conservation Coordinator provided with necessary resources to implement BMPs?** | Name: | Toby Goddard |
| | Title: | Administrative Services Manager |
| | Email: | tgoddard@cityofsantacruz.com |

**2. Water Waste Prevention Documents**

| WW Document Name | WWP File Name | WW Prevention URL | WW Prevention Ordinance Terms Description |
|---|---|---|---|
| Option A Describe the ordinances or terms of service adopted by your agency to meet the water waste prevention requirements of this BMP. | | http://www.codepublishing.com/CA/SantaCruz/html/SantaCruz16/SantaCruz16.html | See Santa Cruz Municipal Code Chapter 16 for the following:<br>a) 16.01 Water Shortage Regulations and Restrictions<br>b) 16.02 Water Conservation/Water Waste Prohibition Ordinance<br>c) 16.16 Water Efficient Landscape Ordinance |
| Option B Describe any water waste prevention ordinances or requirements adopted by your local jurisdiction or regulatory agencies within your service area. | | | |
| Option C Describe any documentation of support for legislation or regulations that prohibit water waste. | | | |
| Option D Describe your agency efforts to cooperate with other entities in the adoption or enforcement of local requirements consistent with this BMP. | | | |
| Option E Describe your agency support positions with respect to adoption of legislation or regulations that are consistent with this BMP. | | | |
| Option F Describe your agency efforts to support local ordinances that establish permits requirements for water efficient design in new development. | | | |

**At Least As effective As** No

CUWCC BMP Retail Coverage Report 2014

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BMP 1.1 Operation Practices ON TRACK

| | |
|---|---|
| Exemption | No |

Comments:

The City of Santa Cruz declared a Stage 3 Water Shortage Emergency effective May 1, 2014 and instituted water rationing for all residential and irrigation accounts, drought regulations for CII accounts, and outdoor water restrictions for all users.

# CUWCC BMP Coverage Report 2014

*Foundational Best Management Practices For Urban Water Efficiency*

## BMP 1.2 Water Loss Control — NOT ON TRACK

**6270 City of Santa Cruz Water Department**

| | |
|---|---|
| Completed Standard Water Audit Using AWWA Software? | Yes |
| AWWA File provided to CUWCC? | Yes |
| City of Santa Cruz 2014 Annual Water Audit.xls | |
| AWWA Water Audit Validity Score? | 66 |
| Complete Training in AWWA Audit Method | Yes |
| Complete Training in Component Analysis Process? | No |
| Component Analysis? | No |
| Repaired all leaks and breaks to the extent cost effective? | Yes |
| Locate and Repar unreported leaks to the extent cost effective? | No |
| Maintain a record keeping system for the repair of reported leaks, including time of report, leak location, type of leaking pipe segment or fitting, and leak running time from report to repair. | Yes |

Provided 7 Types of Water Loss Control Info

| Leaks Repairs | Value Real Losses | Value Apparent Losses | Miles Surveyed | Press Reduction | Cost Of Interventions | Water Saved (AF) |
|---|---|---|---|---|---|---|
| 227 | 119438.04 | 244565 | | False | | |

**At Least As effective As** No

**Exemption** No

Comments:

The City of Santa Cruz has contracted with Water Systems Optimization, Inc to conduct a water loss control project. The contract is for FY16, but the test period to be validated is 2014. See comment in 2013 re: AWWA OEI data not uploading properly

CUWCC BMP Coverage Report 2014

*Foundational Best Management Practices For Urban Water Efficiency*

## BMP 1.3 Metering With Commodity

**ON TRACK**

6270 City of Santa Cruz Water Department

| | |
|---|---|
| Numbered Unmetered Accounts | No |
| Metered Accounts billed by volume of use | Yes |
| Number of CII Accounts with Mixed Use Meters | 737 |
| Conducted a feasibility study to assess merits of a program to provide incentives to switch mixed-use accounts to dedicated landscape meters? | Yes |
| Feasibility Study provided to CUWCC? | Yes |

Date: 12/16/2013

Uploaded file name:

| | |
|---|---|
| Completed a written plan, policy or program to test, repair and replace meters | Yes |

**At Least As effective As** No

**Exemption** No

Comments:

The City instituted water rationing in 2014 in response to a water shortage emergency and migrated all its customers to monthly billing effective April 2014. Previously most outside City accounts were billed bimonthly.

NOT ON TRACK

CUWCC BMP Coverage Report 2014

*Foundational Best Management Practices For Urban Water Efficiency*

## BMP 1.4 Retail Conservation Pricing

6270 City of Santa Cruz Water Department

Implementation (Water Rate Structure) ON TRACK

| Customer Class | Water Rate Type | Conserving Rate? | (V) Total Revenue Comodity Charges | (M) Total Revenue Fixed Carges |
|---|---|---|---|---|
| Single-Family | Increasing Block | Yes | 4097421.24 | 4674757.04 |
| Multi-Family | Uniform | Yes | 3615070.34 | 1333880.79 |
| Commercial | Uniform | Yes | 3178492.82 | 1131061.45 |
| Industrial | Uniform | Yes | 1178030.78 | 168046.78 |
| Institutional | Uniform | Yes | 183173.76 | 168907.53 |
| Dedicated Irrigation | Uniform | Yes | 853359.46 | 338205.43 |
| Agricultural | Uniform | Yes | 35224.07 | 37459.42 |
| Other | Uniform | Yes | 33070.92 | 12069.64 |
| | | | **13173843.39** | **7864388.08** |

**Calculate: V / (V + M)** **63 %**

Implementation Option: Use Canadian Water Wastewater Association Rate Design Model

☐ Use 3 years average instead of most recent year

Canadian Water and Wastewater Association

Upload file:

Agency Provide Sewer Service: Yes NOT ON TRACK

| Customer Class | Rate Type | Conserving Rate? |
|---|---|---|
| Single-Family | Non-Volumetric Flat Rate | No |
| Multi-Family | Non-Volumetric Flat Rate | No |
| Commercial | Uniform | Yes |
| Industrial | Uniform | Yes |
| Institutional | Uniform | Yes |
| Dedicated Irrigation | Service Not Provided | No |

**At Least As effective As** No

**Exemption** No

Comments:

Note to CUWCC staff: The City of Santa Cruz is using Option 3 for BMP 1.4. Coverage calculator does not seem to work; City earned 39 points in its matrix score.

# CUWCC BMP Coverage Report 2014

*Foundational Best Management Practices For Urban Water Efficiency*

## BMP 2.1 Public Outreach

**ON TRACK**

**6270 City of Santa Cruz Water Department** **Retail**

Does your agency perform Public Outreach programs? Yes

The list of wholesale agencies performing public outreach which can be counted to help the agency comply with the BMP

The name of agency, contact name and email address if not CUWCC Group 1 members

Did at least one contact take place during each quater of the reporting year? Yes

| Public Outreach Program List | Number |
|---|---|
| Newsletter articles on conservation | 8 |
| Flyers and/or brochures (total copies), bill stuffers, messages printed on bill, information packets | 24 |
| Website | 100 |
| Landscape water conservation media campaigns | 2 |
| General water conservation information | 100 |
| **Total** | **234** |

Did at least one contact take place during each quater of the reporting year? Yes

| Number Media Contacts | Number |
|---|---|
| Articles or stories resulting from outreach | 50 |
| News releases | 24 |
| Newspaper contacts | 100 |
| **Total** | **174** |

Did at least one website update take place during each quater of the reporting year? Yes

Public Information Program Annual Budget

| Annual Budget Category | Annual Budget Amount |
|---|---|
| Public Information and Outreach | 28000 |
| **Total Amount:** | **28000** |

| Public Outreah Additional Programs |
|---|
| Stage 3 Water Shortage Emergency and associated water restrictions |
| Water Supply Advisory Committee |

Description of all other Public Outreach programs

Green Gardener program

Comments:

CUWCC BMP Coverage Report 2014

*Foundational Best Management Practices For Urban Water Efficiency*

**BMP 2.1 Public Outreach** ON TRACK

| | | |
|---|---|---|
| In addition to Water Conservation, there was considerable public outreach about future water supply. The City created a citizen's Water Supply Advisory Committee which met twice a month during 2014. | | |
| At Least As effective As | No | |
| | | |
| Exemption | No | 0 |

CUWCC BMP Coverage Report 2014

*Foundational Best Management Practices For Urban Water Efficiency*

## BMP 2.2 School Education Programs — ON TRACK

6270 City of Santa Cruz Water Department — Retail

Does your agency implement School Education programs? Yes

The list of wholesale agencies performing public outreach which can be counted to help the agency comply with the BMP

Materials meet state education framework requirements? Yes

12 local 4th and 5th grade classes participated in the Wetlands and Watersheds program. The program includes a teacher workshop and day-long field trip to the City's reservoir and the San Lorenzo River to learn about water supply and water quality.

Materials distributed to K-6? Yes

Each student receives a copy of "Our Water Works in Santa Cruz County" booklet and a journal they complete at the river. Techers receive a county watershed map and background material to support watershed education in the classroom.

Materials distributed to 7-12 students? Yes (Info Only)

As part of Watershed Academy, described below, materials include scientific literature, news articles, hydrographs, data sheets, etc.

Annual budget for school education program: 27000.00

Description of all other water supplier education programs

Watershed Academy: City staff teaches a small group of 10th grade students in the San Lorenzo Valley about watershed processes, fisheries, land use and drinking water source protection, both in the classroom and through a series of field trips

Comments:

Budget figure above is for the Coastal Watershed Council contract managed by Water Resources section.

**At Least As effective As** No

**Exemption** No 0

## CUWCC BMP Coverage Report 2014

6270 City of Santa Cruz Water Department

**Baseline GPCD:** 123.83

GPCD in 2014 75.8

**GPCD Target for 2018:** 101.50

**Biennial GPCD Compliance Table** **ON TRACK**

| | | Target | | Highest Acceptable Bound | |
|---|---|---|---|---|---|
| Year | Report | % Base | GPCD | % Base | GPCD |
| 2010 | 1 | 96.4% | 119.40 | 100% | 123.80 |
| 2012 | 2 | 92.8% | 114.90 | 96.4% | 119.40 |
| 2014 | 3 | 89.2% | 110.50 | 92.8% | 114.90 |
| 2016 | 4 | 85.6% | 106.00 | 89.2% | 110.50 |
| 2018 | 5 | 82.0% | 101.50 | 82.0% | 101.50 |

CUWCC BMP Retail Coverage Report 2013

*Foundational Best Management Practices for Urban Water Efficiency*

## BMP 1.1 Operation Practices

ON TRACK

**6270 City of Santa Cruz Water Department**

**1. Conservation Coordinator provided with necessary resources to implement BMPs?**

Name: Toby Goddard

Title: Water Conservation Manager

Email: tgoddard@cityofsantacruz.com

**2. Water Waste Prevention Documents**

| WW Document Name | WWP File Name | WW Prevention URL | WW Prevention Ordinance Terms Description |
|---|---|---|---|
| Option A Describe the ordinances or terms of service adopted by your agency to meet the water waste prevention requirements of this BMP. | | http://www.codepublishing.com/CA/SantaCruz/html/SantaCruz16/SantaCruz16.html | See Santa Cruz Municipal Code Chapter 16 for the following:<br>a) 16.01 Water Shortage Regulations and Restrictions<br>b) 16.02 Water Conservation/Water Waste Prohibition Ordinance<br>c) 16.16 Water Efficient Landscape Ordinance |
| Option B Describe any water waste prevention ordinances or requirements adopted by your local jurisdiction or regulatory agencies within your service area. | | | |
| Option C Describe any documentation of support for legislation or regulations that prohibit water waste. | | | |
| Option D Describe your agency efforts to cooperate with other entities in the adoption or enforcement of local requirements consistent with this BMP. | | | |
| Option E Describe your agency support positions with respect to adoption of legislation or regulations that are consistent with this BMP. | | | |
| Option F Describe your agency efforts to support local ordinances that establish permits requirements for water efficient design in new development. | | | |

**At Least As effective As** No

CUWCC BMP Retail Coverage Report 2013

*Foundational Best Managemant Practices for Urban Water Efficiency*

BMP 1.1 Operation Practices **ON TRACK**

**Exemption** No

**Comments:**

The City of Santa Cruz declared a Stage 1 Water Shortage Alert effective May 1, 2013 and insitituted water restrictions throughout the year. Two temporary staff were hired to patrol the service area leading to 731 water waste enforcement actions.

CUWCC BMP Coverage Report 2013

*Foundational Best Management Practices For Urban Water Efficiency*

## BMP 1.2 Water Loss Control — NOT ON TRACK

**6270 City of Santa Cruz Water Department**

| | |
|---|---|
| Completed Standard Water Audit Using AWWA Software? | Yes |
| AWWA File provided to CUWCC? | Yes |
| City of Santa Cruz 2013 Annual Water Audit.xls | |
| AWWA Water Audit Validity Score? | 65 |
| Complete Training in AWWA Audit Method | Yes |
| Complete Training in Component Analysis Process? | No |
| Component Analysis? | No |
| Repaired all leaks and breaks to the extent cost effective? | Yes |
| Locate and Repar unreported leaks to the extent cost effective? | No |
| Maintain a record keeping system for the repair of reported leaks, including time of report, leak location, type of leaking pipe segment or fitting, and leak running time from report to repair. | Yes |

Provided 7 Types of Water Loss Control Info

| Leaks Repairs | Value Real Losses | Value Apparent Losses | Miles Surveyed | Press Reduction | Cost Of Interventions | Water Saved (AF) |
|---|---|---|---|---|---|---|
| 267 | 100884 | 320768 | | False | | |

**At Least As effective As** No

**Exemption** No

Comments:

To CUWCC Staff: Please note that the operational efficiency indicators from the AWWA water audit software did not automatically populate the BMP database after uploading and saving. We tried converting format from .xlsx to .xls. We are using V5.0

CUWCC BMP Coverage Report 2013

*Foundational Best Management Practices For Urban Water Efficiency*

## BMP 1.3 Metering With Commodity

ON TRACK

**6270 City of Santa Cruz Water Department**

| | |
|---|---|
| Numbered Unmetered Accounts | No |
| Metered Accounts billed by volume of use | Yes |
| Number of CII Accounts with Mixed Use Meters | 737 |
| Conducted a feasibility study to assess merits of a program to provide incentives to switch mixed-use accounts to dedicated landscape meters? | Yes |
| Feasibility Study provided to CUWCC? | Yes |
| Date: 12/16/2013 | |
| Uploaded file name: | |
| Completed a written plan, policy or program to test, repair and replace meters | Yes |

**At Least As effective As** No

**Exemption** No

Comments:

1) The City bills all inside City and some large outside City customers on a monthly basis; outside City customers are billed bi-monthly. 2) Recent analysis of CII accounts shows 940 accounts with no outdoor water use, and 737 with mixed use.

NOT ON TRACK

CUWCC BMP Coverage Report 2013

*Foundational Best Management Practices For Urban Water Efficiency*

## BMP 1.4 Retail Conservation Pricing

**6270 City of Santa Cruz Water Department**

ON TRACK

Implementation (Water Rate Structure)

| Customer Class | Water Rate Type | Conserving Rate? | (V) Total Revenue Comodity Charges | (M) Total Revenue Fixed Carges |
|---|---|---|---|---|
| Single-Family | Increasing Block | Yes | 5918548.95 | 4472338.86 |
| Multi-Family | Uniform | Yes | 4107973.04 | 1268495.67 |
| Commercial | Uniform | Yes | 3379123.99 | 1074308.13 |
| Industrial | Uniform | Yes | 1320577.7 | 164488.08 |
| Institutional | Uniform | Yes | 313841.02 | 165728.5 |
| Dedicated Irrigation | Uniform | Yes | 1423156.26 | 325452.27 |
| Agricultural | Uniform | Yes | 39245.11 | 35365.59 |
| Other | Uniform | Yes | 36483.72 | 12810.98 |
| | | | **16538949.79** | **7518988.08** |

**Calculate: V / (V + M)** **69 %**

Implementation Option: Use Canadian Water Wastewater Association Rate Design Model

☐ Use 3 years average instead of most recent year

Canadian Water and Wastewater Association

Upload file:

NOT ON TRACK

Agency Provide Sewer Service: Yes

| Customer Class | Rate Type | Conserving Rate? |
|---|---|---|
| Single-Family | Non-Volumetric Flat Rate | No |
| Multi-Family | Non-Volumetric Flat Rate | No |
| Commercial | Uniform | Yes |
| Industrial | Uniform | Yes |
| Institutional | Uniform | Yes |
| Dedicated Irrigation | Service Not Provided | No |

**At Least As effective As** No

**Exemption** No

Comments:

Note to CUWCC staff: We are using Option 3 for BMP 1.4. Coverage calculator does not seem to work; the City earned 37 points in our matrix score.

CUWCC BMP Coverage Report 2013

*Foundational Best Management Practices For Urban Water Efficiency*

## BMP 2.1 Public Outreach

ON TRACK

**6270 City of Santa Cruz Water Department** **Retail**

Does your agency perform Public Outreach programs? Yes

The list of wholesale agencies performing public outreach which can be counted to help the agency comply with the BMP

The name of agency, contact name and email address if not CUWCC Group 1 members

Did at least one contact take place during each quater of the reporting year? Yes

| Public Outreach Program List | Number |
|---|---|
| Newsletter articles on conservation | 8 |
| Flyers and/or brochures (total copies), bill stuffers, messages printed on bill, information packets | 4 |
| Website | 12 |
| Landscape water conservation media campaigns | 2 |
| General water conservation information | 6 |
| **Total** | **32** |

Did at least one contact take place during each quater of the reporting year? Yes

| Number Media Contacts | Number |
|---|---|
| Articles or stories resulting from outreach | 12 |
| News releases | 12 |
| Newspaper contacts | 24 |
| **Total** | **48** |

Did at least one website update take place during each quater of the reporting year? Yes

Public Information Program Annual Budget

| Annual Budget Category | Annual Budget Amount |
|---|---|
| Public Information and Outreach | 28000 |
| **Total Amount:** | **28000** |

| Public Outreah Additional Programs |
|---|
| Stage 1 Water Shortage Alert and associated water restrictions |

Description of all other Public Outreach programs

Green Gardener program

Comments:

CUWCC BMP Coverage Report 2013

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**BMP 2.1 Public Outreach** ON TRACK

| |
|---|
| In addition to Water Conservation, there was considerable public outreach about future water supply. In late 2013, the City created a citizen's Water Supply Advisory Committee. The Water Department also hired its first Community Relations Specialist |

| | |
|---|---|
| **At Least As effective As** | No |

| | | |
|---|---|---|
| **Exemption** | No | 0 |

CUWCC BMP Coverage Report 2013

*Foundational Best Management Practices For Urban Water Efficiency*

## BMP 2.2 School Education Programs

**ON TRACK**

**6270 City of Santa Cruz Water Department** **Retail**

Does your agency implement School Education programs? Yes

The list of wholesale agencies performing public outreach which can be counted to help the agency comply with the BMP

Materials meet state education framework requirements? Yes

15 local 4th and 5th grade classes participated in the Wetlands and Watersheds program. The program includes a teacher workshop and day-long field trip to the City's reservoir and the San Lorenzo River to learn about water supply and water quality.

Materials distributed to K-6? Yes

Each student receives a copy of "Our Water Works in Santa Cruz County" booklet and a journal they complete at the river. Techers receive a county watershed map and background material to support watershed education in the classroom.

Materials distributed to 7-12 students? Yes (Info Only)

As part of the Watershed Academy, described below, materials include scientific literature, news articles, hydrographs, data sheets, etc.

Annual budget for school education program: 27000.00

Description of all other water supplier education programs

Watershed Academy: City staff teaches a small group of 10th grade students in the San Lorenzo Valley about watershed processes, fisheries, land use and drinking water source protection, both in the classroom and through a series of field trips

Comments:

Budget figure above is for the Coastal Watershed Council contract managed by Water Resources section.

**At Least As effective As** No

**Exemption** No 0

# APPENDIX F – POTENTIAL WATER CONSERVATION MEASURES SCREENING PROCESS AND RESULTS

At its April 1, 2013 meeting, the City's Water Commission reviewed 1) the comprehensive list of existing and possible new water conservation measures prepared by MWM, and 2) the criteria proposed to rank and screen the measures down to a more manageable number for further modeling and analysis. In doing so, the Commission requested staff make more effort to solicit public ideas and input in the planning process.

In response to this request, City staff prepared and published display ads in the Santa Cruz Sentinel on both April 5, 2013 and April 12, 2013. A total of 63 suggestions were submitted by 22 individuals by the April 15, 2013 cutoff date. These community ideas for future water conservation programs are summarized in Figure F-1.

City staff and the consultant reviewed these 63 suggestions April 18, 2013. Many were considered to be sufficiently covered in the existing measure description, thus no change was needed. For others, conservation measure descriptions were modified, or a new line was added with the suggested measure incorporated. Finally, there were a handful of comments that either didn't fit into any particular demand management category or dealt with the subject of alternative water supplies, which is beyond the scope of this project.

On April 24, 2013 water conservation staff and the consultant performed the measure screening process. To make the ratings more understandable, consistent, and transparent, staff developed various qualitative/quantitative definitions for each of the numbers associated with the following six criteria:

1. Water Savings Potential (Service Area Match)
2. Sustainable Water Savings – emphasis on savings lifetime/reliability
3. Quantifiable Water Savings
4. Widespread Community & Social Acceptance (Technology/Market Maturity)
5. Feasibility of Implementation/Secondary Impacts – emphasis on ability to achieve objectives
6. Additional Service Area Benefits (GHG, Stormwater)

In some cases, ratings were obvious and straightforward. In others, it triggered deliberation and discussion involving different viewpoints, resulting in a score that fairly represented the consensus of the group.

The outcome of this process is shown in Table F-1. Essentially, the rating process resulted in the following four categories:

Group 1: The 23 top-rated measures that are recommended to be modeled for further analysis. Some of these measures have multiple components and therefore consist of more than one line-item.

Group 2: Measures that are considered important elements of a comprehensive water conservation program that were passed but will not be modeled. These include:

- Public education
- Water waste prohibition
- Landscape water conservation in new development
- Research

Group 3: The lower rated measures that are not recommended for modeling.

Group 4: Measures that were individually left unrated but potentially will be included in the design the measure included as part of the following measures to be modeled:

- Water loss control program
- Future public education initiatives
- Independent water rate study

The Water Commission was encouraged to review and comment on the screening outcome and consider including another 4-5 items from Group 3 to be modeled for further analysis. The project budget provided for a total of 30 measures to be analyzed in detail for costs and benefits. Though additional measures were not planned to be added after the modeling phase had started, many measures were modified, cut and/or added.

The following figure presents a compiled list of the community's ideas for future conservation programs.

**Figure F-1. Community Ideas for Future Water Conservation Programs**

| Program Type | Suggestion | Already Included in the Potential Measures List? |
|---|---|---|
| Water Loss | Collect annual flushing water into tanks and use as reclaimed water. | Item 3C |
| Water Loss | Include an estimate of future water lost to leakage when considering a program for replacing distribution system pipes. | Item 3B |
| Adv. Meter Infrastruct. | Allow customers to monitor their own water consumption via the computer. | Item 5A |
| Water Rates | Charge more for water usage. | Items 6A-B |
| Water Rates | Develop a formula for tying the price of water to population. | |
| Water Rates | Drastically reduce the 'Ready to Serve' charge while increasing the per unit water charge in a revenue neutral manner. | |
| Water Rates | Eliminate the 'Ready to Serve' charge, increase the per unit water charge in a revenue neutral manner, and charge a nominal fee when usage does not register as a billable water unit. | |
| Water Rates | Develop a separate billing category for individually metered apartments and multi-family residences. | |
| Water Rates | Charge more for water used to irrigate golf courses. | Item 6C |
| Water Rates | Increase the rates between tiers. | Item 6A |
| Water Rates | Study and implement a new and improved tiered rate structure that significantly encourages water conservation. | Items 6A-C |
| Indoor Plumb. Fixtures | Install pressure regulators on properties with high pressure. | Item 9D |
| Indoor Plumb. Fixtures | Require businesses to install 1.28gpf toilets and waterless urinals. | Items 15B, 18 |
| Indoor Plumb. Fixtures | Promote composting toilets. | Item 48A |
| Indoor Plumb. Fixtures | Make installation showerheads with shutoffs, ulfts, and waterless urinals mandatory in all hotels and motels. | Items 12A, 13, 15A, 17, 18 |
| Indoor Plumb. Fixtures | Require waterless urinals as part of the building code. | |
| Hot Water on Demand | Promote hot water recirculation pumps. | |
| Hot Water on Demand | Study water savings for hot water on demand pumps and potentially fund program using developer funded offsets. | Items 20A-B |
| Clothes Washers | Buy everyone a High Efficiency Clothes Washer. | |
| Clothes Washers | Offer an immediate "no interest" loan for every household in the service area to purchase a high efficiency clothes washer. | |
| Irrigation/ Washers | Increase incentives to save water e.g. lawn removal, water catchment, and water/energy efficient clothes washers. | Items 21A-B, 26-31, 35A-35B |
| Irrigation | Give rebates to customers who plant drought-resistant and native plants. | Item 26 |
| Irrigation | Ban sprinkler systems. | |
| Irrigation | Increase the turf replacement rebate from $0.50/sq ft to $1.00/sq ft with an upper limit of $1,000. | 27A |
| Irrigation | Develop water conservation programs for agricultural customers focusing on irrigation practices. | |
| Irrigation | New home and business construction should include drought resistant landscaping and permeable paving. | Item 32 |
| Irrigation | Provide funding for drought tolerant landscaping | Items 26, 27A-B |
| Rainwater Catchment | Establish large rain water collection tanks. | |
| Rainwater Catchment | Every new home must be built with a catchment system to collect rainwater. Every existing home must install one too. | Item 35B |
| Rainwater Catchment | Install rainwater catchment systems and use water for flushing toilets. | |
| Rainwater/Graywater | Revise local building code to facilitate use of rainwater and graywater, e.g. rainwater to toilet. | Items 36B, D |
| Graywater | Offer incentives for graywater installation. | Items 36A,C, D |
| Graywater | Plumb for reuseable grey water to be available outdoors or for toilets. | Items 36A-D |
| Graywater | Require golf courses use to use graywater. | |
| Graywater | Every new and existing home should catch and use graywater to water the yard. | Items 36A-C |
| Public Education | Publish a weekly report of the service area's water consumption. | |
| Public Education | Develop a public awareness campaign focusing on total water consumption. | Item 47D |
| Public Education | Publish water consumption data by neighborhood and by large users. | Item 47D |

The following table presents the City's measure screening results.

**Table F-1. Measure Screening Results**

| Existing or Potential New Measures | | | | | Ranking Criteria and Score (0 to 5). See attachment for scale. | | | | | Ranking and Criteria (0 to 2). (2 = excellent) | | | | Community Suggestions | WD Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Measure No. for Model-ing | Equip-ment or Program Type | Specific Program | Focus of Program | Measure Description | Water Savings Potential (Service Area Match) | Sustain-able Water Savings – emphasis on savings lifetime/ reliability | Quanti-fiable Water Savings | Widespread Community & Social Acceptance (Technology/ Market Maturity) | Feasibility of Implemen-tation/ Secondary Impacts – emphasis on ability to achieve objectives | Additional Service Area Benefits (GHG, Storm water) | Total Score | Pass Yes or No | Combine? Yes/No | | |
| **Group 1 - Top Rated Measures Planned to be Modeled** | | | | | | | | | | | | | | | |
| 1A | Clothes Washers | Residential Washer Rebate | SF, MF Indoor | Provide a rebate for efficient washing machines to single family homes and apartment complexes that have common laundry rooms. It is assumed that the rebates would remain consistent with relevant state and federal regulations (Department of Energy, Energy Star) and only offer the best available technology. This program would be similar the City's current program. Current rebate $100. Rebate could be modified to increase incentive for the most efficient washers *up to full replacement cost*. | 5 | 3.5 | 5 | 5 | 5 | 2 | 25.5 | Yes | Yes | 19) Buy everyone a High Efficiency Clothes Washer. 20) Offer an immediate "no interest" loan for every household in the service area to purchase a high efficiency clothes washer. | |

| Existing or Potential New Measures | | | | | Ranking Criteria and Score (0 to 5). See attachment for scale. | | | | | Ranking and Criteria (0 to 2). (2 = excellent) | | | | Community Suggestions | WD Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Measure No. for Model-ing | Equip-ment or Program Type | Specific Program | Focus of Program | Measure Description | Water Savings Potential (Service Area Match) | Sustain-able Water Savings – emphasis on savings lifetime/ reliability | Quanti-fiable Water Savings | Widespread Community & Social Acceptance (Technology/ Market Maturity) | Feasibility of Implemen-tation/ Secondary Impacts – emphasis on ability to achieve objectives | Additional Service Area Benefits (GHG, Storm water) | Total Score | Pass Yes or No | Combine? Yes/No | | |
| 1B | Clothes Washers | High Efficiency Washer Rebate | CII Indoor | Provide a $400 rebate for the installation of a high efficiency commercial washer (HEW). Rebate amounts would reflect the incremental purchase cost. Program will be shorter lived as it is intended to be a market transformation measure and eventually would be stopped as efficient units reach saturation. | 4 | 3.5 | 5 | 5 | 5 | 2 | 24.5 | Yes | Yes | Buy everyone a High Efficiency Clothes Washer. | Uses per machine is higher than residential, less accounts |
| 2 | Clothes Washers | Require High Efficiency Clothes Washers in New Developme nt | New SF Indoor | Require developers to install an efficient clothes washer (meeting certain water efficiency standards, such as gallons/load), Building Department would be requested to ensure that an efficient washer was installed before new home or building occupancy. Verify that the Utility can enforce conditions of water service that may include efficiency | 4 | 3.5 | 5 | 5 | 3 | 2 | 22.5 | Yes | No | | Requires changing local codes |

| Existing or Potential New Measures | | | | | Ranking Criteria and Score (0 to 5). See attachment for scale. | | | | | Ranking and Criteria (0 to 2). (2 = excellent) | | | | Community Suggestions | WD Comments |
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| Measure No. for Model-ing | Equip-ment or Program Type | Specific Program | Focus of Program | Measure Description | Water Savings Potential (Service Area Match) | Sustain-able Water Savings – emphasis on savings lifetime/ reliability | Quanti-fiable Water Savings | Widespread Community & Social Acceptance (Technology/ Market Maturity) | Feasibility of Implemen-tation/ Secondary Impacts – emphasis on ability to achieve objectives | Additional Service Area Benefits (GHG, Storm water) | Total Score | Pass Yes or No | Combine? Yes/No | | |
| | | | | standards for washing machines. Pattern after the North Marin Water District Program. | | | | | | | | | | | |
| 3 | Water Loss | Water Loss Control Program | System | City of Santa Cruz's water losses are relatively low. This measure would seek to maintain low non-revenue water rates through controlling both apparent and real water losses. This would be annual tracked through the AWWA Water Balance Water System Audit. | 4 | 4 | 5 | 5 | 3 | 1 | 22 | Yes | No | | |
| 4 | Indoor Plumbing Fixtures | Ultra High Efficiency Toilet (UHET) Rebates | SF MF | Provide a rebate or voucher for the installation of an ultra high efficiency toilet (UHET). (Toilets flushing 1.0 gpf or less and include dual flush technology. Rebate amounts would reflect the incremental purchase cost and have been at least $150. | 4 | 5 | 4 | 3 | 5 | 0 | 21 | Yes | No | | Modify UHET Program <1.0 gpf toilets |

| Existing or Potential New Measures | | | | | Ranking Criteria and Score (0 to 5). See attachment for scale. | | | | | Ranking and Criteria (0 to 2). (2 = excellent) | | | | Community Suggestions | WD Comments |
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| Measure No. for Model-ing | Equip-ment or Program Type | Specific Program | Focus of Program | Measure Description | Water Savings Potential (Service Area Match) | Sustain-able Water Savings – emphasis on savings lifetime/ reliability | Quanti-fiable Water Savings | Widespread Community & Social Acceptance (Technology/ Market Maturity) | Feasibility of Implemen-tation/ Secondary Impacts – emphasis on ability to achieve objectives | Additional Service Area Benefits (GHG, Storm water) | Total Score | Pass Yes or No | Combine? Yes/No | | |
| 5 | Hot Water on Demand | Provide a Rebate for Hot Water on Demand Pump Systems | SF Indoor | Provide a rebate to equip homes with efficient hot water on demand systems. These systems use a pump placed under the sink to recycle water sitting in the hot water pipes to reduce hot water waiting times by having an on-demand pump on a recirculation line. Can be installed on kitchen sink or master bath, wherever hot water waiting times are more than 1/2 minute. Requires an electrical outlet under the sink, which is not common on older home bathrooms but is on kitchen sinks. | 4 | 2 | 3 | 5 | 5 | 2 | 21 | Yes | No | 17) Promote hot water recircu-lation pumps. | |

| Existing or Potential New Measures | | | | | Ranking Criteria and Score (0 to 5). See attachment for scale. | | | | | Ranking and Criteria (0 to 2). (2 = excellent) | | | | Community Suggestions | WD Comments |
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| 6 | Irrigation | Outdoor Water Audit | Large Irrigation Customers - Outdoor Only | Outdoor water audits offered for existing large landscape customers. Normally those with high water use are targeted and provided a customized report on how to save water. All large multi-family residential, CII, and public irrigators of large landscapes would be eligible for free landscape water audits upon request. Tied to the Water Budget Program. | 4 | 1 | 4 | 5 | 5 | 2 | 21 | Yes | No | | Measureable on Waterfluence |
| 7A | Irrigation | Landscape Conversion or Turf Removal | SF | Provide a per square foot incentive for to remove turf and replace with low water use plants or permeable hardscape. Pattern after the City's current program. Rebate is currently $0.50 per square foot removed, and capped at an upper limit of $500 for single family residence. *Consider higher rebate amount.* | 4 | 2.5 | 4 | 5 | 4 | 1 | 20.5 | Yes | Yes | Increase incentives to save water e.g. lawn removal, water catchment, and water/ energy efficient clothes washers. | |

| Existing or Potential New Measures | | | | | Ranking Criteria and Score (0 to 5). See attachment for scale. | | | | | Ranking and Criteria (0 to 2). (2 = excellent) | | | | Community Suggestions | WD Comments |
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| 7B | Irrigation | Landscape Conversion or Turf Removal | MF CII | Provide a per square foot incentive for to remove turf and replace with low water use plants or hardscape. Pattern after the City's current program. Rebate is currently $0.50 per square foot removed, and capped at an upper limit of $2,500 for multi-family or commercial residence. | 3 | 3 | 4 | 5 | 4 | 1 | 20 | Yes | Yes | | |
| 8A | Advanced Meter Infrastruct ure (AMI) | Targeted AMI to Irrigation or Large User Accounts | ALL | Require that larger or irrigation customers install such AMI meters as described above and possibly purchase means of viewing daily consumption by landscape/property managers, or business either through the Internet (if available) or separate device. The AMI system would, on demand, indicate to the customer and Utility where and how their water is used, | 2 | 4 | 4 | 4 | 4 | 2 | 20 | Yes | Yes | | |

| Existing or Potential New Measures | | | | | Ranking Criteria and Score (0 to 5). See attachment for scale. | | | | | Ranking and Criteria (0 to 2). (2 = excellent) | | | | Community Suggestions | WD Comments |
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| | | | | facilitating water use reduction and prompt leak identification. This would require Utility to install an AMI system. | | | | | | | | | | | |
| 8B | Advanced Meter Infrastruct ure (AMI) | Install AMI System-wide | ALL | Retrofit system with AMI meters and associated network capable of providing continuous consumption data to Utility offices. Improved identification of system and customer leaks is major conservation benefit. Some of costs of these systems are offset by operational efficiencies and reduced staffing, as regular meter reading and those for opening and closing accounts are accomplished without need for physical or drive-by meter reading. Also enables enhanced billing options and ability to monitor | 4 | 4 | 3 | 4 | 2 | 2 | 19 | Yes | Yes | Allow customers to monitor their own water consump-tion via the computer. | |

| Existing or Potential New Measures | | | | | Ranking Criteria and Score (0 to 5). See attachment for scale. | | | | | Ranking and Criteria (0 to 2). (2 = excellent) | | | | | |
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| | | | | unauthorized usage (such as use/tampering with closed accounts or irrigation if time of day or days per week are regulated). Customer service is improved as staff can quickly access continuous usage records to address customer inquiries. Optional features include online customer access to their usage, which has been shown to improve accountability and reduce water use. A ten-year change-out would be a reasonable objective. | | | | | | | | | | | |
| 9 | Indoor Plumbing Fixtures | Real Customer Water Loss Reduction - Leak Repair and Plumbing Emergency Assistance | SFR, MFR | Customer leaks can go uncorrected at properties where owners are least able to pay costs of repair. These programs may require that customer leaks be repaired, but either subsidize part of the repair and/or pay the cost with revolving | 4 | 2 | 4 | 5 | 4 | 1 | 20 | Yes | No | | Social justice benefits to low income households |

| Existing or Potential New Measures | | | | | Ranking Criteria and Score (0 to 5). See attachment for scale. | | | | | Ranking and Criteria (0 to 2). (2 = excellent) | | | | Community Suggestions | WD Comments |
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| | | | | funds that are paid back with water bills over time. May also include an option to replace inefficient plumbing fixtures at low-income residences. | | | | | | | | | | | |
| 10A | Indoor Plumbing Fixtures | High Efficiency Faucet Aerator/ Shower-head Giveaway | SF MF | Utility would buy showerheads and faucet aerators in bulk and give them away at Utility office or community events. | 2 | 3 | 4 | 4 | 5 | 2 | 20 | Yes | Yes | | Giveaway, don't know if installed |
| 10B | Indoor Plumbing Fixtures | High Efficiency Faucet Aerator/ Shower-head Giveaway | CII | Utility would buy showerheads and faucet aerators in bulk and give them away at Utility office or community events. | 1 | 3 | 4 | 4 | 5 | 2 | 19 | Yes | Yes | | Hotel opportunities ? |
| 11 | Indoor Plumbing Fixtures | Toilet Retrofit at Time of Sale | ALL | Work with real estate industry to require a certificate of compliance be submitted to Utility that verifies a plumber has inspected property and efficient fixtures were either already there or were installed at time of sale. | 2 | 5 | 4 | 4 | 5 | 0 | 20 | Yes | No | | Saturated and 1.6 gpf would get an exemption |

| Existing or Potential New Measures | | | | | Ranking Criteria and Score (0 to 5). See attachment for scale. | | | | | Ranking and Criteria (0 to 2). (2 = excellent) | | | | Community Suggestions | WD Comments |
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| 12 | Irrigation | Outdoor Water Surveys | SF MF | Outdoor water surveys offered for existing customers. Normally those with high water use are targeted and provided a customized report on how to save water. Can be combined with indoor surveys or focused on certain customer classes. All single family and multi-family residential would be eligible for free landscape water surveys upon request. | 4 | 1 | 3 | 5 | 5 | 2 | 20 | Yes | No | | Customer service, water quality runoff benefits |
| 13A | CII Equip-ment | Customized Top Users Incentive Program | CII Indoor/ Outdoor | After the free water use survey has been completed at site, the Utility will analyze the recommendations on the findings report that is provided and determine if site qualifies for a financial incentive. Financial incentives will be provided after analyzing the cost benefit ratio of each proposed project. Incentives are tailored | 3 | 4 | 4 | 4 | 4 | 1 | 20 | Yes | No | | |

| Existing or Potential New Measures | | | | | Ranking Criteria and Score (0 to 5). See attachment for scale. | | | | | Ranking and Criteria (0 to 2). (2 = excellent) | | | | Community Suggestions | WD Comments |
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| | | | | to each individual site as each site has varying water savings potentials. Incentives will be granted at the sole discretion of the Utility while funding lasts. | | | | | | | | | | | |
| 13B | CII Equip-ment | Promote Restaurant Spray Nozzles | CII Indoor | Provide free 1.3 gpm (or lower) spray nozzles and possibly free installation for the rinse and clean operation in restaurants and other commercial kitchens. Thousands have been replaced in California going door to door, very cost-effective because saves hot water. | 4 | 4 | 5 | 4 | 4 | 2 | 23 | Yes | No | | |

| Existing or Potential New Measures | | | | | Ranking Criteria and Score (0 to 5). See attachment for scale. | | | | | Ranking and Criteria (0 to 2). (2 = excellent) | | | | | |
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| 14 | CII Equip-ment | CII Surveys and Top Water Users Program (Top customers from each customer category) | CII Indoor/ Outdoor | Top water customers from each category would be offered a professional water survey that would evaluate ways for the business to save water and money. The surveys would be for large accounts (such as, accounts that use more than 5,000 gallons of water per day) such as hotels, restaurants, stores and schools. Emphasis will be on supporting the top 25 users for each customer category. | 3 | 2 | 3 | 3 | 4 | 1 | 16 | Yes | No | | |

| Existing or Potential New Measures | | | | | Ranking Criteria and Score (0 to 5). See attachment for scale. | | | | | Ranking and Criteria (0 to 2). (2 = excellent) | | | | | |
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| 15 | Water Rates | Water Budget Based Billing | Dedicated Meters – Outdoor Use is primary focus | Develop individualized monthly water budgets for all or a selected category of customers. Water budgets are linked to a rate schedule where rates per unit of water increase when a customer goes above their budget, or decreases if they are below their budget. Budgets typically are based on such factors as the size of the irrigated area and often vary seasonally to reflect weather during the billing period. These rates have been shown to be effective in reducing landscape irrigation demand (AWWARF Reports). Could combine this measure with Measures 6A -6C. This measure would require rate study and capable billing software. | 2 | 4 | 4 | 4 | 4 | 1 | 19 | Yes | No | | |

| Existing or Potential New Measures | | | | | Ranking Criteria and Score (0 to 5). See attachment for scale. | | | | | Ranking and Criteria (0 to 2). (2 = excellent) | | | | Community Suggestions | WD Comments |
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| 16 | Indoor Plumbing Fixtures | Single Family Water Surveys | SF Indoor | Indoor water surveys for existing single family residential customers. Target those with high water use and provide a customized report to owner. May include give-away of efficient shower heads, aerators, toilet devices. Usually combined with outdoor surveys (See Irrigation Measures). | 3 | 1 | 3 | 5 | 5 | 2 | 19 | Yes | No | | Important customer service benefits |
| 17 | Indoor Plumbing Fixtures | Pressure Reduction | ALL | Provide incentive to install pressure regulating valve on existing properties with pressure exceeding 80 psi. | 2 | 5 | 3 | 5 | 3 | 1 | 19 | Yes | | 11) Install pressure regulators on properties with high pressure. | |
| 18 | Indoor Plumbing Fixtures | High Efficiency Urinal Rebates | CII | Provide a rebate or voucher for the installation of a high efficiency urinals. WaterSense standard is .5 gpf or less, though models flushing as low as 0.125 gpf (1 pint) are available and function well, so could be specified. Rebate | 3 | 4 | 4 | 5 | 3 | 0 | 19 | Yes | No | | Unsure about capability to retrofit existing CII Buildings |

| Existing or Potential New Measures | | | | | Ranking Criteria and Score (0 to 5). See attachment for scale. | | | | | Ranking and Criteria (0 to 2). (2 = excellent) | | | | Community Suggestions | WD Comments |
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| | | | | amounts would reflect the incremental purchase cost and have been about $300. | | | | | | | | | | | |
| 19 | Indoor Plumbing Fixtures | Install High Efficiency Toilets, Shower-heads, and Faucet Aerators in Residential Buildings | SF, MF | Utility would subsidize installation cost of a new HET purchased by the utility. Licensed plumbers, pre-qualified by the Utility would solicit customers directly. Customers would get a new HET installed at a discounted price. *Example: the Niagara City Smart Program* | 4 | 4 | 4 | 2 | 4 | 1 | 19 | Yes | No | | |
| 20 | Indoor Plumbing Fixtures | Install sensor-activated faucets | CII Indoor | Consider direct install program, rebates or grants for installation of high efficiency sensor faucet fixtures in all or selected high-use commercial or institutional buildings. | 2 | 3 | 2 | 5 | 5 | 2 | 19 | Yes | No | | |

| Existing or Potential New Measures | | | | | Ranking Criteria and Score (0 to 5). See attachment for scale. | | | | | Ranking and Criteria (0 to 2). (2 = excellent) | | | | Community Suggestions | WD Comments |
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| 21 | Hot Water on Demand | Require Hot Water on Demand/ Structured Plumbing in New Develop-ments | SF Indoor | Work with developers to equip new homes or buildings with efficient hot water on demand systems such as structured plumbing systems. These systems use a pump placed under the sink to recycle water sitting in the hot water pipes to the water heater or to move the water heater into the center of the house and/or reduce hot water waiting times by having an on-demand pump on a recirculation line. | 2 | 2 | 3 | 5 | 5 | 2 | 19 | Yes | No | | |
| 22 | CII Equip-ment | School Building Retrofit | CII Indoor/ Outdoor | School retrofit program wherein school receives a grant to replace fixtures and upgrade irrigation systems. Expand current City Program, pattern after EBMUD program. | 2 | 4 | 4 | 5 | 4 | 0 | 19 | Yes | No | | |

| Existing or Potential New Measures | | | | | Ranking Criteria and Score (0 to 5). See attachment for scale. | | | | | Ranking and Criteria (0 to 2). (2 = excellent) | | | | Community Suggestions | WD Comments |
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| 23A | Irrigation | Financial Incentives for Irrigation and Landscape Upgrades | ALL | For SF, MF, CII, and IRR customers with landscape, provide a Smart Landscape Rebate Program with rebates for substantive landscape retrofits or installation of water efficient upgrades; Rebates contribute towards the purchase and installation of water-wise plants, compost, mulch and selected types of irrigation equipment upgrades. Rebate for residential accounts and up to 50% more for commercial customers. | 4 | 2.5 | 3 | 5 | 3 | 1 | 18.5 | Yes | Yes | | |
| 23B | Irrigation | Rotating Sprinkler Nozzle Rebates | ALL Outdoor | Provide rebates to replace standard spray sprinkler nozzles with rotating nozzles that have lower application rates. Nozzles cost about $6 and rebates have been on the order of $4 with a minimum purchase of about 20 nozzles. | 4 | 3 | 5 | 5 | 4 | 1 | 22 | Yes | Yes | | |

| Existing or Potential New Measures | | | | | Ranking Criteria and Score (0 to 5). See attachment for scale. | | | | | Ranking and Criteria (0 to 2). (2 = excellent) | | | | Community Suggestions | WD Comments |
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| 24 | Irrigation | Shade Tree Program | ALL | Provide incentives and information to promote shade tree planting as a water conservation measure. Potential for Water-Energy Partnership. | 2 | 5 | 2 | 5 | 5 | 1 | 20 | Yes | Yes | | |
| 25 | Rainwater Catchmen t | Provide Rain Barrel Incentive | SFR Outdoor | Provide incentive for installation of rain barrels. This could involve rebates or bulk purchase and giveaways of barrels plus workshops on proper installation and use of captured rain water for landscape irrigation. Pattern after Honolulu Board of Water Supply program. | 2 | 3 | 2 | 5 | 4 | 1 | 17 | Yes | Yes | Every new home must be built with a catchment system to collect rainwater. Every existing home must install one too. | Current Program |
| 26 | Irrigation | Weather-Based Irrigation Controller Rebates | ALL | Provide a per station rebate (typically $25 per station) up to a 50% cost-share for the purchase of a weather based irrigation controller. These controllers have on-site weather sensors or rely on a signal from a central weather station that modifies irrigation times at least | 3 | 2 | 3 | 2 | 3 | 1 | 14 | No | | | Retrofitted existing homes only |

| Existing or Potential New Measures | | | | | Ranking Criteria and Score (0 to 5). See attachment for scale. | | | | | Ranking and Criteria (0 to 2). (2 = excellent) | | | | Community Suggestions | WD Comments |
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| | | | | weekly. Requires local irrigation contractors who are competent with these products, so may require sponsoring a training program in association with this measure. | | | | | | | | | | | |
| 27 | Irrigation | Require Rain Sensors | Outdoor ALL or Selected | Require installation of rain sensor shut-off devices when installing new irrigation systems. | 1 | 2 | 2 | 3 | 4 | 1 | 13 | No | | | |
| 28 | Rainwater Catch-ment | Provide Incentive for Large Rainwater Catchment Systems | MFR CII IRR Outdoor | Provide incentive for installation of large rainwater catchment systems. This could involve rebates, grants and other cost share methods. Might require simultaneous installation of water efficient landscaping to assure that amount of water collected is capable of lasting into peak irrigation season. | 1 | 3 | 2 | 3 | 3 | 1 | 13 | No | | | |
| 29 | Gray water | Gray water Retrofit SF | SF Outdoor | Provide a rebate to assist a certain percentage of single family homeowners per year to install gray water systems. | 3 | 2 | 1 | 3 | 3 | 0 | 12 | No | | Offer incentives for graywater installation. | |

| Existing or Potential New Measures | | | | | Ranking Criteria and Score (0 to 5). See attachment for scale. | | | | | Ranking and Criteria (0 to 2). (2 = excellent) | | | | Community Suggestions | WD Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Measure No. for Model-ing | Equip-ment or Program Type | Specific Program | Focus of Program | Measure Description | Water Savings Potential (Service Area Match) | Sustain-able Water Savings – emphasis on savings lifetime/ reliability | Quanti-fiable Water Savings | Widespread Community & Social Acceptance (Technology/ Market Maturity) | Feasibility of Implemen-tation/ Secondary Impacts – emphasis on ability to achieve objectives | Additional Service Area Benefits (GHG, Storm water) | Total Score | Pass Yes or No | Combine? Yes/No | | |
| 30 | Indoor Plumbing Fixtures | High Efficiency Toilet (HET) Rebates | CII | Provide a rebate or voucher for the installation of a high efficiency toilet (HET). (Toilets flushing 1.28 gpf or less and include dual flush technology. Rebate amounts would reflect the incremental purchase cost and have been at least $200. | 3 | 5 | 4 | 3 | 3 | 0 | 18 | No | Consider Including | | CII difficult to motivate the change |
| 31 | Indoor Plumbing Fixtures | Plumber Initiated High Efficiency Toilet and/ or Urinal Retrofit Program | CII | Utility would subsidize installation cost of a new HET/ urinals purchased by the utility. Licensed plumbers, pre-qualified by the Utility would solicit customers directly. Customers would get a new HET installed at a discounted price. Pattern after Sonoma County program. | 3 | 5 | 4 | 3 | 3 | 0 | 18 | No | Consider Including | | Mixed response from CII Customers, Practical obstacles of direct install type program |

| Existing or Potential New Measures | | | | | Ranking Criteria and Score (0 to 5). See attachment for scale. | | | | | Ranking and Criteria (0 to 2). (2 = excellent) | | | | Community Suggestions | WD Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Measure No. for Model-ing | Equip-ment or Program Type | Specific Program | Focus of Program | Measure Description | Water Savings Potential (Service Area Match) | Sustain-able Water Savings – emphasis on savings lifetime/ reliability | Quanti-fiable Water Savings | Widespread Community & Social Acceptance (Technology/ Market Maturity) | Feasibility of Implemen-tation/ Secondary Impacts – emphasis on ability to achieve objectives | Additional Service Area Benefits (GHG, Storm water) | Total Score | Pass Yes or No | Combine? Yes/No | | |
| **Group 2 - Measures Intended for Plan, not to be Modeled** | | | | | | | | | | | | | | | |
| | Public Education | ALL | ALL | Comprehensive education and public awareness campaign that would evolve over the years and seek to drive participation in other conservation programs. | | | | | | | 0 | Yes | Yes | | |
| | Other | Prohibit Once through Cooling, Non-Recycling Fountains, Water Wasting Fixtures and Practices | CII | Prohibit certain obvious wastes of water in new and existing facilities, such as those listed. Consider requiring retrofits of existing situations, allowing reasonable time for compliance. | | | | | | | 0 | Yes | Yes | | Not ranked. Included. |
| | Other Outdoor | Prohibit Water Waste and Practices | All Outdoor | Adopt or modify ordinance that prohibits the waste of water defined as gutter flooding and failure to repair leaks in a timely manner. | 4 | 1 | 1 | 5 | 5 | 1 | 17 | No | | | Required, stormwater benefits |

| Existing or Potential New Measures | | | | | Ranking Criteria and Score (0 to 5). See attachment for scale. | | | | | Ranking and Criteria (0 to 2). (2 = excellent) | | | | Community Suggestions | WD Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Measure No. for Model-ing | Equip-ment or Program Type | Specific Program | Focus of Program | Measure Description | Water Savings Potential (Service Area Match) | Sustain-able Water Savings – emphasis on savings lifetime/ reliability | Quanti-fiable Water Savings | Widespread Community & Social Acceptance (Technology/ Market Maturity) | Feasibility of Implemen-tation/ Secondary Impacts – emphasis on ability to achieve objectives | Additional Service Area Benefits (GHG, Storm water) | Total Score | Pass Yes or No | Combine? Yes/No | | |
| City Code | Irrigation | Water Conserving Landscape and Irrigation Codes | ALL | Develop and enforce Water Efficient Landscape Design Standards. Standards specify that development projects subject to design review be landscaped according to climate appropriate principals, with appropriate turf ratios, plant selection, efficient irrigation systems and smart irrigation controllers. There are many examples that have demonstrated significant water savings. The ordinance could require certification of landscape professionals. | 1 | 4 | 3 | 4 | 4 | 1 | 17 | Yes | Yes | New home and business construc-tion should include drought resistant landscaping and permeable paving. | Current Code |

| Existing or Potential New Measures | | | | | Ranking Criteria and Score (0 to 5). See attachment for scale. | | | | | Ranking and Criteria (0 to 2). (2 = excellent) | | | | Community Suggestions | WD Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Measure No. for Model-ing | Equip-ment or Program Type | Specific Program | Focus of Program | Measure Description | Water Savings Potential (Service Area Match) | Sustain-able Water Savings – emphasis on savings lifetime/ reliability | Quanti-fiable Water Savings | Widespread Community & Social Acceptance (Technology/ Market Maturity) | Feasibility of Implemen-tation/ Secondary Impacts – emphasis on ability to achieve objectives | Additional Service Area Benefits (GHG, Storm water) | Total Score | Pass Yes or No | Combine? Yes/No | | |
| City Code | Irrigation | Require Weather Adjusting Smart Irrigation Controllers and/or Rain Sensors in New Develop-ment | ALL | Require developers for all properties of greater than four residential units and all commercial development to install the weather based irrigation controllers. Some utilities offer rebates for rain sensors. For example, see Cal Green building code that requires this on all new buildings with an irrigation system. Like line 28, may require landscaper training. | 1 | 2 | 2 | 3 | 4 | 1 | 13 | No | | | Current Ordinance for City |
| City Code | Irrigation | Require Irrigation Designers/ Installers be Certified – possibly by Irrigation Association or CA Landscape Contractors Association | CII Outdoor | Require design/ installation of irrigation systems by trained/certified contractors. Certification might be through the CLCA, Irrigation Association (IA) and/or specialized training provided by utility. Model after Cary North Carolina's program. | 1 | 4 | 2 | 4 | 4 | 1 | 16 | Yes | Yes | | Current Code |

| Existing or Potential New Measures | | | | | Ranking Criteria and Score (0 to 5). See attachment for scale. | | | | | Ranking and Criteria (0 to 2). (2 = excellent) | | | | Community Suggestions | WD Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Measure No. for Model-ing | Equip-ment or Program Type | Specific Program | Focus of Program | Measure Description | Water Savings Potential (Service Area Match) | Sustain-able Water Savings – emphasis on savings lifetime/ reliability | Quanti-fiable Water Savings | Widespread Community & Social Acceptance (Technology/ Market Maturity) | Feasibility of Implemen-tation/ Secondary Impacts – emphasis on ability to achieve objectives | Additional Service Area Benefits (GHG, Storm water) | Total Score | Pass Yes or No | Combine? Yes/No | | |
| | Other | Research | ALL | *Support the potential Best Management Practices, including hot water recirculation pumps, and other emerging technologies or approaches to conservation. End Use analysis, savings evaluations, continued monitor Baseline Study and AWWA studies and CUWCC support.* | | | | | | | 0 | | | 18) Study water savings for hot water on demand pumps and potentially fund program using developer funded offsets. | Not ranked. Include in plan |
| **Group 3 - Measures Not Selected for Plan or to be Modeled** | | | | | | | | | | | | | | | |
| | Indoor Plumbing Fixtures | Multi-Family Water Surveys | MF Indoor | Indoor water surveys for existing multifamily residential customers (2 units or more). Target those with high water use and provided a customized report to owner. Usually combined with outdoor surveys (see Irrigation Measures) and sometimes with single family surveys. | 2 | 3 | 2 | 5 | 5 | 1 | 18 | No | Consider Including | | Economy of scale – many customers when property manager, and facility maintenance. |

| Existing or Potential New Measures | | | | | Ranking Criteria and Score (0 to 5). See attachment for scale. | | | | | Ranking and Criteria (0 to 2). (2 = excellent) | | | | Community Suggestions | WD Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Measure No. for Model-ing | Equip-ment or Program Type | Specific Program | Focus of Program | Measure Description | Water Savings Potential (Service Area Match) | Sustain-able Water Savings – emphasis on savings lifetime/ reliability | Quanti-fiable Water Savings | Widespread Community & Social Acceptance (Technology/ Market Maturity) | Feasibility of Implemen-tation/ Secondary Impacts – emphasis on ability to achieve objectives | Additional Service Area Benefits (GHG, Storm water) | Total Score | Pass Yes or No | Combine? Yes/No | | |
| | Indoor Plumbing Fixtures | High Efficiency Toilet (HET) Rebates | CII | Provide a rebate or voucher for the installation of a high efficiency toilet (HET). Toilets flushing 1.28 gpf or less and include dual flush technology. Rebate amounts would reflect the incremental purchase cost and have been at least $200. | 3 | 5 | 4 | 3 | 3 | 0 | 18 | No | Consider Including | | CII difficult to motivate the change |
| | Indoor Plumbing Fixtures | Plumber Initiated High Efficiency Toilet and/ or Urinal Retrofit Program | CII | Utility would subsidize installation cost of a new HET/urinals purchased by the utility. Licensed plumbers, pre-qualified by the Utility would solicit customers directly. Customers would get a new HET installed at a discounted price. Pattern after Sonoma County program. | 3 | 5 | 4 | 3 | 3 | 0 | 18 | No | Consider Including | | Mixed response from CII Customers, Practical obstacles of direct install type program |
| | Indoor Plumbing Fixtures | Install High Efficiency Fixtures in Governmen t Buildings | CII Indoor | Provide rebates or grants to install high efficiency faucets, toilets, urinals and showerheads in local and state government facilities. | 2 | 5 | 4 | 4 | 3 | 0 | 18 | No | Consider Including | | Consider county jail, use Otay WD example (William Granger) |

| Existing or Potential New Measures | | | | | Ranking Criteria and Score (0 to 5). See attachment for scale. | | | | | Ranking and Criteria (0 to 2). (2 = excellent) | | | | Community Suggestions | WD Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Measure No. for Model-ing | Equip-ment or Program Type | Specific Program | Focus of Program | Measure Description | Water Savings Potential (Service Area Match) | Sustain-able Water Savings – emphasis on savings lifetime/ reliability | Quanti-fiable Water Savings | Widespread Community & Social Acceptance (Technology/ Market Maturity) | Feasibility of Implemen-tation/ Secondary Impacts – emphasis on ability to achieve objectives | Additional Service Area Benefits (GHG, Storm water) | Total Score | Pass Yes or No | Combine? Yes/No | | |
| | Indoor Plumbing Fixtures | Install High Efficiency Toilets, Urinals, and Showerheads in Commercial Buildings | CII Indoor | Consider direct install program-type for installation of high efficiency fixtures in all or selected commercial or institutional buildings. Replacements would include high efficiency toilets, showerhead, and waterless or high efficiency urinals. | 3 | 5 | 4 | 3 | 3 | 0 | 18 | No | Consider Including | Require businesses to install 1.28gpf toilets and waterless urinals. | Same as 13A – could be more turn-key with City Smart Program. Schools? |
| | Dish-washers | Efficient Dishwasher Rebates | SF Indoor | Provide a rebate to encourage homeowner to purchase an efficient dishwasher (meeting certain water efficiency standards, such as a limit on the gallons/load) when replacing an existing dishwasher. | 2 | 3 | 2 | 5 | 5 | 1 | 18 | No | Consider Including | | Baseline study shows relatively modern machines in service area |
| | Irrigation | Artificial Turf Sports Fields | IRR Outdoor | Provide a rebate (up to $10,000) as a cost share for customer wishing to install artificial grass on sports fields, parks, or golf courses. | 2 | 3 | 4 | 3 | 5 | 1 | 18 | No | Consider Including | | |

| Existing or Potential New Measures | | | | | Ranking Criteria and Score (0 to 5). See attachment for scale. | | | | | Ranking and Criteria (0 to 2). (2 = excellent) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Measure No. for Model-ing | Equip-ment or Program Type | Specific Program | Focus of Program | Measure Description | Water Savings Potential (Service Area Match) | Sustain-able Water Savings – emphasis on savings lifetime/ reliability | Quanti-fiable Water Savings | Widespread Community & Social Acceptance (Technology/ Market Maturity) | Feasibility of Implemen-tation/ Secondary Impacts – emphasis on ability to achieve objectives | Additional Service Area Benefits (GHG, Storm water) | Total Score | Pass Yes or No | Combine? Yes/No | Community Suggestions | WD Comments |
| | Sub-metering | MF Submeter Incentive | Existing MF Indoor | Provide a rebate (per unit) to assist MF building owners installing submeters on each existing individual apartment or condominium unit. | 3 | 4 | 4 | 4 | 1 | 1 | 17 | No | | | |
| | Indoor Plumbing Fixtures | Install High Efficiency Fixtures in Low Income Housing | SFR/MFR | Direct install type toilet replacement program in in low income housing operated a government agency/ housing authority. | 1 | 5 | 4 | 4 | 3 | 0 | 17 | No | | | |
| | CII Equip-ment | CII Rebates to Replace Inefficient Equipment | Existing Customers CII | Expand on the City's program to provide rebates for a standard list of water efficient equipment. Included: x-ray machines, icemakers, air-cooled ice machines, steamers, washers, spray valves, efficient dishwashers, replace once through cooling, and add conductivity controller on cooling towers. Pattern after San Diego County Water Authority or Seattle Water Department programs. | 2 | 3 | 3 | 4 | 4 | 1 | 17 | No | | | |

| Existing or Potential New Measures | | | | | Ranking Criteria and Score (0 to 5). See attachment for scale. | | | | | Ranking and Criteria (0 to 2). (2 = excellent) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Measure No. for Model-ing | Equip-ment or Program Type | Specific Program | Focus of Program | Measure Description | Water Savings Potential (Service Area Match) | Sustain-able Water Savings – emphasis on savings lifetime/ reliability | Quanti-fiable Water Savings | Widespread Community & Social Acceptance (Technology/ Market Maturity) | Feasibility of Implemen-tation/ Secondary Impacts – emphasis on ability to achieve objectives | Additional Service Area Benefits (GHG, Storm water) | Total Score | Pass Yes or No | Combine? Yes/No | Community Suggestions | WD Comments |
| | CII Equip-ment | Hotels/Mot els Retrofit w/Financial Assistance | CII Indoor | Following a free water audit offer motels a rebate for equipment identified that would save water. Or provide a rebate schedule for certain efficient equipment such as air-cooled ice machines that motels could apply for without an audit. Pattern after San Antonio, Texas program. | 2 | 3 | 3 | 4 | 4 | 1 | 17 | No | | | |
| | Sub-metering | Mobile Home Park Sub-metering | MF Indoor | Require or provide a partial cost rebate to meter all remaining mobile home parks that are currently master metered but not separately metered, pattern after Santa Clara Valley Water District program. | 1 | 4 | 4 | 4 | 3 | 0 | 16 | No | | | Most already accomplished this. |
| | Sub-metering | Require Multifamily Sub-metering for New Developme nts | New MF Indoor | Require the submetering of individual units in new multi-family, condos, townhouses, and mobile-home parks. | 1 | 4 | 4 | 4 | 2 | 1 | 16 | No | | | Require Code Change |

| Existing or Potential New Measures | | | | | Ranking Criteria and Score (0 to 5). See attachment for scale. | | | | | Ranking and Criteria (0 to 2). (2 = excellent) | | | | Community Suggestions | WD Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Measure No. for Model-ing | Equip-ment or Program Type | Specific Program | Focus of Program | Measure Description | Water Savings Potential (Service Area Match) | Sustain-able Water Savings – emphasis on savings lifetime/ reliability | Quanti-fiable Water Savings | Widespread Community & Social Acceptance (Technology/ Market Maturity) | Feasibility of Implemen-tation/ Secondary Impacts – emphasis on ability to achieve objectives | Additional Service Area Benefits (GHG, Storm water) | Total Score | Pass Yes or No | Combine? Yes/No | | |
| | Indoor Plumbing Fixtures | Require Fixture Replacement by a Deadline | ALL | Utility would pass an ordinance that requires certain targeted sectors of businesses to bring fixtures up to efficient standard by a fixed date at their own expense. | 2 | 4 | 5 | 2 | 2 | 1 | 16 | No | | | Look to sectors |
| | Irrigation | Landscape irrigation restricted to designated days and times | ALL Outdoor | Specify specific irrigation schedules, including which days and times watering is allowed. Would help with load balancing system demands with planning for water areas can water on what days. Consider water waste enforcement approach. For an example see the Southern Nevada Water Authority program. http://www.snwa.com/consv/restrictions_landscape.html | 4 | 2 | 4 | 3 | 2 | 1 | 16 | No | | | Requires local codes |

| Existing or Potential New Measures | | | | | Ranking Criteria and Score (0 to 5). See attachment for scale. | | | | | Ranking and Criteria (0 to 2). (2 = excellent) | | | | Community Suggestions | WD Comments |
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| | Indoor Plumbing Fixtures | Require <0.25 gal/flush urinals in new develop-ment | CII (New Develop-ment) | Require that new building be fitted with 0.25 gpf (or one pint) *or less* urinals rather than the current standard of 0.5 gal/flush models. | 1 | 4 | 4 | 4 | 2 | 0 | 15 | No | | Require businesses to install 1.28gpf toilets and waterless urinals. 16) Require waterless urinals as part of the building code. | |
| | Dishwash ers | Require Efficient Dish-washers in New Develop-ment | SF Indoor | Require developers to install an efficient dishwasher (meeting certain water efficiency standards, such as gallons/load). | 1 | 3 | 2 | 5 | 3 | 1 | 15 | No | | | Requires changing local codes |
| | CII Equip-ment | Water Savings Performanc e Program | CII Indoor | Water Districts such as the East Bay Municipal Utility District and Metropolitan Water District of Southern California provide about $0.50 per 748 gallons (1 billing unit) saved to sites within the City's service area. Incentive is based on the potential for savings over 5 years. | 2 | 3 | 3 | 2 | 4 | 1 | 15 | No | | | Switch to non-potable supply? |

| Existing or Potential New Measures | | | | | Ranking Criteria and Score (0 to 5). See attachment for scale. | | | | | Ranking and Criteria (0 to 2). (2 = excellent) | | | | Community Suggestions | WD Comments |
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| | | | | Eligible project costs include labor, hardware and up to 1 year of water management fees. | | | | | | | | | | | |
| | Other | Low Impact New and Remodeled Developme nt | ALL | City would require developers of new/remodeled sites to follow Low Impact Development concepts/standards/Be st Management Practices for stormwater and water conservation benefits. Encourage or require use of bio-retention facilities, rain water cisterns, graywater plumbing, etc. | 1 | 4 | 1 | 4 | 4 | 1 | 15 | No | | | Public Works Dept. |

| Existing or Potential New Measures | | | | | Ranking Criteria and Score (0 to 5). See attachment for scale. | | | | | Ranking and Criteria (0 to 2). (2 = excellent) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Measure No. for Model-ing | Equip-ment or Program Type | Specific Program | Focus of Program | Measure Description | Water Savings Potential (Service Area Match) | Sustain-able Water Savings – emphasis on savings lifetime/ reliability | Quanti-fiable Water Savings | Widespread Community & Social Acceptance (Technology/ Market Maturity) | Feasibility of Implemen-tation/ Secondary Impacts – emphasis on ability to achieve objectives | Additional Service Area Benefits (GHG, Storm water) | Total Score | Pass Yes or No | Combine? Yes/No | Community Suggestions | WD Comments |
| | Advanced Meter Infrastruct ure (AMI) | Install AMI New Develop-ment Only | ALL | Require that new customers install such AMI meters as described above and possibly purchase means of viewing daily consumption inside their home/business either through the Internet (if available) or separate device. The AMI system would, on demand, indicate to the customer and Utility where and how their water is used, facilitating water use reduction and prompt leak identification. This would require Utility to install an AMI system. | 1 | 4 | 3 | 4 | 0 | 2 | 14 | No | | | |
| | Sub-metering | MF Submeter Incentive | New MF Indoor | Provide a rebate (per unit) to assist MF building owners installing submeters on each new individual apartment unit. | 1 | 4 | 4 | 4 | 0 | 1 | 14 | No | | | Already required unless space is not available. |

| Existing or Potential New Measures | | | | | Ranking Criteria and Score (0 to 5). See attachment for scale. | | | | | Ranking and Criteria (0 to 2). (2 = excellent) | | | | Community Suggestions | WD Comments |
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| | Indoor Plumbing Fixtures | High Efficiency Toilet and/ or Urinal Bulk Purchase Program | ALL | Utility would buy HETs or urinals in bulk and give them away or sell them at a discounted price for customers who want to replace a 3.5 gallon/flush toilet or >1 gal/flush urinal. | 3 | 4 | 4 | 2 | 1 | 0 | 14 | No | | | |
| | Irrigation | Weather-Based Irrigation Controller Rebates | ALL | Provide a per station rebate (typically $25 per station) up to a 50% cost-share for the purchase of a weather based irrigation controller. These controllers have on-site weather sensors or rely on a signal from a central weather station that modifies irrigation times at least weekly. Requires local irrigation contractors who are competent with these products, so may require sponsoring a training program in association with this measure. | 3 | 2 | 3 | 2 | 3 | 1 | 14 | No | | | |

| Existing or Potential New Measures | | | | | Ranking Criteria and Score (0 to 5). See attachment for scale. | | | | | Ranking and Criteria (0 to 2). (2 = excellent) | | | | Community Suggestions | WD Comments |
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| | Irrigation | Rebate or Free Rain Sensors | Outdoor ALL or Selected | Provide a rebate or free rain sensor shut-off device for existing irrigation controllers. These cancel scheduled sprinkling when sufficient rain has been received. This measure is most effective in areas with intermittent rain in peak watering seasons. | 2 | 2 | 2 | 4 | 3 | 1 | 14 | No | | | |
| | Rainwater Catch-ment | Require Rain Barrel | SFR Outdoor | *All new homes would need a rainwater catchment* | 1 | 3 | 2 | 4 | 3 | 1 | 14 | No | | Every new home must be built with a catchment system to collect rainwater. Every existing home must install one too. | Explain - plumbed for non-potable (or potable use) use for irrigation. Code change required |
| | CII Equip-ment | Require Plan Review for new CII | CII Indoor / Outdoor | Require plan reviews for water use efficiency for all new business customers. | 1 | 3 | 2 | 4 | 4 | 0 | 14 | No | | | |

| Existing or Potential New Measures | | | | | Ranking Criteria and Score (0 to 5). See attachment for scale. | | | | | Ranking and Criteria (0 to 2). (2 = excellent) | | | | Community Suggestions | WD Comments |
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| | CII Equip-ment | Focused Water Audits for Hotels/ Motels | CII Indoor/ Outdoor | Proved free water audits to hotels and motels. Standardize on the types of services offered to reduce costs. Included would be bathrooms, kitchens, ice machines, laundry, landscaping, and irrigation systems and schedules. | 1 | 1 | 3 | 4 | 4 | 1 | 14 | No | | | |
| | CII Equip-ment | Hotels/Mot els Retrofit | CII Indoor | *Require schedule for certain efficient plumbing fixtures be replaced by a deadline.* | 2 | 3 | 4 | 2 | 2 | 1 | 14 | No | | Make installation showerhea ds with shutoffs, ULFT's, and waterless urinals mandatory in all hotels and motels. | |
| | Irrigation | Require Weather Adjusting Smart Irrigation Controllers and/or Rain Sensors in New Develop-ment | ALL | Require developers for all properties of greater than four residential units and all commercial development to install the weather based irrigation controllers. Some utilities offer rebates for rain sensors. For example, | 1 | 2 | 2 | 3 | 4 | 1 | 13 | No | | | |

| Existing or Potential New Measures | | | | | Ranking Criteria and Score (0 to 5). See attachment for scale. | | | | | Ranking and Criteria (0 to 2). (2 = excellent) | | | | Community Suggestions | WD Comments |
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| | | | | see Cal Green building code that requires this on all new buildings with an irrigation system. Like line 28, may require landscaper training. | | | | | | | | | | | |
| | Irrigation | Require Rain Sensors | Outdoor ALL or Selected | Require installation of rain sensor shut-off devices when installing new irrigation systems. | 1 | 2 | 2 | 3 | 4 | 1 | 13 | No | | | |
| | Rainwater Catch-ment | Provide Incentive for Large Rainwater Catchment Systems | MFR CII IRR Outdoor | Provide incentive for installation of large rainwater catchment systems. This could involve rebates, grants and other cost share methods. Might require simultaneous installation of water efficient landscaping to assure that amount of water collected is capable of lasting into the peak irrigation season. | 1 | 3 | 2 | 3 | 3 | 1 | 13 | No | | | |
| | Gray water | Gray water Retrofit SF | SF Outdoor | Provide a rebate to assist a certain percentage of single family homeowners per year to install gray water systems. | 3 | 2 | 1 | 3 | 3 | 0 | 12 | No | | Offer incentives for graywater installation. | |

| Existing or Potential New Measures | | | | | Ranking Criteria and Score (0 to 5). See attachment for scale. | | | | | Ranking and Criteria (0 to 2). (2 = excellent) | | | | Community Suggestions | WD Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Measure No. for Model-ing | Equip-ment or Program Type | Specific Program | Focus of Program | Measure Description | Water Savings Potential (Service Area Match) | Sustain-able Water Savings – emphasis on savings lifetime/ reliability | Quanti-fiable Water Savings | Widespread Community & Social Acceptance (Technology/ Market Maturity) | Feasibility of Implemen-tation/ Secondary Impacts – emphasis on ability to achieve objectives | Additional Service Area Benefits (GHG, Storm water) | Total Score | Pass Yes or No | Combine? Yes/No | | |
| | Other Outdoor | Require or Rebate Swimming Pool Covers | ALL Outdoor | Provide a rebate through pool equipment supply stores for purchase of a swimming pool cover. | 1 | 2 | 1 | 3 | 4 | 0 | 11 | No | | | |
| | Other | Regulations | ALL | *Ban Sprinkler Systems* | 5 | 0 | 3 | 1 | 0 | 1 | 10 | No | | | |
| | Indoor Plumbing Fixtures | Garbage Disposal | SF Indoor | Encourage 1% of single family homeowners per year to remove garbage disposals. Could provide a rebate. | 2 | 2 | 1 | 1 | 3 | 0 | 9 | No | | | |
| | Rainwater Catchmen t | Promote Rain Barrel | SFR Outdoor/In door | *Promote with an incentive rainwater catchment for toilet flushing.* | 1 | 3 | 2 | 2 | 1 | 0 | 9 | No | | Install rainwater catchment systems and use water for flushing toilets. | |
| | Gray water | Require Plumbing for Gray Water in New SF Develop-ment | SF Outdoor | Require builders of single family homes to provide plumbing for and/or install a gray water system in new homes. | 1 | 2 | 1 | 3 | 2 | 0 | 9 | No | | Revise local building code to facilitate use of rainwater and graywater, e.g. rainwater to toilet. Plumb for | Requires Code Change and enforcement |

| Existing or Potential New Measures | | | | | Ranking Criteria and Score (0 to 5). See attachment for scale. | | | | | Ranking and Criteria (0 to 2). (2 = excellent) | | | | Community Suggestions | WD Comments |
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| Measure No. for Model-ing | Equip-ment or Program Type | Specific Program | Focus of Program | Measure Description | Water Savings Potential (Service Area Match) | Sustain-able Water Savings – emphasis on savings lifetime/ reliability | Quanti-fiable Water Savings | Widespread Community & Social Acceptance (Technology/ Market Maturity) | Feasibility of Implemen-tation/ Secondary Impacts – emphasis on ability to achieve objectives | Additional Service Area Benefits (GHG, Storm water) | Total Score | Pass Yes or No | Combine? Yes/No | | |
| | | | | | | | | | | | | | | reusable grey water to be available outdoors or for toilets. | |
| | Gray Water | SF Toilet Reuse | SFR, MFR | *Recycle lavatory sink water for toilet flushing, such as Aqus System* | 1 | 2 | 1 | 3 | 2 | 0 | 9 | No | | Every new and existing home should catch and use graywater to water the yard. | |
| | Indoor Plumbing Fixtures | Compost-ing Toilet Promotions | Residential | *Promote composting toilets.* | 3 | 2 | 2 | 1 | 0 | 0 | 8 | No | | 14) Promote composting toilets. | Change of law |
| | Gray water | Rebate for Gray Water Systems in New CII Develop-ment | CII Outdoor | Provide a rebate for gray water systems in new CII development, in accordance with existing codes. *Consider graywater for golf courses.* | 0 | 2 | 1 | 3 | 2 | 0 | 8 | No | | Require golf courses use to use graywater. | Domestic use in hotels only |

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| | Other | Agricultural | ALL | *Develop water conservation programs for agricultural customers focusing on irrigation practices.* | 1 | 2 | 1 | 3 | 0 | 1 | 8 | No | | | Most north coast agriculture customers do not use City water. Water Department operational benefits on raw water transmission line. |
| | CII Equip-ment | Rebates for Submeters on Cooling Towers | CII Indoor | Offer a rebate to buildings that install submeters to measure the make-up and bleed-off water of the facility cooling towers. Provide educational brochures and a phone contact of a knowledgeable person to provide conservation information. | See WD comment | | | | | | 0 | No | | | Only applies to one site. Not ranked |

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| | CII Equipmen t | Rebates for Conduc-tivity Controllers on Cooling Towers | CII Indoor | Offer a rebate ($900-$1,200 dependent on type) to buildings that install conductivity controllers to reduce bleed-off water of the facility cooling towers. Provide educational brochures and a phone contact of a knowledgeable person to provide conservation information. | See WD comment | | | | | | 0 | No | | | UC completed this. One more site eligible. |
| | CII Equipmen t | Cooling Tower Regulations | CII Indoor | Prohibit discharge of cooling tower blow down unless the TDS of the water is at least a certain level (that would ensure 5-10 cycles of concentration). Pattern regulations after the State of Arizona. | See WD comment | | | | | | 0 | No | | | Not applicable |
| | CII Equipmen t | Dry Vacuum Pump | CII Indoor | Provide a rebate to assist CII with installation of dry vacuum pumps. (Possibly combine into Measure #40B CII Inefficient Equipment) | See WD comment | | | | | | 0 | No | | | Not ranked. Few sites. |

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| | Other | Encourage "Life Cycle Analysis" Mentality of Sustain-ability and Reliability | ALL | Encourage customers to "save water" instead of "sell water". This is a suggested fundamental business model change that would focus on infrastructure delay or prevention by focusing on lowering production. Key would be to get customers to believe in this idea and message as well as management and directors. This is a paradigm shift to the importance of the entire "life cycle" cost of water including review and inclusion of the energy and Green House Gas components associated with each and every gallon of water use. | See WD comment | | | | | | 0 | | | | Education program. Cultural philosophy of efficient water use. Add more into energy education of water use, for example. |
| **Group 4 - Unrated Measures May Be Included in Group 1 Measures Design when Modeled** | | | | | | | | | | | | | | | |

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| *Included in above Water Loss Measure* | Water Loss | Conduct Annual System Water Use Audit | System | Maintain a thorough annual accounting of water production, sales by customer class and quantity of water produced but not sold (non-revenue water). In conjunction with system accounting, include audits that identify and quantify known legitimate uses of non-revenue water in order to determine remaining unaccounted for water losses. Goal would be to lower Infrastructure Leakage Index (ILI) and non-revenue water every year by a pre-determined amount based on cost-effectiveness. These programs typically pay for themselves based on savings in operational costs (and saved rate revenue can be directed more to system repairs/replacement and other costs). | | | | | | | 0 | No | | | |

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| | Water Loss | Apparent Loss Reduction - Billing System | System | Continuously analyze billing data for system errors and under-registering meters. Identify and quickly notify customers of apparent leaks. | | | | | | | 0 | No | | | |
| | Water Loss | Apparent Loss Reduction - Meter Testing | System | Address meter testing and repair/ replacement to insure more accurate meter reads and revenue collection. Actions could include meter calibration and accelerated meter replacement. | | | | | | | 0 | No | | | |
| | Water Loss | Real Water Loss Reduction - Leak Repair | System | Measure covers efforts to find and repair leaks in the distribution system to reduce real water loss. More aggressive actions could include installation of data loggers and proactive leak detection. Leak repairs would be handled by existing crews at no extra cost. Specific goals and methods to be developed by Utility. | | | | | | | 0 | No | | | |

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| | | | | May include accelerated main and service line replacement. | | | | | | | | | | | |
| | Water Loss | Real Water Loss Reduction | System | Capture water from water main flushing and hydrant flow testing for reuse | | | | | | | | | | Collect annual flushing water into tanks and use as reclaimed water. | |
| | Water Loss | Real Water Loss Reduction – Reduce Backgroun d Losses with Main Replace-ment | System | Enhanced real loss reduction may include more ambitious main replacement and active leak detection. | | | | | | | 0 | No | | Include an estimate of future water lost to leakage when considering a program for replacing distribution system pipes. | |

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| | Water Loss – Pressure Regula-tion | Distribution System Pressure Regulation | System | Install additional pressure regulators in portions of distribution system to maintain pressure within limits so accounts do not receive excessive pressure. There is a high correlation between high water usage and high pressure, due to higher leakage, atomization of sprinklers and ease of using excessive water. | | | | | | | 0 | No | | | |

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| *To be included in Public Educa-tion Measure above* | Public Education | Conservati on Print Media | ALL | Use a range of printed materials to raise awareness of conservation measures available to customers, including incentive programs offered by Utility. This can include newsletters, bill stuffers, brochures (self-developed or purchased), working with local newspapers, signage at retailers, signs on public buses. Regional participation and development can help assure consistent message. Such programs would continue indefinitely. *"Develop the public awareness campaign to focus on total water consumption." "Display water conservation banners." "Educate customers on water conservation measures." "Change culture of water use through advertising and publicity."* | | | | | | | 0 | Yes | | | |

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| | Public Education | Electronic Conserva-tion Options/ Web Site/ Social Media | ALL | Provide variety of conservation information on city or utility web site, distribution of "videos." Also consider social media options such as cell phone apps, Facebook, interactive kiosk with view screen, etc. *Publish a weekly report of the service area's water use. Educate customers on water conservation measures.* | | | | | | | 0 | | | | |
| | Public Education | Speakers Bureau/ Event Participa-tion | ALL | Conduct presentations at various venues, from radio and TV to service organizations and focused groups. Have booths at relevant community events. Participate in parades, etc. *"Disseminate education materials, and give talks and tours promoting drought tolerant landscaping."* | | | | | | | 0 | | | | |

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| | Public Education | Media Campaign: such as the "Use Only What You Need" or "Beat the Peak" | ALL | *Suggest a general "Use Only What You Need" message like Denver Water's program or a "Beat the Peak" message media campaign like Cary, North Carolina or Tucson Arizona: aahttp://cms3.tucsonaz.gov/water/beatthepeak. Also considered a program with focused action like: "Take Control of your Controller" Campaign for a focused social media based campaign as a media campaign. Consider determining appropriate usage and media campaign message with marketing study/focus groups. Develop the public awareness campaign to focus on total water consumption.* | | | | | | | *0* | | | | |

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| | Public Education | Billing Report Educational Tool | ALL | *Example: Water Smart Software with online and print billing consumptions to customers.* Public Comment: *"Publish water consumption data by neighborhood and by large users." "Use WaterSmart Software or similar program to help customers understand and reduce their water demand."* | | | | | | | 0 | Yes - stand alone | | | |
| | Public Education | *Ambassa-dor Program* | *SFR, MFR* | *Have water ambassadors within neighborhoods to promote awareness. Could be staff by volunteers or student interns. Pattern after Town of Cary, North Carolina or Regional Water Authority in Sacramento, CA. "Have a water patrol of students inform neighborhoods about water conservation and promote water wise landscapes."* | | | | | | | | Yes | | | |

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| | Public Education | Recogni-tion Programs for Water Savings by Residences & Apartments Program | SFR Outdoor | Sponsor an annual awards program for residences and multi-family properties that significantly reduce water use. They would receive a plaque/ recognition. This could include innovative customers that install compost toilets, gray-water, bio-swales and rainwater cisterns in an effort to maximize practical home water use efficiency. *"Praise people with xeriscapes. Make them public heroes for others to emulate."* | | | | | | | 0 | | | | |
| | Public Education | Recogni-tion Programs for Water Savings by Businesses | CII Indoor/ Outdoor | Sponsor an annual awards program for businesses that significantly reduce water use. They would receive a plaque/recognition. | | | | | | | 0 | | | | |

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| | Public Education: Irrigation Focus | Outdoor Residential Focused Public Awareness Informa-tion Program | SF Outdoor Only | Programs could continue efforts including poster contests, speakers to community groups, conservation hotline, website, video loan, radio and television time, demonstration gardens and printed educational material such as bill inserts, etc. Could also consider increasing current Utility efforts possibly adding social media such as cell phone apps, Facebook, interactive kiosk with view screen, etc. Program would continue indefinitely. *"Promote the removal of front lawns as they are more ornamental in general than a back lawn."* | | | | | | | 0 | Yes | | | |

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| | Public Education: Irrigation Focus | Efficient Outdoor Use Education and Training Programs | SF/MF/CII Outdoor | Utility would offer, organize and sponsor a series of educational workshops or other means for educating homeowners, landscapers and contractors in efficient landscaping and irrigation principals. Utilize guest speakers, native demonstration gardens, incentives, such as a nursery plant coupon. *"Support consistent and long term educational workshops and events." "For customers wishing to retain a lawn, promote the use of eco-friendly, high drought tolerant, low maintenance turf."* | | | | | | | 0 | | | | |

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| | Public Education: Irrigation Focus | Train Landscape Mainte-nance Workers (Green Gardener Program) | ALL Outdoor | Utility would sponsor bilingual training for managers and workers in landscape maintenance methods that will save irrigation water. Model after Green Gardener Program. Santa Barbara County Water Agency example: http://www.greengardener.org/. With some of these programs, names of businesses that have obtained training are included in Utility publications and/or Web sites (as an incentive to participate). *"Provide the Qualified Water Efficient Landscaper (QWEL) course to landscapers."* | | | | | | | 0 | | | | |
| | Public Education: Irrigation Focus | Networking with Landscap-ing Industry | ALL Outdoor | Meet with and become members in "Green Industry" organizations; partner with projects and outreach material development. Outreach to nurseries | | | | | | | 0 | | | | |

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| | | | | for information distribution, provide "water wise plant" signage, etc. | | | | | | | | | | | |
| | Public Education: Irrigation Focus | Landscape Water Calculator | ALL | Develop Landscape Watering Calculator and Watering Index, and actively market these. Consider cell phone app with Watering Index, following up in person with large landscape customers on a frequent basis to encourage use of Watering Index. | | | | | | | 0 | | | | |
| | Public Education: Irrigation Focus | Climate appropri-ate (Water Efficient) Demonstra tion Gardens | ALL | Donate or acquire a portion of public or private land to create a demonstration garden displaying living examples of low water-using gardens and landscaping. The Utility would provide signs and brochures to educate those people visiting the garden. | | | | | | | 0 | | | | |

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| | Public Education | Promote Green Buildings | ALL | Assign Staff a position to work with local Green Building associations, developers, designers, vendors to promote incorporating water efficiency into building design. Possibly work with other partner utilities or agencies energy/wastewater/ stormwater. Co-sponsor award program. | | | | | | | 0 | Not WC Mea-sure | | | |
| | Public Education | Schools Education Programs | ALL | Work with local school districts to develop classroom programs that they would embrace. Consider poster contests, etc. Some programs would require dedicated utility staff to assist & present. | | | | | | | 0 | Yes | | | |

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| *Model-ing will be comple-ted at conclu-sion of Future Rate Study* | Water Rates | Rate Structure Evaluation | ALL | Rates must meet Utility costs, but some features can improve customer accountability by better imposing cost impacts for high water usage. Conservation oriented rate structures in California generally collect less than 30% of water revenue through base charges. Tiered rate structures are the most popular form of conservation rates, and can be very effective provided there are sufficient tiers (3 to 4 is recommended), and price differences between tiers is sufficient and tiers are placed at usage levels that appropriately reflect low, medium and high usage levels for the Utility. This measure would also require a rate study. *Consider "drastically* | | | | | | | 0 | No | | 6) Drastically reduce the 'Ready to Serve' charge while increasing the per unit water charge in a revenue neutral manner. 7) Eliminate the 'Ready to Serve' charge, increase the per unit water charge in a revenue neutral manner, and charge a nominal fee when usage does not register as a billable water unit. | |

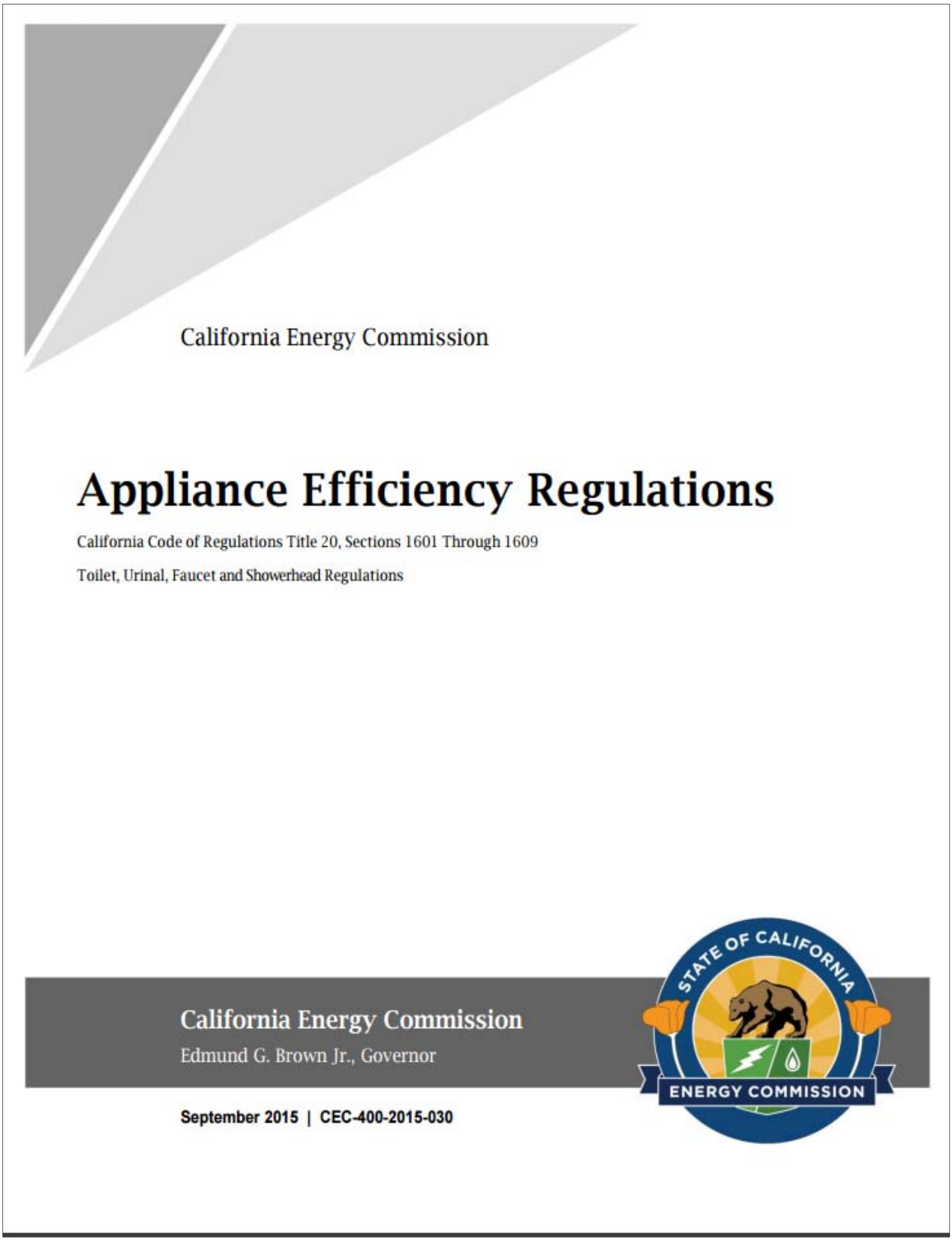
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| | | | | *reducing" the base charge.* | | | | | | | | | | | |
| | Water Rates | Modifica-tion to or Implemen-tation of Tiered Rate Conserva-tion Pricing | Multi-Family CII Outdoor is Primary Focus | Consider revising City's tiered rates or seasonal pricing for other customer classes. Some utilities utilize percentages of average winter usage as the basis for individualized summer tiers. Multi-Family Residential tiers could be based on number of housing units served by meters. This | | | | | | | 0 | No | | 4) Charge more for water usage. 8) Develop a separate billing category for individually metered apartments and multi-family | |

| Existing or Potential New Measures | | | | | Ranking Criteria and Score (0 to 5). See attachment for scale. | | | | | Ranking and Criteria (0 to 2). (2 = excellent) | | | | Community Suggestions | WD Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Measure No. for Model-ing | Equip-ment or Program Type | Specific Program | Focus of Program | Measure Description | Water Savings Potential (Service Area Match) | Sustain-able Water Savings – emphasis on savings lifetime/ reliability | Quanti-fiable Water Savings | Widespread Community & Social Acceptance (Technology/ Market Maturity) | Feasibility of Implemen-tation/ Secondary Impacts – emphasis on ability to achieve objectives | Additional Service Area Benefits (GHG, Storm water) | Total Score | Pass Yes or No | Combine? Yes/No | | |
| | | | | measure would require a rate study and advanced billing system capabilities. *Consider developing a separate billing category for individually metered apartments and multi-family residences.* | | | | | | | | | | residences. 9) Increase the rates between tiers. 10) Study and implement a new and improved tiered rate structure that significantly encourages water conserva-tion. | |
| | Water Rates | Establish Separate Pricing Structure for Irrigation Accounts | All large irrigation | Implementing conservation-oriented pricing for dedicated irrigation customers would encourage more efficient irrigation practices. This is best combined with Measures 7B and 8. Would require a rate study. *Consider charging more for water used to irrigate golf courses.* | | | | | | | 0 | No | | Charge more for water used to irrigate golf courses. | |

| Existing or Potential New Measures | | | | | Ranking Criteria and Score (0 to 5). See attachment for scale. | | | | | Ranking and Criteria (0 to 2). (2 = excellent) | | | | Community Suggestions | WD Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Measure No. for Model-ing | Equip-ment or Program Type | Specific Program | Focus of Program | Measure Description | Water Savings Potential (Service Area Match) | Sustain-able Water Savings – emphasis on savings lifetime/ reliability | Quanti-fiable Water Savings | Widespread Community & Social Acceptance (Technology/ Market Maturity) | Feasibility of Implemen-tation/ Secondary Impacts – emphasis on ability to achieve objectives | Additional Service Area Benefits (GHG, Storm water) | Total Score | Pass Yes or No | Combine? Yes/No | | |
| | Water Rates | Water Budget Based Billing | ALL | Develop individualized monthly water budgets for all or a selected category of customers. Water budgets are linked to a rate schedule where rates per unit of water increase when a customer goes above their budget, or decreases if they are below their budget. Budgets typically are based on such factors as size of the irrigated area and often vary seasonally to reflect weather during billing period. These rates have been shown to be effective in reducing landscape irrigation demand (AWWARF Reports). Could combine this measure with Measures 6A - 6C. This measure would require rate study and capable billing software. | 4 | 4 | 4 | 4 | 3 | 2 | 21 | Yes | No | Develop a formula for tying the price of water to population. | Major modification or New Billing System required |

Notes: I – Indoor Use; L – Landscape Demand; I, L – Both Indoor and Sprinkling Demand; O – Other.

# APPENDIX G – CALIFORNIA ENERGY COMMISSION APPLIANCE EFFICIENCY REGULATIONS



California Energy Commission

# Appliance Efficiency Regulations

California Code of Regulations Title 20, Sections 1601 Through 1609

Toilet, Urinal, Faucet and Showerhead Regulations

California Energy Commission

Edmund G. Brown Jr., Governor

September 2015 | CEC-400-2015-030

# California Energy Commission

Harinder Singh
Ken Rider
Tuan Ngo
Sean Steffensen
Betty Chrisman
Michael Murza
Jared Babula
**Primary Author(s)**

Harinder Singh
John Nuffer
**Project Managers**

Kristen Driskell
**Supervisor**
**Appliances and Existing Buildings Office**

Dave Ashuckian, P.E.
**Deputy Director**
**Efficiency Division**

Robert P. Oglesby
**Executive Director**

**DISCLAIMER**

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# Amendments to Appliance Efficiency Regulations

## Section 1601. Scope.

...

This Article applies to the following types of new appliances, if they are sold or offered for sale in California, except those sold wholesale in California for final retail sale outside the state and those designed and sold exclusively for use in recreational vehicles, or other mobile equipment. Unless otherwise specified, each provision applies only to units manufactured on or after the effective date of the provision.

...

(h) Plumbing fittings, which are showerheads, lavatory faucets, kitchen faucets, metering faucets, replacement aerators, wash fountains, tub spout diverters, public lavatory faucets, and commercial pre-rinse spray valves.

...

Note: Authority cited: Sections 25213, 25218(e), 25402(a)-25402(c) and 25960, Public Resources Code. Sections 16, 26 and 30, Governor's Executive Order No. B-29-15 (April 1, 2015). Reference: Sections 25216.5(d), 25402(a)-25402(c) and 25960, Public Resources Code. Section 16, Governor's Executive Order No. B-29-15 (April 1, 2015).

## Section 1602. Definitions.

...

(h) Plumbing Fittings.

...

"Plumbing fitting" means a device that controls and guides the flow of water in a supply system. Examples include showerhead, lavatory faucet, kitchen faucet, metering faucet, lavatory replacement aerator, kitchen replacement aerator, wash fountain, commercial pre-rinse spray valve, public lavatory faucet, or tub spout diverter.

"Public lavatory faucet" means a fitting intended to be installed in non-residential bathrooms that are exposed to walk-in traffic.

"Showerhead" means a device through which water is discharged for a shower bath and includes a body sprayer and handheld showerhead but does not include a safety showerhead.

"Water use" means the quantity of water flowing through a showerhead or faucet, at point of use, as determined using the test method in Section 1604(h).

...

(i) Plumbing Fixtures.

"Dual-flush effective flush volume" means the average flush volume of two reduced flushes and one full flush.

"Dual-flush water closet" is a water closet incorporating a feature that allows the user to flush the water closet with either a reduced or a full volume of water.

"Plumbing fixture" means an exchangeable device, which connects to a plumbing system to deliver and drain away water and waste. A plumbing fixture includes a water closet or a urinal.

...

Note: Authority cited: Sections 25213, 25218(e), 25402(a)-25402(c) and 25960, Public Resources Code. Sections 16, 26 and 30, Governor's Executive Order No. B-29-15 (April 1, 2015). Reference: Sections 25216.5(d), 25402(a)-25402(c) and 25960, Public Resources Code. Section 16, Governor's Executive Order No. B-29-15 (April 1, 2015).

2

## Section 1604. Test Methods for Specific Appliances.

...

(h) Plumbing Fittings.

(1) The test method for commercial pre-rinse spray valves is 10 C.F.R. Sections 431.263 and 431.264.

(2) The test methods for showerheads are:

(A) **Maximum flow rate test.** The test method for determining maximum flow rate of a showerhead is 10 C.F.R. Section 430.23(t) (Appendix S to Subpart B of Part 430).

(B) **Minimum flow rate test.** The test method for determining minimum flow rate of a showerhead is ASME A112.18.1-2012 / CSA B125.1-2012, Section 5.12.

(C) **Showerheads with multiple nozzles.** Showerheads with multiple nozzles shall be tested with all nozzles in use at the same time.

(3) The test method for other plumbing fittings is 10 C.F.R. Section 430.23(s) (Appendix S to Subpart B of part 430).

(4) Showerhead-tub spout diverter combinations shall have both the showerhead and tub spout diverter tested individually.

...

(i) Plumbing Fixtures.

The test methods for plumbing fixtures are:

(1) **Water Closets.** The test method for testing gallons per flush of water closets is 10 C.F.R. Section 430.23 (u) (Appendix T to Subpart B of part 430). See Section 1604(i)(3) for the required waste extraction test.

(2) **Urinals.** The test method for testing gallons per flush of urinals is 10 C.F.R. Section 430.23(v) (Appendix T to Subpart B of part 430).

(3) Waste Extraction Test (Section 7.10) of ASME A112.19.2/CSA B45.1-2013.

The following documents are incorporated by reference in Section 1604.

...

The American Society of Mechanical Engineers (ASME)

| | |
|---|---|
| ASME A112.19.2/CSA B45.1-2013 | Ceramic Plumbing Fixtures |
| ASME A112.18.1-2012/CSA B125.1-2012 | Plumbing Supply Fittings |

3

Copies available from:

ASME Headquarters Two Park Avenue
New York, NY 10016-5990
www.asme.org
Phone: 800-843-2762 (U.S./Canada)
001-800-843-2763 (Mexico)
973-882-1170 (outside North America)
Email: CustomerCare@asme.org

...

Note: Authority cited: Sections 25213, 25218(e), 25402(a)-25402(c) and 25960, Public Resources Code. Sections 16, 26 and 30, Governor's Executive Order No. B-29-15 (April 1, 2015). Reference: Sections 25216.5(d), 25402(a)-25402(c) and 25960, Public Resources Code. Section 16, Governor's Executive Order No. B-29-15 (April 1, 2015).

4

## Section 1605.1. Federal and State Standards for Federally-Regulated Appliances.

...

(h) Plumbing Fittings.

(1) **Metering Faucets and Wash Fountains.** The flow rate of wash fountains and metering faucets shall be not greater than the applicable values shown in Table H-1.

**Table H-1: Standards for Plumbing Fittings**

| Appliance | Maximum Flow Rate |
|---|---|
| Wash fountains | $2.2 \times \frac{rim\ space\ (inches)}{20}\ gpm\ at\ 60\ psi$ |
| Metering faucets | 0.25 gallons/cycle[1,2] |
| Metering faucets for wash fountains | $0.25 \times \frac{rim\ space\ (inches)}{20}\ gpm\ at\ 60\ psi$[1,2] |

[1]**Sprayheads with independently controlled orifices and metered controls.** The maximum flow rate of each orifice that delivers a preset volume of water before gradually shutting itself off shall not exceed the maximum flow rate for a metering faucet.

[2]**Sprayheads with collectively-controlled orifices and metered controls.** The maximum flow rate of a sprayhead that delivers a preset volume of water before gradually shutting itself off shall be the product of (a) the maximum flow rate for a metering faucet and (b) the number of component lavatories (rim space of the lavatory in inches [millimeters] divided by 20 inches [508 millimeters]).

(5) **Showerheads, lavatory faucets, kitchen faucets, aerators, and public lavatory faucets**. See Section 1605.3 (h) for standards for all showerheads, lavatory faucets, kitchen faucets, aerators, and public lavatory faucets sold or offered for sale in California.

...

The following documents are incorporated by reference in Section 1605.1.

...

(i) Plumbing Fixtures.

See Section 1605.3(i) for water efficiency standards for plumbing fixtures.

...

Note: Authority cited: Sections 25213, 25218(e), 25402(a)-25402(c) and 25960, Public Resources Code. Sections 16, 26 and 30, Governor's Executive Order No. B-29-15 (April 1, 2015). Reference: Sections 25216.5(d), 25402(a)-25402(c) and 25960, Public Resources Code. Section 16, Governor's Executive Order No. B-29-15 (April 1, 2015).

5

## Section 1605.2. State Standards for Non-Federally-Regulated Appliances.

...

(i) Plumbing Fixtures.

See Section 1605.3(i) for water efficiency standards for plumbing fixtures.

...

Note: Authority cited: Sections 25213, 25218(e), 25402(a)-25402(c) and 25960, Public Resources Code. Sections 16, 26 and 30, Governor's Executive Order No. B-29-15 (April 1, 2015). Reference: Sections 25216.5(d), 25402(a)-25402(c) and 25960, Public Resources Code. Section 16, Governor's Executive Order No. B-29-15 (April 1, 2015).

## Section 1605.3. State Standards for Non-Federally-Regulated Appliances.

...

(h) Plumbing Fittings.

**(1) Tub Spout Diverters and Showerhead Tub Spout Diverter Combinations.** The leakage rate of tub spout diverters manufactured on or after March 1, 2003 shall be not greater than the applicable values shown in Table H-2. Showerhead tub spout diverter combinations shall meet both the standard for showerheads and the standard for tub spout diverters.

...

(2) **Lavatory Faucets and Aerators.** The flow rate of lavatory faucets and lavatory replacement aerators shall be not greater than the applicable values shown in Table H-3.

**Table H-3: Standards for Lavatory Faucets and Aerators**

| Appliance | Maximum Flow Rate | | |
|---|---|---|---|
| | Manufactured prior to September 1, 2015 | Manufactured on or after September 1, 2015, and prior to July 1, 2016 | Manufactured on or after July 1, 2016 |
| Lavatory faucets and aerators | 2.2 gpm at 60psi[1,2] | 1.5 gpm at 60 psi[1,2] | 1.2 gpm at 60 psi[1,2] |

[1]**Sprayheads with independently-controlled orifices and manual controls**. The maximum flow rate of each orifice that manually turns on or off shall not exceed the maximum flow rate for a lavatory faucet.
[2]**Sprayheads with collectively-controlled orifices and manual controls**. The maximum flow rate of a sprayhead that manually turns on or off shall be the product of (a) the maximum flow rate for a lavatory faucet and (b) the number of component lavatories (rim space of the lavatory in inches (millimeters) divided by 20 inches (508 millimeters).

...

(3) **Kitchen Faucets and Aerators and Public Lavatory Faucets and Aerators.** The flow rate of kitchen faucets, kitchen replacement aerators, public lavatory faucets, and public lavatory replacement aerators shall be not greater than the applicable values shown in Table H-4.

(A) For the plumbing fittings identified in Table H-4, noncompliant products may not be sold or offered for sale on or after January 1, 2016, regardless of manufactured date.

**Table H-4: Standards for Kitchen Faucets and Aerators and Public Lavatory Faucets and Aerators**

| Appliance | Maximum Flow Rate | |
|---|---|---|
| | Sold or offered for sale prior to January 1, 2016 | Sold or offered for sale on or after January 1, 2016 |
| Kitchen faucets and aerators | 2.2 gpm at 60 psi | 1.8 gpm with optional temporary flow of 2.2 gpm at 60 psi |
| Public lavatory faucets and aerators | 2.2 gpm at 60 psi | 0.5 gpm at 60 psi |

...

(4) **Commercial Pre-rinse Spray Valves**.

(A) Commercial pre-rinse spray valves manufactured on or after January 1, 2006, shall be capable of cleaning 60 plates in an average time of not more than 30 seconds per plate.

(B) See Section 1605.1(h) for water consumption standards for commercial pre-rinse spray valves.

...

(5) **Showerheads**. The flow rate of showerheads shall be not greater than the applicable values shown in Table H-5.

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**Table H-5: Standards for Showerheads**

| Appliance | Maximum Flow Rate | | |
|---|---|---|---|
| | **Manufactured on or after January 1, 1994 and prior to July 1, 2016** | **Manufactured on or after July 1, 2016 and prior to July 1, 2018** | **Manufactured on or after July 1, 2018** |
| Showerheads | 2.5 gpm at 80 psi | 2.0 gpm at 80 psi[1,2,3] | 1.8 gpm at 80 psi[1,2,3] |

[1] The maximum flow rate shall be the highest value obtained through testing at a flowing pressure of 80 ±1 psi and shall not exceed the maximum flow rate in Table H-5.

[2] **Minimum flow rate.** The minimum flow rate, determined through testing at a flowing pressure of 20 ± 1 psi, shall not be less than 60 percent of the maximum flow rate in Table H-5. The minimum flow rate determined through testing at flowing pressures of 45 and 80 ± 1 psi shall not be less than 75 percent of the maximum flow rate in Table H-5.

[3] Showerheads with multiple nozzles. The total flow rate of showerheads with multiple nozzles must be less than or equal to the maximum flow rate in Table H-5 when any or all nozzles are in use at the same time.

...

(6) **Other Plumbing Fittings**. See Section 1605.1(h) for water efficiency standards for plumbing fittings that are federally-regulated consumer products.

...

(i) Plumbing Fixtures.

(1) The water consumption of water closets, and urinals, other than those designed and marketed exclusively for use at prisons or mental health care facilities shall be no greater than the values shown in Table I-2.

**Table I-2 Standards for Plumbing Fixtures**

| Appliance | Maximum Gallons per Flush or Dual-flush effective flush volume | |
|---|---|---|
| | **Sold or offered for sale on or after January 1, 2014[1]** | **Sold or offered for sale on or after January 1, 2016[1]** |
| All water closets | 1.28 | 1.28 |
| Trough-type urinals | $\frac{\text{trough length (inches)}}{16}$ | $\frac{\text{trough length (inches)}}{16}$ |
| Wall mounted urinals | 0.5 | 0.125 |
| Other urinals | 0.5 | 0.5 |

[1]For the items identified in Table I-2, non-compliant products may not be sold or offered for sale on or after the designated date, regardless of manufacture date

9

(2) Water closets sold or offered for sale or after January 1, 2016 shall pass the Waste Extraction Test (Section 7.10) of ASME A112.19.2.

...

Note: Authority cited: Sections 25213, 25218(e), 25402(a)-25402(c) and 25960, Public Resources Code. Sections 16, 26 and 30, Governor's Executive Order No. B-29-15 (April 1, 2015). Reference: Sections 25216.5(d), 25402(a)-25402(c) and 25960, Public Resources Code. Section 16, Governor's Executive Order No. B-29-15 (April 1, 2015).

## Section 1606. Filing by Manufacturers; Listing of Appliances in Database.

...

**Table X Continued – Data Submittal Requirements**

| | Appliance | Required Information | Permissible Answers |
|---|---|---|---|
| H | Plumbing Fittings | *Type | Showerhead, lavatory faucet (independent or collective), public lavatory faucet, kitchen faucet, metering faucet (independent or collective), lavatory replacement aerator, kitchen replacement aerator, wash fountain, lift- type tub spout diverter, turn-type tub spout diverter, pull-type tub spout diverter, and push-type tub spout diverter. |
| | | Flow Rate | |
| | | Pulsating (for showerheads only) | Yes, no |
| | | Minimum Flow Rate at 45 psi and 80 psi (for showerheads manufactured on or after July 1, 2016) | |
| | | Minimum Flow Rate at 20 psi (for showerheads manufactured on or after July 1, 2016) | |
| | | Rim Space (for wash fountains only) | |
| | | Tub Spout Leakage Rate When New | |
| | | Tub Spout Leakage Rate After 15,000 Cycles | |
| | Commercial Pre-rinse Spray Valves | Flow Rate (gpm) | |
| | | Cleaning ability test | Pass, fail |

...

**Table X Continued – Data Submittal Requirements**

| | Appliance | Required Information | Permissible Answers |
|---|---|---|---|
| I | Plumbing Fixtures | *Type | Blowout water closet, gravity tank type water closet, dual-flush water closet, electromechanical hydraulic water closet, flushometer tank water closet, urinal, prison-type urinal, prison-type water closet, flushometer valve water closet, trough-type urinal, wall-mounted urinal, waterless urinal, vacuum other type urinal, vacuum type water closet |
| | | Water Consumption (dual-flush effective flush volume for dual-flush water closet) | |
| | | Passes waste extraction test | Yes, No |
| | | Waste extraction value | grams |
| | | Trough Length (trough-type urinals only) | |

...

**(4) Declaration.**

(A) Each statement shall include a declaration, executed under penalty of perjury of the laws of California, that

...

4. the appliance was tested under the applicable test method specified in Section 1604, and, for the following appliances, was tested as follows:

...

j. for kitchen faucets that utilize an optional and temporary higher flow rate than 1.8 gpm, the higher flow rate has been tested utilizing the test procedure identified for kitchen faucets in Section 1604(h) at 60 psi and verified to have a flow rate less than or equal 2.2 gpm.

...

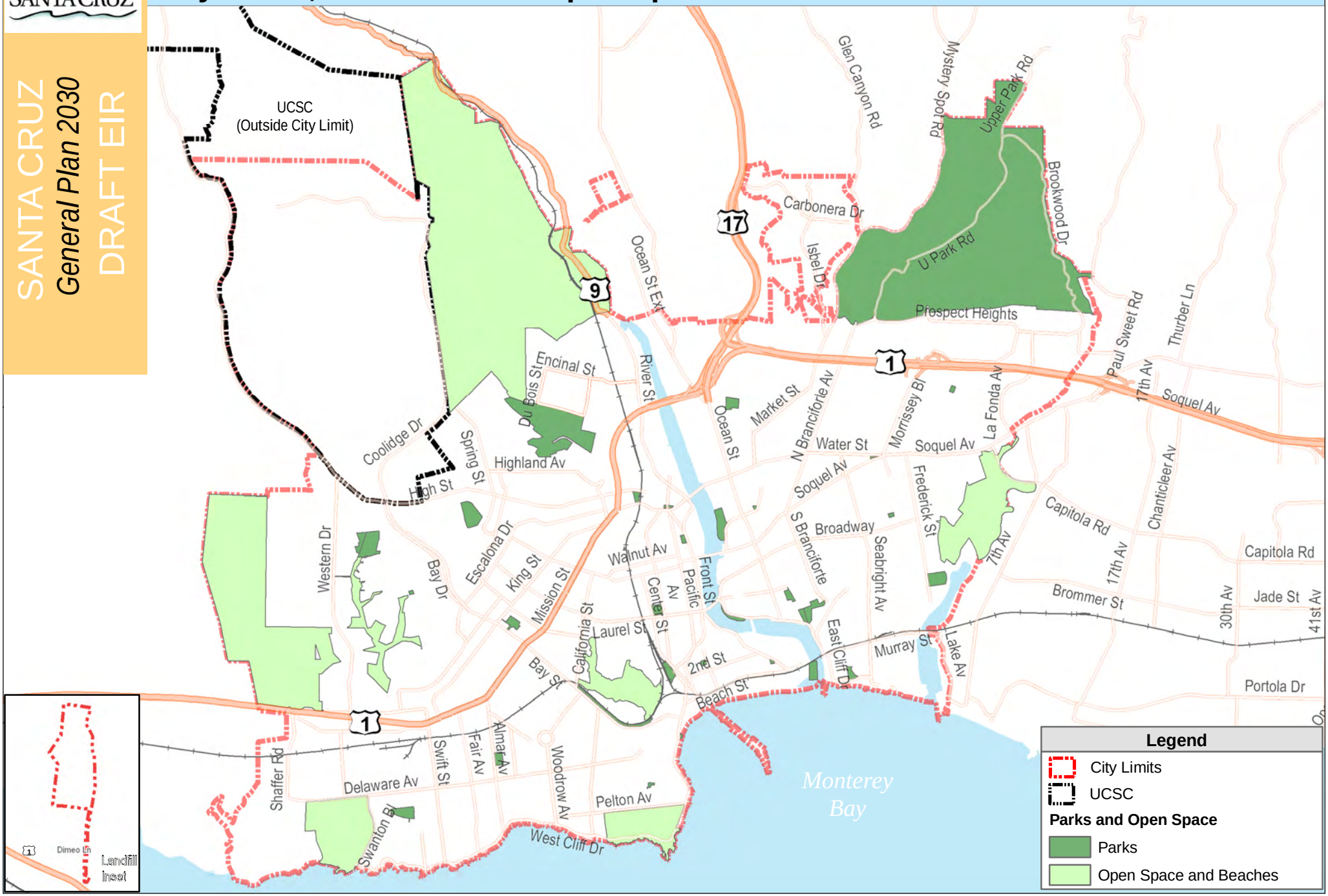
Note: Authority cited: Sections 25213, 25218(e), 25402(a)-25402(c) and 25960, Public Resources Code; and Sections 16, 26 and 30, Governor's Executive Order No. B-29-15 (April 1, 2015). Reference: Sections 25216.5(d), 25402(a)-25402(c), 25402.5.4 and 25960, Public Resources Code; and Section 16, Governor's Executive Order No. B-29-15 (April 1, 2015).

12

SANTA CRUZ
*General Plan 2030*
DRAFT EIR

# Figure 4.6-2
# City Parks, Greenbelt and Open Space Lands

0 0.75 1.5 Miles



**Santa Cruz City Parks**

Beach Flats Park
Bethany Curve
Chestnut Park
City Hall Gardens
DeLaveaga Park
Depot Park
Frederick Street Park
Garfield Park
Grant Park
Harvey West Park
John Franks Park
Ken Wormhoudt Skate Park
La Barranca
Laurel Park
Lighthouse Ave Park
Lighthouse Field
Loch Lomond Recreation Area
Mission Plaza
Neary Lagoon
Ocean View Park
Riverside Gardens
San Lorenzo Park
Santa Cruz Riverwalk
Sergeant Derby Park
Star of the Sea
Trescony
Tyrrell Park
University Terrace
West Cliff
Westlake Park
West Side Pump Track

Under guidance from the County, City of Santa Cruz playgrounds are open. While we are excited to announce this, please remember to follow the recommended guidelines to help keep everyone safe:

● Practice social distancing and wear face coverings following State guidance.

● Wash hands or use a hand sanitizer regularly, especially after playing with/on shared equipment and after using the restrooms.

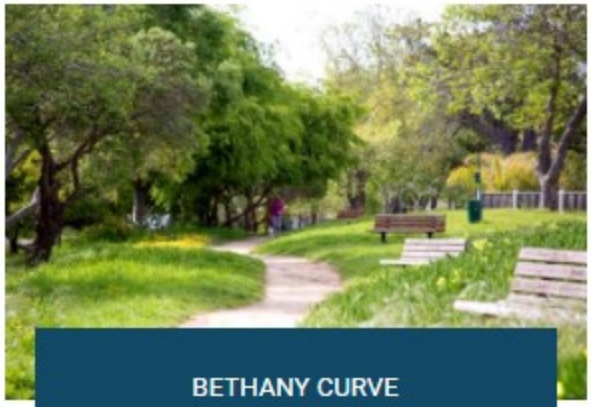
● Be prepared for limited access to public restrooms.

● Stay home if you are not feeling well or showing symptoms.

● Playground equipment is not sanitized.



BEACH FLATS



BETHANY CURVE



CHESTNUT PARK



CITY HALL GARDENS



DELAVEAGA PARK



DEPOT PARK



FREDERICK STREET



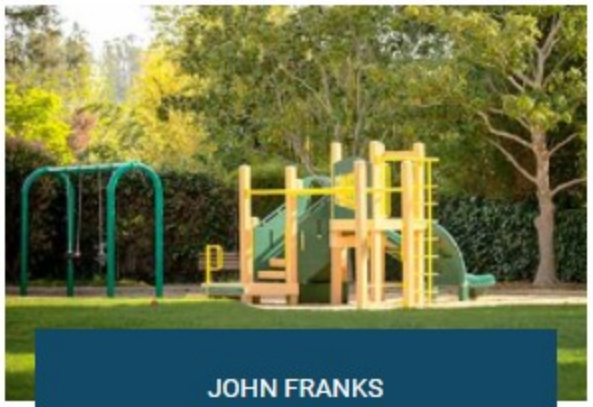
GARFIELD PARK



GRANT PARK



HARVEY WEST



JOHN FRANKS



KEN WORMHOUDT



LA BARRANCA



LAUREL PARK



LIGHTHOUSE AVENUE



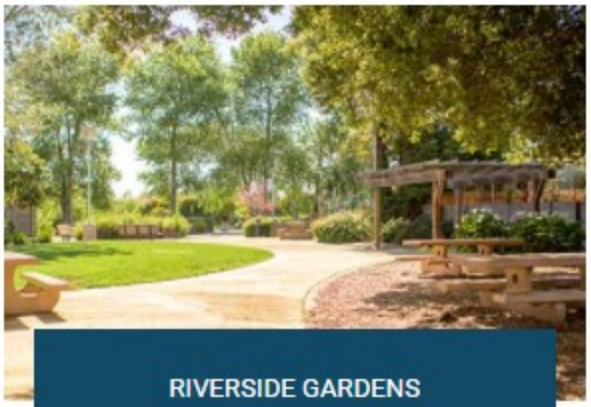
MISSION PLAZA



NEARY LAGOON



OCEAN VIEW PARK



RIVERSIDE GARDENS



SAN LORENZO



SANTA CRUZ RIVERWALK



SERGEANT DERBY



STAR OF THE SEA



TRESCONY PARK



TYRRELL PARK



UNIVERSITY TERRACE



WEST CLIFF



WEST LAKE PARK



WESTSIDE PUMP TRACK

- Parks & Recreation
  + COVID-19
  Virtual Recreation
  + Advisory Bodies
  + Civic Auditorium
  Current Job Openings
  + Event Permits
  + Facilities
  + How Do I...
  + Louden Nelson Community Center
  - Parks, Beaches & Open Spaces
    Beaches
    Dog Off Leash Areas
    + Open Spaces
    + Parks
    Parks Master Plan



# Dog Off Leash Areas



**Branciforte Dog Park:** Quarter acre fenced dog park. Open Sunrise to Sunset. Located at 200 N. Branciforte Drive.

**DeLaveaga Park:** Sand Pit Service Road into Lower DeLaveaga Park. Designated off-leash times are sunrise to sunset. Take Market Street past Gruenwald Court.

**Frederick Street Park:** The off-leash area is clearly marked by signs and fencing. Monday-Friday- 8:00am-7:00pm (or sunset, if earlier) Saturday-Sunday- 8:00am-5:00pm. The area is located at 168 Frederick Street (Frederick at Broadway).

**Grant Street Park:** The off-leash area is clearly marked with signs. Off-leash times are sunrise to sunset. The area is located at 180 Grant Street.

**Mimi De Marta Dog Park:** Half acre fenced, off leash dog area. Open sunrise to sunset. Located at 130 Broadway.

**Mitchell's Cove Beach:** Dogs are allowed off-leash before 10 am and after 4 pm The beach is located near West Cliff Drive and Almar Avenue.

**Pacheco Dog Park:** This area is completely fenced and the off-leash times are sunrise to sunset. The area is located at Pacheco Avenue and Prospect Heights.

**Ocean View Park:** The off-leash area is clearly marked with signs. Off-leash times are sunrise to sunset. The area is located at 102 Ocean View Avenue.

**University Terrace Park:** Two off-leash dog park areas: one for all dogs and a separate park for smaller dogs. Both areas are fenced and off-leash times are sunrise to sunset. The designated off-leash area is located at the second entrance at Nobel Drive and Meder Street.

- Dogs are **not allowed** at the Wharf, Cowell Beach, Main Beach, Laurel Park, or San Lorenzo Park.
- Dog owners must be in full control of their dogs at all times. Control must be immediate. Dog owners are financially responsible for any damage caused by their dog to public property. SCMC 8.14.200.2
- Dog owners must clean up all of their dog's defecation and must carry dog defecation removal devices at all times. SCMC 8.14.215

Santa Cruz County "Where Can I Take my Dog?" Brochure



## PARKS

1 Moore Creek Preserve
2 University Terrace
3 Westlake
4 Trescony
5 Sgt. Charles Derby and Skate Park
6 Garfield
7 Bethany
8 Neary Lagoon Wildlife Refuge
9 Depot Park, Scott Kennedy Fields, Freight Building and Bicycle Trip Bike Park
10 Beach Flats
11 Poet's
12 Town Clock
13 Mission Plaza
14 Harvey West
15 Pogonip
16 Grant
17 San Lorenzo
18 Central
19 Ken Wormhoudt Skate Park/ Mike Fox Roller Hockey Practice Area
20 Jessie Street Marsh
21 Ocean View
22 Tyrrell
23 Arana Gulch
24 Frederick Street
25 Star of the Sea
26 Laurel
27 DeLaveaga
28 DeLaveaga Golf Course
29 Disc Golf Course
30 John Franks
31 Lighthouse Neighborhood
32 Pump Track
33 Pacheco Dog Park
34 Mimi de Marta Dog Park
35 Riverside Gardens

greenbelt property

## FACILITIES

A Surfing Museum
B Santa Cruz Wharf and Lifeguard Headquarters
C Nueva Vista Community Center
D Louden Nelson and Teen Center
E Pacific Avenue
F Civic Auditorium
G City Hall
H Harvey West Clubhouse, Scout House and Pool
I Museum of Natural History
J Kaiser Permanente Arena
K Archery Range
L Tannery Arts



+ Louden Nelson Community Center
- Parks, Beaches & Open Spaces
  - Beaches
  - Dog Off Leash Areas
  - Open Spaces
    + Arana Gulch
      - Moore Creek
      - Pogonip
    + Parks
  - Parks Master Plan
- Recreation Events
+ Reservations
+ Senior Programs
+ Sports
+ Teach a Class With Us!
- Teen Center and Teen Programs
+ Youth Programs


Due to financial impacts of the COVID-19 pandemic, the Parks and Recreation Department has seen a temporary reduction in staffing levels. To mitigate this reduction the following parks have been temporarily closed:

- Lower DeLaveaga Park and George Washington Grove (Trails at DeLaveaga remain open)
- Laurel Park
- San Lorenzo Park Benchlands

Park restrooms will be replaced by portable restrooms and handwashing stations at Grant Park, San Lorenzo Park, Frederick St. Park, Ocean View Park, Neary Lagoon, and Garfield Park.

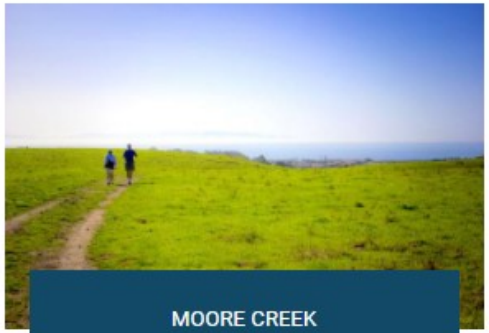
List of amenities and park features that have been affected countywide.

To help safeguard our community, please observe CDC guidance on stopping the spread of germs and review the Parks & Recreation COVID-19 page to keep up to date with our efforts to flatten the curve.

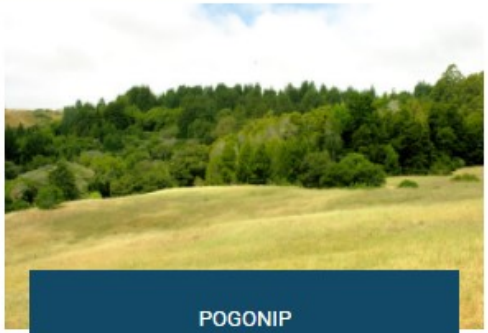




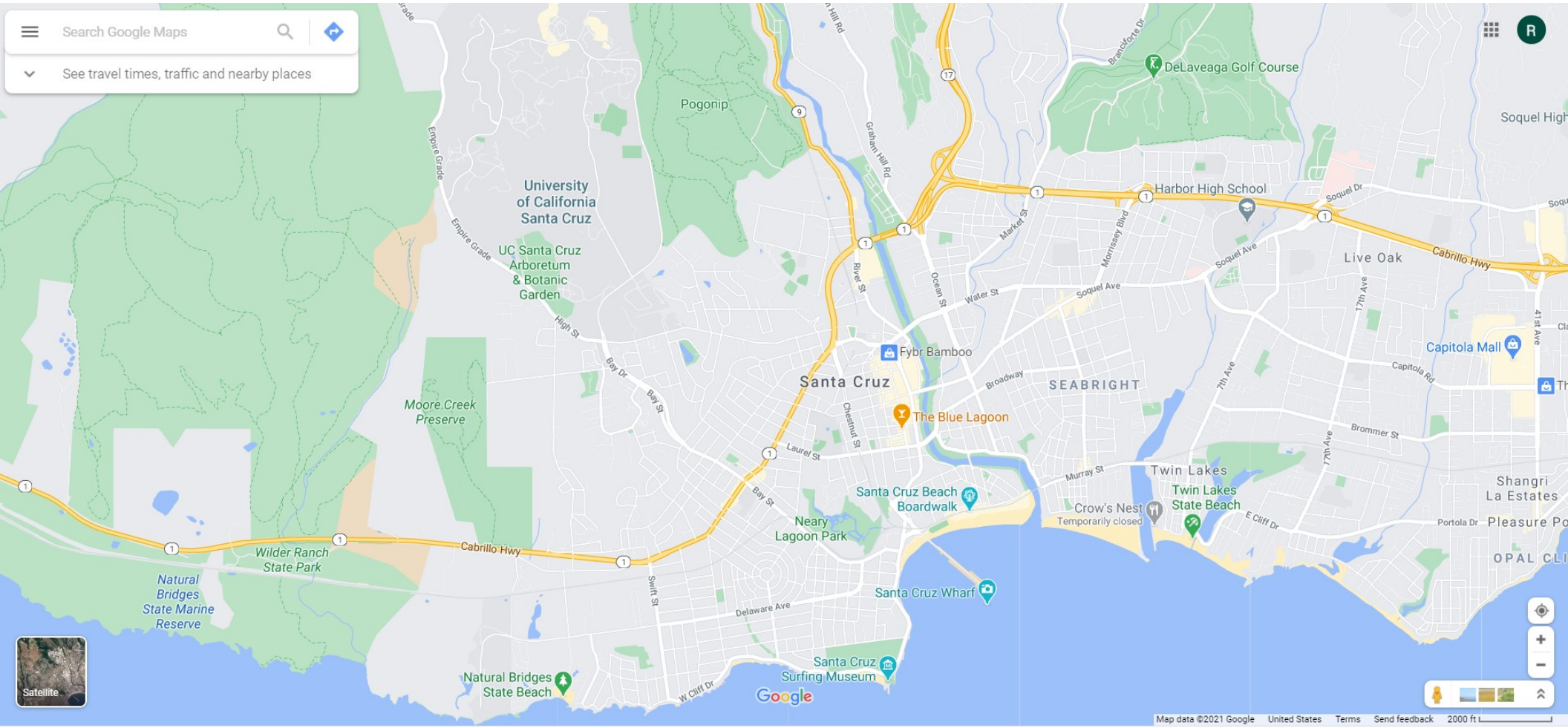

ARANA GULCH



MOORE CREEK



POGONIP


Search Google Maps
See travel times, traffic and nearby places
DeLaveaga Golf Course
Pogonip
University of California Santa Cruz
UC Santa Cruz Arboretum & Botanic Garden
Harbor High School
Live Oak
Capitola Mall
Fybr Bamboo
Santa Cruz
SEABRIGHT
The Blue Lagoon
Moore Creek Preserve
Twin Lakes
Twin Lakes State Beach
Crow's Nest
Temporarily closed
Santa Cruz Beach Boardwalk
Neary Lagoon Park
Wilder Ranch State Park
Natural Bridges State Marine Reserve
Santa Cruz Wharf
Natural Bridges State Beach
Santa Cruz Surfing Museum
Cabrillo Hwy
Soquel Dr
Soquel Ave
Broadway
Water St
Bay St
Laurel St
Delaware Ave
Swift St
W Cliff Dr
E Cliff Dr
Portola Dr
Brommer St
Murray St
Capitola Rd
Graham Hill Rd
Empire Grade
High St
Bay Dr
River St
Ocean St
Market St
Morrissey Blvd
7th Ave
17th Ave
41st Ave
Satellite
Google
Map data ©2021 Google
United States
Terms
Send feedback
2000 ft






# City Beaches



Santa Cruz City beaches are the heart of Santa Cruz coastline. Whether taking a scenic walk along the shore, enjoying a game of volleyball, exploring the Santa Cruz Wharf, or getting your toes in the soft sand, City beaches are the essential stop for any trip to Santa Cruz.

We ask visitors to help us stop the spread of COVID-19 in our community by remembering to do the following:

✔Wear a mask - the order is still in effect ✔Wash your hands ✔ Keep 6 foot distance

"Pack it in, Pack it out": There are reduced trash services on the beaches at this time. If you are using the beach we ask you to be responsible and take your trash with you when you leave.

Please visit our COVID-19 resource page for additional information.

- **Visit**
- **Guidelines**
- **Beach Conditions & Safety**
- **Reserve**
- **Beach Volleyball**
- **Water Craft Launching**
- **Surf Schools**



Main Beach
108 Beach St
Santa Cruz, CA 95060



Cowell Beach
21 Municipal Wharf
Santa Cruz, CA 95060
*Cowell Beach closed midnight to one hour before sunrise.*
*Beach visitors are allowed to cross the beach to access the water*



Mitchell's Cove
West Cliff Drive
Santa Cruz, CA 95060

Lifeguard Headquarters
#1 Municipal Wharf
831-420-5715

Lifeguard Service:

- Area serviced- Cowell Beach to the San Lorenzo River

**Informational Links**

Junior & Little Guards
The Santa Cruz Wharf
The Surfing Way: Surf Etiquette Brochure
Beach Safety
Water Quality
Santa Cruz Weather
Santa Cruz Surf Forecast
National Weather Service Marine Forecast
Visit Santa Cruz
Santa Cruz County Beaches

+ Civic Auditorium
Current Job Openings
+ Event Permits
+ Facilities
+ How Do I...
+ Louden Nelson Community Center
+ Parks, Beaches & Open Spaces
Recreation Events
+ Reservations
- **Senior Programs**
Senior Services
Senior Activities
Walking Adventure Group
Senior Computer Center
Trips
Senior Clubs
+ Sports
+ Teach a Class With Us!
Teen Center and Teen Programs
+ Youth Programs


# DOWNTOWN SENIOR CENTER

at Louden Nelson Community Center



SENIOR ACTIVITIES



SENIOR SERVICES



SENIOR COMPUTER CENTER



WALKING ADVENTURE GROUP



TRIPS



SENIOR CLUBS

# SANTA CRUZ TEEN CENTER

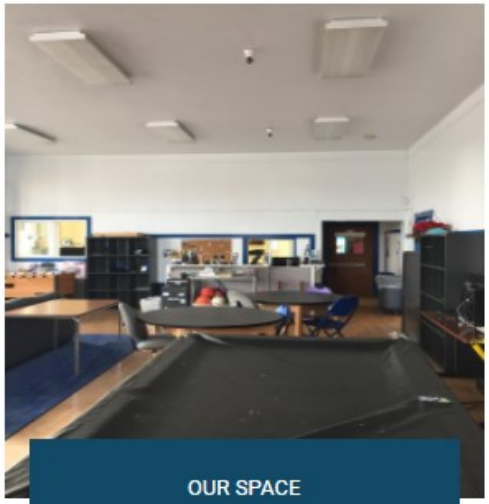


## Santa Cruz Teen Center

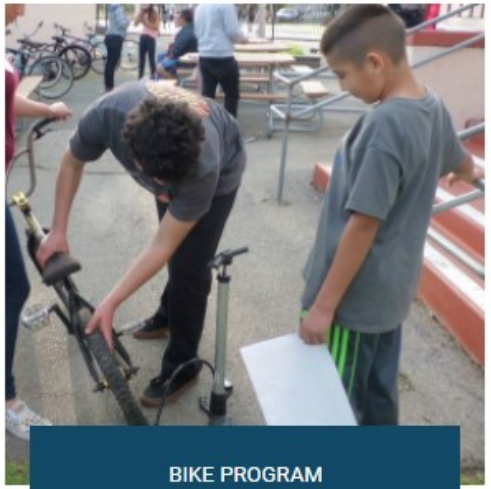




MONTHLY CALENDAR



OUR SPACE



BIKE PROGRAM

+ Civic Auditorium

Current Job Openings

+ Event Permits

+ Facilities

+ How Do I...

+ Louden Nelson Community Center

+ Parks, Beaches & Open Spaces

Recreation Events

+ Reservations

+ Senior Programs

+ Sports

+ Teach a Class With Us!

Teen Center and Teen Programs

+ Youth Programs


Today | Next 7 days | Next 30 days | All Upcoming | All Past | All

No results found.




Welcome to the City of Santa Cruz's Virtual Recreation Page.

Follow us on social media for more fun activities and updates. Share your Virtual Recreation with #CruzFunAtHome.

**The Winter/Spring Activity Guide is online and interactive!**

Want more information on a park or program? Click links for updates and details. Like a photo? Click on it to enlarge. Videos can be played right from the guide!

Parks & Recreation is committed to keeping our community members safe, active and connected!

Check back often as we will continue to add content!

- **Message from the Director** >
- **Fun For Seniors** >
- **Senior Center Without Limits** >
- **Fun At Home** >
- **Fun Outside** >
- **Arts & Culture** >
- **Get Active** >
- **COVID Creations** >
- **Local Resources** >
- **Stay Connected** >


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City of Santa Cruz

# PARKS MASTER PLAN 2030

Parks • Recreational Facilities • Open Spaces • Beaches



CITY OF SANTA CRUZ PARKS AND RECREATION

City of Santa Cruz

# PARKS MASTER PLAN 2030

**Parks • Recreational Facilities • Open Spaces • Beaches**

**AUGUST 2020**

CITY OF SANTA CRUZ
PARKS & RECREATION DEPARTMENT

Parks Make Life Better!

rhaa
LANDSCAPE ARCHITECTURE + PLANNING

# ACKNOWLEDGEMENTS

This plan would not have been possible without the assistance and participation of a great number of individuals. A special thanks to all of the members of the public who participated in the public input process for the Santa Cruz Parks Master Plan 2030.

**CITY COUNCILMEMBERS**
Mayor Justin Cummings
Vice Mayor Donna Meyers
David Terrazas
Martine Watkins
Cynthia Chase
Cynthia Mathews
Sandy Brown
Richelle Noroyan
Chris Krohn
Don Lane
Micah Posner
Pamela Comstock
Katherine Beiers
Renee Golder

**PARKS & RECREATION COMMISSIONERS**
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Hollie Locatelli
Gail G. Evans
Cece Pinheiro
Christine Palochak
Randy Widera
Kristina Kincaid Glavis
Gillian Greensite
Dawn Schott-Norris

**PARKS MASTER PLAN 2030 SUBCOMITTEE MEMBERS**
Cynthia Chase
David Terrazas
Christine Palochak
John Falkowski

**PARKS AND RECREATION DEPARTMENT**
Tony Elliot, Director of Parks and Recreation
Mauro Garcia
Dannettee Shoemaker
Travis Beck
Noah Downing
Carol Scurich
Meta Rhodeos
Clint Bohlen
Victor Albers
Heather Reiter
Leslie Keedy
Miles Hicks
Andrew Eisenberg
Steve Gomez
Andrea Botsford
Jill Bates
Josh Clevenger
Robert Acosta
Rachel Kaufman
Jon Bombaci
Angela Gray
Ashley Fisher
Maya Crelan Ray

Prepared By:
**CITY OF SANTA CRUZ PARKS & RECREATION DEPARTMENT**
Noah Downing

**CONSULTANT TEAM**
Royston Hanamoto Alley and Abey, Landscape Architects
Cordy Hill, Barbara Lundburg, Lauren Knight, Lauren Ivey & Nathanael Gray

Godbe Research, Public Opinion & Research
Bryan Godbe

Applied Development Economics, Economic Planning & Strategies
Doug Svensson

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# CHAPTER 1: EXECUTIVE SUMMARY

1.1 Executive Summary



Mitchell’s Cove

# SECTION 1.1: EXECUTIVE SUMMARY

A. Purpose of the Parks Master Plan 2030
B. Planning Process
C. Organization of the Parks Master Plan 2030
D. Overview of Chapters & Sections

## A. PURPOSE OF THE PARKS MASTER PLAN 2030

The *Santa Cruz Parks Master Plan 2030* (Parks Master Plan 2030) is a tool to guide the City of Santa Cruz in parks, facility, beach, and open space planning on a long-term basis. This document contains policies and actions for the provision of parks services and recommendations for improvements at specific parks.

## B. PLANNING PROCESS

The planning process included three significant report milestones:

- Administrative Draft – A working draft of the Parks Master Plan 2030 distributed amongst key City staff for review, study, and comment.
- Draft Plan – Comments on the Administrative Draft were incorporated, and the report was open to public review and comment.
- Final Plan – Final comments from the public, City Council, Parks & Recreation Commission, and key City staff were incorporated before release of the Final Plan. The Final Plan was adopted by the City Council on October 13, 2020.



University Terrace Park

## C. ORGANIZATION OF THE PARKS MASTER PLAN 2030

The Parks Master Plan 2030 is comprised of the following chapters and sections:

**CHAPTER 1: EXECUTIVE SUMMARY**

1.1 Executive Summary

**CHAPTER 2: INTRODUCTION & INVENTORY - WHO WE ARE & WHAT WE HAVE**

2.1 Goals & General Objectives

2.2 History & Introduction

2.3 Community Profile

2.4 Existing Conditions

**CHAPTER 3: COMMUNITY OUTREACH & NEEDS ASSESSMENT - WHAT WE NEED & WANT**

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3.2 Emerging Trends

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5.5 Summary of Community Input

5.6 Stakeholder Interviews

5.7 Joint Study Session Presentation

5.8 Presentations from Subcommittee Meetings

5.9 Potential Grant Sources



View up Woodrow Avenue, planted with drought-tolerant vegetation

## D. OVERVIEW OF CHAPTERS & SECTIONS

**CHAPTER 1: EXECUTIVE SUMMARY**

This chapter provides an overview of the purpose and organization of the Parks Master Plan 2030, while also explaining the process that the Plan undergoes in order to be approved.

**CHAPTER 2: INTRODUCTION & INVENTORY - WHO WE ARE & WHAT WE HAVE**

In order to make relevant recommendations for the future, it is critical to understand the Santa Cruz community as well as the history and current condition of the parks system. This chapter presents an introduction to the City of Santa Cruz's existing parks and recreation system as well as the community. A detailed inventory and assessment of the existing parks, open spaces, beaches, and facilities is included. Specific recommendations for each of these assets can be found in Chapter 4.

### Section 2.1 Goals & General Objectives of Master Plan

The Parks Master Plan 2030 presents a road map to improve the existing parks system and anticipate future needs of the community while still

preserving the City's unique character and environment. The Parks, Recreation, & Open Space chapter of the City of Santa Cruz General Plan 2030 provides the outline for the recommendations. The specific goals are:

- **Goal PR1**: Ample, accessible, safe, and well-maintained parks, open space, and active recreational facilities
- **Goal PR2**: High-quality, affordable recreational programs, activities, events, and services for all
- **Goal PR3**: Well managed, clean, and convenient public access to open space lands and coastline
- **Goal PR4**: An integrated system of citywide and regional trails

The objectives of the Parks Master Plan 2030 process were as follows:

- Identify and assess the City's various existing parks, open space, and facility assets.
- Conduct a comprehensive outreach effort including telephone surveys, community meetings, and interviews with key stakeholders and community members.
- Create a feasible vision and goals that prioritize community needs and desires for expansion and improvements.
- Generate policies to support community goals.
- Construct an implementable action plan to accomplish community goals, while establishing phasing and funding opportunities.

## Section 2.2 History & Introduction

This section introduces the recreational lifestyle of Santa Cruz and the history of recreation in the City. The bay, beaches, and extensive greenbelts provide numerous opportunities to explore and recreate.

Additionally, the City has a variety of traditional park facilities for its residents and visitors. These include group picnic areas, a swimming pool, sports fields, basketball and tennis courts, playgrounds, a golf course, horseshoe pits and such unique facilities as an archery range and disc golf course. The City continues to embrace new trends in recreation with such facilities as pump tracks and pickleball courts. Indoor community facilities offer a wide variety of programs and activities. The extensive trail network provides both transportation and recreation throughout the City and access to a regional trail network.

Santa Cruz's history of recreation is also outlined in this chapter, starting with the incorporation of the City in 1866. Highlights include establishment of the Parks and Recreation Department, introduction of surfing, donation of DeLaveaga Park, construction of the wharf, interest in recreation after World War II, donation of Harvey West Park, and a rapid park expansion from the 60's to present time.



The City's 150th Anniversary Celebration on Main Beach in 2016

## Section 2.3 Community Profile

This section focuses on the factors that influence recreation in Santa Cruz, including location, geography, climate, and demographics.

Santa Cruz's location, geography, and climate are conducive to recreation. The Monterey Bay and surrounding mountains provide diverse landscapes to accommodate a wide-range of recreational

interests and activities, and the mild climate facilitates year-round participation.

Increasing 7.1% between 2010 and 2014, the population of Santa Cruz continues to grow. The City has lower percentages of children and seniors than the state-wide averages, but both groups still need to be considered in recreation planning. The population of the University of California, Santa Cruz (UCSC) is a large user group for recreation. An additional significant user group that must be considered is the tourist population, with over three million trips to Santa Cruz County each year.



Youth Basketball at Kaiser Permanente Arena

### Section 2.4 Existing Conditions

This section examines what assets the City of Santa Cruz has that can be used to meet the needs of the community.

Compared to other Central California cities, the City of Santa Cruz has a higher than average ratio of parks and open space. These ratios do not include other assets such as school property, privately owned recreation facilities, and adjacent county and state park lands.

Existing City facilities include 32 neighborhood parks, 6 community parks, 7 open spaces, and 18 community, cultural, or recreational facilities such as community centers. Though the overall ratio of parklands is relatively high, there are some neighborhoods that lack direct access to parks.

Besides the various parks owned and maintained by the city, there are many other resources both within and adjacent to the city. These include school facilities, the Boardwalk, the UC Santa Cruz campus, over 30 county parks, and 14 state parks in the county.

The City's parks have a great diversity of natural habitats that contribute significantly to Santa Cruz's unique character.

## CHAPTER 3: COMMUNITY OUTREACH & NEEDS ASSESSMENT - WHAT WE NEED & WANT

The needs of the community are presented in this chapter, as uncovered through the public outreach process, and a discussion of emerging trends in parks and recreation that should be considered in future recreation planning.



Second community meeting at Louden Nelson Community Center

### Section 3.1 Community Outreach

The goals, objectives and action items of the plan are the result of an extensive community outreach process which included quantitative surveys, open houses, stakeholder interviews and focus groups, department-wide meetings, and questionnaires distributed at parks, facilities, events, and online.

Key findings included:

- An overall favorable impression of City parks
- Concern about illegal activities and safety in many parks
- Need for more sports fields
- Desire for more recreation amenities and upgraded playgrounds
- Need for more bike trails and facilities
- Desire for greenbelt preservation
- Access to all parks and facilities for all users

The information obtained from the outreach process was used by a working group comprised of Parks and Recreation Commissioners, City Council members and City staff to frame key directives on parks management, specific parks and facilities action items, and safety and security.



Bicycle Trip Bike Park at Depot Park

### Section 3.2 Emerging Trends

In addition to expressed community needs and desires, understanding trends in recreation is crucial for framing action items. These trends may influence future recreation needs within the community. Trends examined include changes in demographics, programming, access, marketing, and management.

## CHAPTER 4: IMPLEMENTATION - WHERE WE'RE HEADED & HOW WE'RE GETTING THERE

Based on the information received in the community outreach and needs assessment process, this chapter frames specific recommendations, time frames for those recommendations, funding strategies, and ongoing planning and updates.



Scott Kennedy Fields re-opening dedication in 2014

### Section 4.1 Goals, Policies & Actions

This section presents the vision, goals, policies, and actions proposed in the plan. Goals are intended to support those reached in the adopted City of Santa Cruz General Plan 2030 process and include:

- Provide attractive and sustainably maintained parks and facilities throughout the City.
- Provide ample parks and facilities throughout the City.
- Provide parks and facilities to meet the existing and emerging needs of residents and visitors of all ages and abilities.
- Protect the City's natural resources, wildlife habitat, and environment.
- Maintain a safe, clean, and comfortable environment for all park users.
- Provide an integrated parks system with clean, convenient access to parks, open spaces, and the coastline.
- Establish, maintain, and operate parks, facilities, and programs in a manner that is cost effective and manageable while engaging the community in a manner that maximizes involvement and support.

Each goal is supported by policies and action items that sustain that goal.

### Section 4.2 Asset Inventory & Specific Facility Recommendations

This section contains recommendations and action items for specific parks, open spaces, beaches, and facilities. In addition there are detailed descriptions of amenities at each park, open space, beach, and facility. Many of the recommendations reflect community goals that have been studied and vetted during previous processes.

### Section 4.3 Funding Strategies

This section examines possible funding mechanisms available in California for municipal parks and recreation acquisition, improvements, and on-going operations and maintenance costs. Funding strategies describe potential partnership opportunities for further exploration.

### Section 4.4 Ongoing Planning & Updates

The Parks Master Plan 2030 is a means to guide future park improvements and to accommodate emerging needs to continue to provide a quality parks system. It is envisioned as a living document that continues to evolve and progress over time. Outlined in this section are the factors for consideration including need, environmental impact, and funding impacts. Other key factors are ability to move large projects forward with grants and responsiveness to community needs.



Pogonip Open Space

## CHAPTER 5: APPENDICES

This chapter compiles the detailed information gathered throughout the planning process of the Parks Master Plan 2030 for reference and support of the final recommendations. Included in the appendices are links to pertinent existing plans, the results and analysis of the community telephone and email surveys, materials that were displayed and distributed at the community meetings, a summary of feedback from the community, the Joint Study and Subcommittee Meeting presentations, and potential grant funding sources.

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# CHAPTER 2: INTRODUCTION & INVENTORY

**WHO WE ARE & WHAT WE HAVE**

2.1 Goals & General Objectives
2.2 History & Introduction
2.3 Community Profile
2.4 Existing Conditions



Grant Park

# SECTION 2.1: GOALS & GENERAL OBJECTIVES

A. Introduction
B. Guiding Principles from the City of Santa Cruz General Plan 2030
C. Relationship of the Parks Master Plan 2030 to Existing Plans & Studies

## A. INTRODUCTION

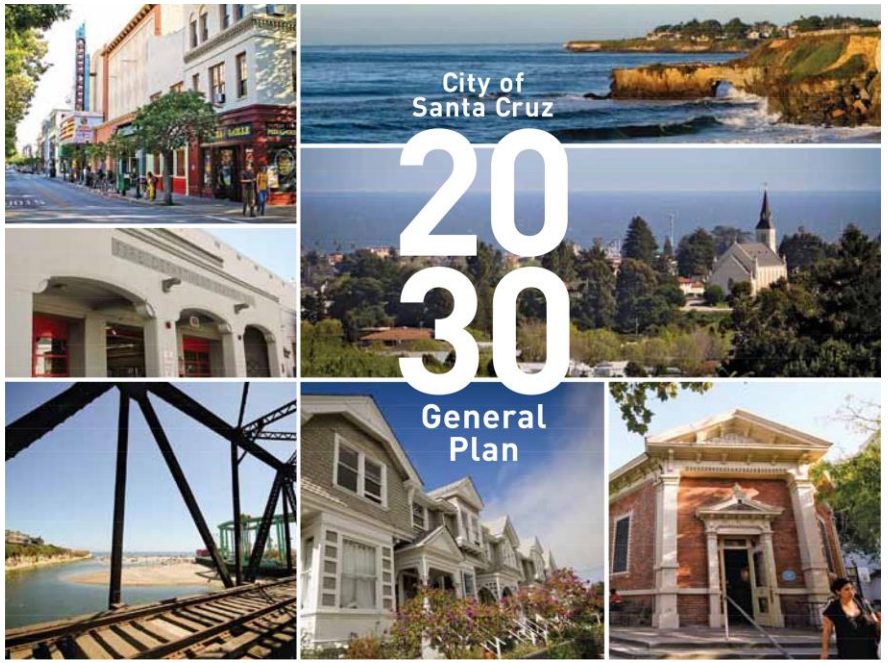
The *City of Santa Cruz Parks Master Plan 2030* (Parks Master Plan 2030) represents an opportunity to improve the existing parks system and anticipate future needs of the community while still preserving the unique character of the City's community and environment. The Parks Master Plan 2030 provides an analysis of the current parks, open spaces, and recreational facilities, based on assessments of the existing assets, quantitative and qualitative data gathered from the community, emerging trends in recreation, and standards for park development. This analysis directly shapes the Parks Master Plan 2030's recommendations, reflecting the wishes of the community and guiding the future development of the park system for the next 15 years.

The objectives of the Parks Master Plan 2030 process were as follows:

- Identify and assess the City's existing park, open space, beach, and facility assets.
- Conduct a comprehensive outreach effort including telephone surveys, community meetings, and interviews with key stakeholders and community members.
- Create a feasible vision and goals that prioritize community needs and desires for expansion and improvements.
- Generate policies to support the community goals.
- Create an implementable action plan to accomplish community goals, while establishing phasing and funding opportunities.

## B. GUIDING PRINCIPLES FROM THE CITY OF SANTA CRUZ GENERAL PLAN 2030

The City of Santa Cruz General Plan 2030 acts as the long-term planning document for the City of Santa Cruz as required by California Law. The General Plan 2030 presents goals, policies, and recommendations for future development and is separated into State-mandated elements. The Parks Master Plan 2030 document helps implement the General Plan 2030, providing more detailed direction and recommendations for the future development and maintenance of parks, open spaces, beaches, and recreational facilities in Santa Cruz.




The Parks Master Plan 2030 lays out recommendations for the next 15 years, but is designed to be updated over time. This document should evolve with the City, providing a guiding framework while allowing for adjustments based on both presently anticipated and unforeseen future needs and community desires.

The general goals outlined in the Parks, Recreation, & Open Space chapter of the City of Santa Cruz General Plan 2030 helped to guide the progress of the Parks Master Plan 2030 and played a vital role in the development of its recommendations. Those goals are included here for reference:

- **Goal PR1**: Ample, accessible, safe, and well-maintained parks, open space, and active recreational facilities
- **Goal PR2**: High-quality, affordable recreational programs, activities, events, and services for all
- **Goal PR3**: Well managed, clean, and convenient public access to open space lands and coastline
- **Goal PR4**: An integrated system of citywide and regional trails

## C. RELATIONSHIP OF THE PARKS MASTER PLAN 2030 TO EXISTING PLANS & STUDIES

Prior to the undertaking of this comprehensive Parks Master Plan 2030 process, the City of Santa Cruz has completed various other plans and studies that helped inform this document. The existing Plans listed here were considered, referenced, and incorporated where applicable into the overall Parks Master Plan 2030. Many suggestions from the community requested complying with the goals and actions of recently completed plans for specific parks. Conversely, as part of this planning process, new community needs were examined, and, some of the existing plans for specific parks and park assets may need to be updated to accommodate current and future trends and desires. These plans can be amended separately, and a concurrent amendment of the Parks Master Plan 2030 will not be required. The Plans are listed here alphabetically:

- Arana Gulch Master Plan (2006)
- Civic Auditorium - Concept Design Study (2012) and Business Planning Study (2015)
- Cowell and Main Beach Management Plan (2014)
- DeLaveaga Golf Course Master Plan (2002)
- DeLaveaga Park Master Plan (1960)
- Depot Park Master Plan (2001)
- Jessie Street Marsh Management Plan (1998)
- Moore Creek Interim Management Plan (2002)
- Neary Lagoon Management Plan (1992)
- Pogonip Clubhouse Rehabilitation Plan (2002)
- Pogonip Master Plan (1998)
- San Lorenzo Urban River Plan (2003)
- Santa Cruz Wharf Master Plan (2014)

The City has also adopted many plans to help guide the overall direction on community-wide level improvements that also helped inform this document. These plans include:

- Active Transportation Plan (2017)
- Arts Master Plan (2008)
- City-wide Creeks and Wetlands Management Plan (2008)
- Climate Action Plan and Climate Adaptation Plan (Currently being updated)
- Local Coastal Program (Currently being updated)

See Appendix 5.1 for links to view the full text of these existing plans, as well as summaries of other important documents that have provided background and context into the Parks Master Plan 2030 process.

# SECTION 2.2: HISTORY & INTRODUCTION

A. A Recreational Lifestyle
B. Honoring Our Heritage

**"The most rewarding use of life is to spend it for something that outlasts it!"**

– Harvey West

## A. A RECREATIONAL LIFESTYLE




Santa Cruz's temperate climate, location, scenic beauty, and diverse landscapes combine to create a unique and favorable recreational destination and support an active lifestyle. Santa Cruz and the surrounding region provide a broad range of recreational activities and natural treasures for residents and visitors to explore and enjoy.

**THE COASTLINE:**

Located at the northern tip of Monterey Bay, Santa Cruz is known for surf and beach play. The large sandy beaches of Cowell and Main Beach are popular to sunbathe, swim, play beach volleyball and other beach activities. These beaches host a variety of public and private programs and events such as the Junior Lifeguard Program, volleyball tournaments, concert performances, movies on the beach, and an occasional fireworks show. The Santa Cruz Wharf is located between Main and Cowell Beaches. The pier, spanning a half-mile in length, is the longest timber pile-supported pier structure in the United States. Visitors to the beaches and wharf can shop, dine, rent kayaks, fish, or view wildlife. Along the northern edge of Main Beach, the Santa Cruz Seaside Company's Beach Boardwalk amusement park features rides and games including the historic, wooden Giant Dipper roller coaster.




The coastal bluffs along West Cliff Drive are an additional feature, attracting visitors with coastal views and providing opportunities to walk, run, bicycle, watch wildlife, as well as access to beaches and surf breaks. Along this corridor resides Lighthouse Field and Natural Bridges State

Parks, managed by the California Department of Parks and Recreation. Natural Bridges State Park is an exceptional location to view large populations of Monarch Butterflies overwintering during the fall.

Santa Cruz is renowned for surfing, its numerous breaks are designated as a World Surfing Reserve. Surfing was introduced to Santa Cruz in 1885 by three Hawaiian princes, who surfed at the San Lorenzo River mouth. It is the first recorded board surfing in North and South America. Along West Cliff Drive, the Mark Abbott Memorial Lighthouse houses the Santa Cruz Surfing Museum and a Surfer Statue pays tribute to the sport. The museum is located on Lighthouse Point and contains interesting artifacts tracing more than 100 years of surfing in Santa Cruz. Lighthouse Point overlooks the world famous surf break, Steamer Lane, where spectators line the cliffs above the surf break to spectate. It is no wonder why most regard Santa Cruz as the "real surf city."



Steamer Lane

Additional resources along the City's coastline include the Santa Cruz Harbor Port District's Santa Cruz Harbor and the adjacent Seabright and Twin Lakes State Beaches. The Santa Cruz Harbor provides a boat launch ramp for recreational boating in addition to fishing, paddle boarding and kayaking rentals and other recreational opportunities.

**THE GREENBELT:**



Moore Creek Preserve

Beyond the coastline lay many scenic, natural environments to wander and admire. The City's Neary Lagoon Wildlife Refuge has a floating pathway which allows access across the lagoon. It is a respite of nature surrounded by urban development, where visitors can peacefully watch birds, turtles, and fish.

Arana Gulch Open Space features woodlands, creeks, and grasslands. Bluffs and bridges offer elevated perspectives of the creeks and surrounding natural features. Cattle graze the property seasonally to help restore the endangered Santa Cruz tarplant.

Pogonip Open Space contains natural habitat for a large variety of plants and animals. Trails pass through grasslands and forests and by creeks, former limestone quarries, and the historic Pogonip Clubhouse. The Emma McCrary trail is a relatively new addition and provides multi-use

access from the City to a regional network linking the City's Harvey West Park to the State's Henry Cowell and Wilder Ranch State Parks and UC Santa Cruz's wilderness areas.

The trails in Moore Creek Preserve wind through canyons, forests, and grasslands and provide views to the Pacific Ocean. Cattle graze the coastal prairie areas to help restore native plants and local species such as the Ohlone tiger beetle and San Francisco popcorn flower.

**PARKS AND RECREATIONAL FACILITIES:**

The City provides a variety of traditional park facilities including group picnic areas, a swimming pool, sports fields, basketball and tennis courts, playgrounds, community gardens, off-leash dog use areas, a golf course, and horseshoe pits. Throughout the years, the City has embraced new trends in recreation and the range of recreational facilities reflects the diversity of interests within the community. Sergeant Derby and Frederick Street parks were among the first public skate parks in the world, and the more recent addition of Ken Wormhoudt Skate Park has gained national recognition. Located in DeLaveaga Park, Santa Cruz Archery Range is an indoor and outdoor archery range and DeLaveaga Disc Golf Course is a 29 hole disc golf course that has hosted world championships. The San Lorenzo Park Lawn Bowling facility maintains a nearly perfectly flat artificial turf surface to meet playing standards. The Bicycle Trip Bike Park is the only ramped bike park of its kind in the area. The Main Beach volleyball courts allow for both pick-up games and tournaments. More recent recreational facility additions to accommodate emerging trends and desires have included pump tracks, pickelball courts, outdoor exercise equipment, bocce ball courts, and new multi-use trails.



Ken Wormhoudt Skate Park

**COMMUNITY FACILITIES:**

The City's community facilities provide programs and services. The 20,000 square foot Louden Nelson Community Center hosts Santa Cruz's teen center, community rooms for rent and programming, and an indoor auditorium and stage. The Civic Auditorium is a 34,000 square foot space which accommodates large gatherings, concerts, and sporting events.

Smaller community centers and facilities are leased out to separate non-profit providers to offer services. Senior Citizens Opportunity provides services and programming for seniors at 222 Market Street. At the Beach Flats Community Center, Community Bridges offers programs and

services for summer recreation, environmental education, application assistance, after school programs, advocacy, parent education, and food and nutrition. The Santa Cruz Museum of Natural History provides services, events, programs, exhibits, and other educational tools to inspire stewardship and connect people to nature and history at the Museum of Natural History. The City recently worked with Santa Cruz Shakespeare to locate a new outdoor amphitheater to hold summer performances in DeLaveaga Park.



Louden Nelson Community Center

**TRAILS:**

The City's 35 mile network of trails allow for hiking, biking, dog walking, and horseback riding. Many provide access through designated open spaces or along the coastline, and others provide linkages across the City to a regional network. Significant trails in the City include the Santa Cruz Riverwalk, an important north-south connector along the San Lorenzo River, and the Monterey Bay Sanctuary Scenic Trail which will soon cross through the City, connecting Davenport to Monterey.



Santa Cruz Riverwalk

## B. HONORING OUR HERITAGE

The City of Santa Cruz General Plan 2030, the guiding document for the City, establishes a vision for the future.

"Surrounded by the greenbelt and the Pacific Ocean, Santa Cruz is a compact vibrant city that preserves the diversity and quality of its natural and built environments, creates a satisfying quality of life for its diverse population and workers, and attracts visitors from around the world".

The *Santa Cruz Parks Master Plan 2030* (Parks Master Plan 2030) will help achieve this vision and continue the traditions of efforts that led to the parks system we have today. The history of the parks system reflects a community that deeply cares about providing and preserving the quality and diversity of the recreational, natural, and urban environments. The following timeline highlights some of the milestones of the City's park system:



Santa Cruz Wharf and Cowell and Main Beaches

City incorporates.
1866

Jose De Laveaga leaves his 560 acre estate to the City and County for parkland. The City now owns more than 500 acres.
1894

The City forms a seven member recreation commission to guide recreation programs.
1944

Early programs concentrated on athletic skills development such as softball and swimming.
1946

A Workreation Program, modeled after similar programs in Oakland and Berkeley, was developed. It gave local youths job experience part of the day and supervised recreational activities for the remainder. The City continues to provide a Youth Trails Program where youths can gain work experience maintaining the parks.
1956

1885
Surfing introduced to Santa Cruz by three Hawaiian Princes.

1876
The City's first charter establishes the Streets and Parks Department as one of the five departments governed by a Mayor and a four member Common Council.

1904
Laura Hecox, a naturalist and collector, deeds her collection of seashells, minerals, fossils, Native American artifacts, and other specimens to the City of Santa Cruz to establish a museum which opened in 1905. The museum moved to the Seabright Branch Library building in 1954. In 2009, the City's non-profit partner, Santa Cruz Museum of Natural History, took over operations to avert closure due to lack of funding.

1914
The Santa Cruz Wharf was constructed for cargo handling and shipping and would later shift towards commercial fishing. In the 1950s, it started to become more commercially oriented and was expanded for commercial uses and parking.

1940
The Civic Auditorium was constructed with assistance from the Federal Works Progress Administration.

1948
Interest in recreation renewed after World War II and recreation would be integrated into the new City Charter and the Parks and Recreation Department was formed. The charter established the Council/Manager form of government, with a Mayor and six Councilmembers setting policy for the City and a City Manager to administer.

1957
Philanthropist Harvey West donates Harvey West Park to the City. Harvey West continued to supply lumber for park facilities and the bathhouse facilities for the original Harvey West Pool. The pool was constructed in 1959. He played a key role in the pool itself. He also purchased the Wagner Grove area for the City, and helped acquire the Southern Pacific steam engine.

1958
A levee is constructed along San Lorenzo River to mitigate flooding. Efforts in the late 80s and late 90s helped guide restoration, flood control, and public access improvements along the levee. In 2003, the San Lorenzo Urban River Plan updated the plans and includes recommendations for habitat, safety, and aesthetics.


1915 — Picnicking in DeLaveaga Park, Source of Information, Museum of Natural History.


Circa 1920s or 30s — Main Beach.

## 1960s

1964 — San Lorenzo Park opens.

1965 — The parents of Mark Abbott donated $20,000 to help construct the Mark Abbott Memorial Lighthouse. In 1986, the lighthouse became the location for the Surfing Museum.

1967 — Neary Lagoon is purchased by the City. Recreation facilities were developed gradually between 1975 and 1986.



1963 — "Serpent" at San Lorenzo Park.

## 1970s

1970 — The DeLaveaga Golf Course is constructed.

1971 — Garfield Park opens.

1973 — Grant Park opens.

1976 — Frederick Street Park opens.

1976 — John D. Franks Park is leased to the City without charge by the Franks family to provide park space in an underserved neighborhood. The City purchased the property from the Frank family in 1993.

1976 — Star of the Sea Park is dedicated.

1978 — Louden Nelson Community Center opens in the building previously used as an elementary school. The center was first known as the Laurel Community Center and was changed to honor Louden Nelson, a former slave who lived in Santa Cruz in the 1850s. Around the time of his death, Nelson owned land near the school and made an oral will leaving his estate to the school district of which the elementary school was a part of.

1978 — Bethany Curve Greenbelt was constructed.

1979 — Community interest grew to create greenbelt preserves and open spaces during the 1970s. In 1979, Measure O passed which identified specific open space properties to preserve.

1979 — Derby Park dedication (renamed to Sgt. Derby Park in 2014)

## 1980s

1980 — Ocean View Park is constructed.

1982 — Trescony Park is constructed.

1982 — Beach Flats Park is constructed.

1983 — University Terrace Park opens.

1984 — DeLaveaga Disc Golf course opens.

1988 — Pogonip Open Space is purchased.

## 1990s to Present

1993 — Beach Flats Community Center is constructed.

1994 — City purchases Arana Gulch Open Space.

1996 — Jessie Street Marsh is purchased.

1998 — The City acquires Moore Creek Preserve.

1999 — Lighthouse Avenue Park is constructed.

2003 — La Barranca Park is constructed.

2005 — Depot Park opens.

2007 — Ken Wormhoudt Skatepark opens.

2014 — Riverside Gardens Park is constructed.

2016 — Audrey Stanley Grove opens.



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# SECTION 2.3: COMMUNITY PROFILE

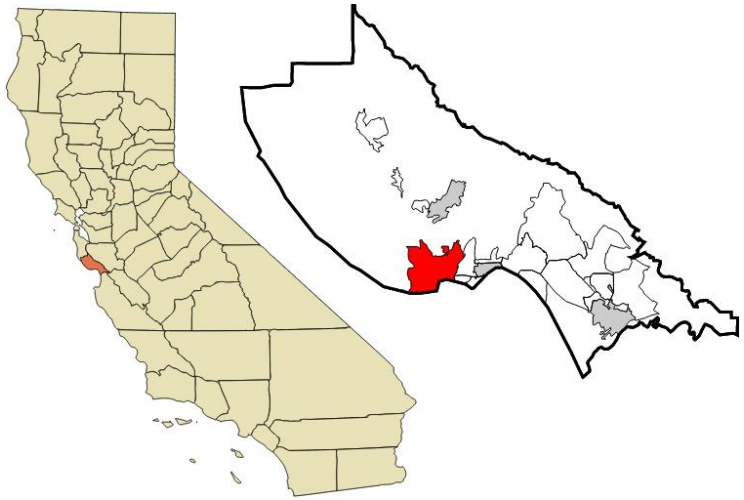
A. Location, Geography, and Climate
B. Demographics
C. Community Profile Summary

## A. LOCATION, GEOGRAPHY, AND CLIMATE

The City's location, geography, and climate provide for a wide-range of outdoor recreational opportunities, not only within the City limits, but throughout the region. The City has a strong sense of physical identity because of its four miles of beautiful Monterey Bay coastline, and well defined natural features and open spaces along the City's edges. Its mild coastal Mediterranean climate contributes to the popularity of year round recreation.

### LOCATION

Surrounded by the Santa Cruz Mountains, the City is on the northern edge of the Monterey Bay. The City is roughly 15.8 square miles in area, of which 12.7 square miles is land and 3.1 square miles is water. Part of Santa Cruz County, the City is approximately 32 miles south of San Jose and 75 miles south of San Francisco.



### GEOGRAPHY

The geography of the City is split between the coastal plain and the slopes of the foothills and mountains. Divided by several rivers and streams, the coastal plain gently slopes toward the Bay and its beaches. The northern part of the City rises up into foothills along the edge of the Santa Cruz Mountains. The bay and mountains are natural boundaries which give Santa Cruz a strong physical identity.



### CLIMATE

Santa Cruz has a Mediterranean climate influenced by its coastal location. According to the National Weather Service, temperatures are mild with monthly averages of highs ranging from 76 in the summer to 62 in the winter, and lows from 41 in the winter to 54 in the summer. Coastal fog, contributing to the mild summer climate, is common during morning and night hours in the summer. Rain occurs primarily during the months of November through March.

## B. DEMOGRAPHICS

The following demographic figures are based on the 2010 Census and the US Census American Community Survey 2010-2014 projections.[1]

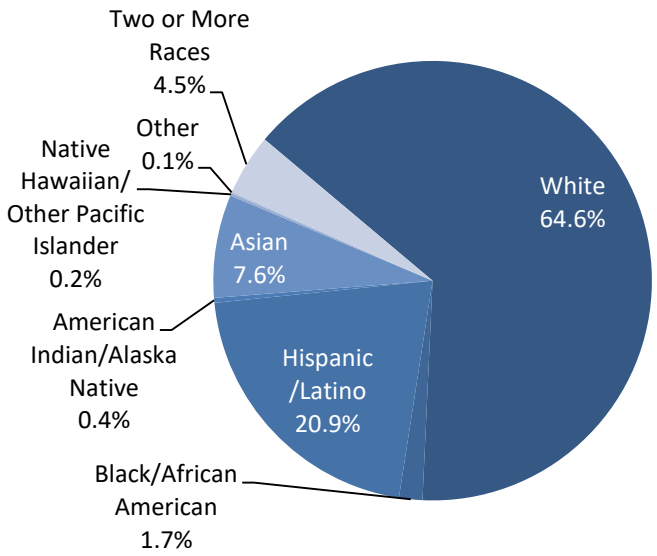
### POPULATION

The City of Santa Cruz has a population of 63,364 (2014 US Census Bureau estimate). The population for Santa Cruz is higher in 2014 than that of 63,265 projected for 2020 in the Association of Monterey Bay Area Governments Monterey Bay Area 2008 forecast, indicating a strong growth pattern. In the 2010 Census, the City had a population of 59,948, showing a growth rate of 7.1% between 2010 and 2014.

### RACE

The City of Santa Cruz is predominantly White and Hispanic. The chart below shows the racial distribution within the City.

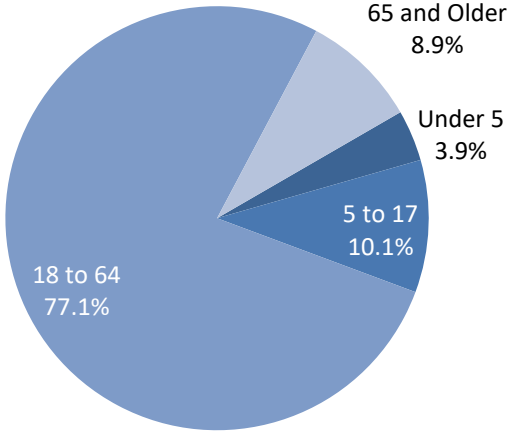
**Racial Distribution in Santa Cruz**




### AGE DISTRIBUTION

According to the 2014 Census, at 77.1%, the majority of the population was between 18 and 64 years of age. The populations both under 18 and over 65 were significantly lower than the State-wide population averages at 13.7% and 8.8%, respectively. According to the census, the California population under 18 was 23.6% and the population over 65 was 12.9%. The senior population is expected to grow steadily. This existing and future distribution potentially influences the demand for active recreation in Santa Cruz.

**Age Distribution in Santa Cruz**




The City of Santa Cruz is home to the University of California, Santa Cruz. The three quarter average enrollment for the 2016-2017 year was 18,063 students. [2] The portion of this student population that declared Santa Cruz as their primary residence is included in the population data above, which may account for some of the skew in age distribution. Students do use City facilities and therefore should be considered in the needs assessment. This was particularly true during the recent drought conditions when the University stopped watering their sports fields. As a result, casual University sport groups used City sports fields.

### POVERTY LEVEL

In 2014, 24.3% of the Santa Cruz population fell below the poverty level. This is higher than the overall California poverty level of 16.4%. This may impact the ability of certain persons to pay fees for recreation. Santa Cruz's large student population could impact poverty rates, as students living in non-campus housing are included in a census. Looking closely at the Census, the rates are highest for men and women age 18-24 in Santa Cruz which would include the student population.

### DISABILITIES

The 2014 Census lists 9.2% of the population under 65 as having a disability and a total of 4,721 persons with disabilities. According to the website Local Disability Data for Planners', within the County of Santa Cruz, 11.6% of the population between the ages of 5 to 64 has a disability.[3] Neither the census or Local Disability Data for Planners' website gives statistics for persons below 5 or over 65, which would considerably raise these percentages. These statistics indicate a need for accommodation in park facilities and recreation programs for persons with physical and mental challenges.

### TOURISM

One major influence on recreation in Santa Cruz is the large number of visitors to Santa Cruz. According to the Visit Santa Cruz County (VSCC) tourism board website, "Tourism ranks, alongside agriculture, as one of the top employers and revenue-producing industries in Santa Cruz County, generating over $700 million in direct travel expenditures annually. There are approximately 3 million visitor trips taken to Santa Cruz County each year."[4] In an intercept survey conducted by the VSCC, top activities of visitors included going to the beach, visiting attractions such as the Boardwalk and Wharf, exploring the area, and shopping. The high impact of visitors on recreation should be considered in recreation planning.

### TRANSPORTATION

The City of Santa Cruz has high percentages of its population that commute by walking and bicycling. According to the American Community Survey, Journey to Work data 2010 - 2014, 9.9% of the population walked and 9.7% bicycled as compared to the state averages of 2.7% and 1.1% respectively. This indicates a need and high demand beyond recreation for pedestrian and bike routes and trails.

### COMMUNITY WELL-BEING

According to the 2016 Community Well-Being Rankings, a report produced through Gallup-Healthways, Santa Cruz is highly ranked in the overall well-being of its community members.[5] The report assesses the following elements as indicators of well-being: purpose, social, financial, community, and physical. In the assessment, Santa Cruz ranked 3rd out of 189 communities evaluated in the United States revealing a high level of satisfaction with the City's quality of life.

## C. COMMUNITY PROFILE SUMMARY

The City of Santa Cruz's location, climate and geography contribute to its recreation diversity and abundance. The population of the city is relatively young, most likely in part due to the adjacent university and the attraction of the outstanding access to outdoor recreation. Tourists are major users of Santa Cruz parks and beaches. Recreation programming and facility development will need to consider this community profile, while accommodating all age groups and abilities. When setting fees for recreation programs, consideration must be given to the large segment of the population that is below the poverty level.

## REFERENCES

[1] United States Census Bureau, Quick Facts. Retrieved from http://www.census.gov/quickfacts/table/PST045215/0669112
[2] University of California Santa Cruz, Facts and Figures. Retrieved from https://www.ucsc.edu/about/facts-figures.html.
[3] Local Disability Data for Planners: A Planning Resource for County and State Data. Retrieved from http://disabilityplanningdata.com
[4] Visit Santa Cruz County, Tourism Facts. Retrieved from http://www.santacruzca.org/partners/tourism-facts.php
[5] State of American Well-Being: 2016 Community Well-Being Rankings. Retrieved from http://www.well-beingindex.com/2016-community-rankings

# SECTION 2.4: EXISTING CONDITIONS

A. Parkland and Facility Inventory
B. Other Community Recreation and Facility Service Providers
C. Level of Service Assessment
D. Benchmarking Comparison of Similar Cities
E. Condition of Parks and Recreation Facilities
F. Safety and Security
G. Organizational Structure and Roles
H. Existing Parks Master Plans
I. Natural Resources

The City's Parks System covers more than 1,700 acres of parks, open spaces, beaches and recreational facilities. This section includes a review of the quantity, type, condition, level of service, access, and quality of the overall parks system. More information on each asset is provided in Section 4.2 Asset Inventory & Specific Recommendations.

## A. PARKLAND AND FACILITY INVENTORY

The parks system is comprised of neighborhood parks, community parks, regional parks, open spaces, beaches and recreational facilities. The parks system offers a variety of recreational opportunities. Many recreational facilities are located within individual parks and open spaces and some stand alone. This section describes the types of parkland and recreational facilities that are provided in each area.

### NEIGHBORHOOD PARKS

Neighborhood parks serve the recreational needs of those living or working within a service radius of one-half mile. They provide recreational facilities such as children's play areas, picnic areas, athletic fields, and outdoor basketball courts. The City's standard is to provide neighborhood parks at a ratio of 2.0 acres per 1,000 people. The City does not currently differentiate neighborhood parks from mini parks. Some communities account for parks smaller than 2 acres in size as a mini park. Smaller parks often provide less recreational opportunities for the surrounding neighborhood and the distinction helps in determining an adequate level of service.



Neary Lagoon Wildlife Refuge

Neary Lagoon Park and Chestnut Park have previously been accounted for as open space as part of the Neary Lagoon Wildlife Refuge. These parks provide neighborhood-serving facilities such as playgrounds, a basketball court, picnic tables, and tennis courts. These recreational facilities are more accurately described as neighborhood park space and have been listed as neighborhood parks in the inventory.

Neighborhood parks that have very limited recreational use such as Rincon Park, Scope Park, Town Clock Park, and El Portal Park are included in the neighborhood park inventory because they contain art, pathways,

landscaping treatments, monuments, or other features that provide a recreation benefit, although limited, to employees and residents.

School facilities are not included under neighborhood parks. School lands have been an important park resource for communities for the provision of park and recreational facilities during schools' off-hours. The use of school lands for public recreation can be an important resource to meet community needs given their size, distribution, seasonal and daily non-use periods, and proximity to neighborhoods. However, issues such as safety, liability, maintenance costs, enforcement, and vandalism have caused many schools to close or offer limited access during off-hours. The City's current reciprocal joint-use agreement with Santa Cruz City Schools is more specifically tailored for facility use and scheduled programming. The joint-use agreements could be updated and the acreage could be added to neighborhood parks at a future time.

The City leases underutilized land from private property owners to provide neighborhood park space at Beach Flats Community Garden and the Westside Pump Track. The leases are currently short-term. Therefore, the acreage has not been added to the total park acreage.

The City has 32 neighborhood parks (49 acres):

- Beach Flats Park (0.22 acres)
- Bethany Curve (3.4 acres)
- Branciforte Dog Park (0.22 acres)
- Central Park (0.16 acres)
- Chestnut Park (0.28 acres)
- El Portal Park (0.21 acres)
- Frederick Street Park (3.97 acres)
- Garfield Park (1.78 acres)
- Grant Park (2.36 acres)
- John D Franks Park (0.48 acres)
- La Barranca Park (2.26 acres)
- Laurel Park (1.77 acres)
- Lighthouse Avenue Park (0.35 acres)
- Mimi de Marta Dog Park(0.5 acres)
- Mission Plaza (0.94 acres)
- Moore Creek Overlook (0.12 acres)
- Neary Lagoon Park (1.27 acres)
- Ocean View Park (3.06 acres)
- Pacheco Dog Park (0.45 acres)
- Poets Park (0.13 acres) and Beach Flats Community Garden (Leased)
- Rincon Park (0.06 acres)
- Riverside Gardens Park (0.52 acres)
- Round Tree Park (0.28 acres)
- Scope Park (0.1 acres)
- Sgt. Derby Park (3.65 acres)
- Star of the Sea Park (2.1 acres)
- Town Clock (0.19 acres)
- Trescony Park (2 acres)
- Tyrrell Park (1.2 acres)
- University Terrace Park (8.7 acres)
- Westlake Park (6.03)
- Westside Pump Track (Leased)



Westlake Park

Table 2.4-1 below indicates facilities available in the parks system.

**Table 2.4-1 Recreational Facilities by Location**

| General Recreational Facilities by Location | Baseball/Softball Field | Basketball Court | Bike Park | Bocce Courts | Community Gardens | Disc Golf | Exercise Equipment | Horseshoe Pits | Off-leash Dog Run | Pickleball Court | Playground/Play Equipment | Pump Track | Reservable Picnic Areas | Roller Hockey | Sand Volleyball Court | Skate Park | Soccer | Table Tennis | Tennis Court | Tot Lot Playground |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Beach Flats Park | | | | | | | | | | | 1 | | | | | | | | | 1 |
| Branciforte Dog Park | | | | | | | | | 1 (fenced) | | | | | | | | | | | |
| Central Park | | | | | | | | | | | 1 | | | | | | | | | |
| Chestnut Park | | 0.5 | | | | | | | | | 1 | | | | | | | | | |
| Cowell Beach | | | | | | | | | | | | | | | 2 | | | | | |
| Depot Park/Bicycle Trip Bike Park /Scott Kennedy Fields | | | 1 | | | | | | | | 1 | | | | | | 1 adult or 2 youth practice | | | |
| Frederick Street Park | | | | | | | | | 1 (fenced) | | 1 | | | | 1 | 1 (small) | | | | 1 |
| Garfield Park | | 1 | | | | | | | | | 1 | | | | | | | 2 | | 1 |
| Grant Park | 1 diamond field | 1 | | 1 | | | | | 1 (fenced) | | 1 | | | | | | | | | 1 |
| Harvey West Park | 6 baseball | | | 2 | | | 1 | 2 | | | 1 | 1 | 9 (7 > 50 capacity) | | 1 | | 2 (outfield of baseball fields) | | | 1 |
| John D. Franks Park | | | | | | | 1 | | | | 1 | | | | | | | | | |
| Ken Wormhoudt Skate Park at Mike Fox Park | | 0.5 | | | | | | | | 3 (painted on multi-purpose area) | | | | 1 | | 1 | | | | |
| Laurel Park | | 1 | | | | | | | | 1 (painted on b-ball) | 1 | | | | | | | 1 | | 1 |
| Lighthouse Avenue Park | | | | | 1 (18 plots) | | | | | | 1 | | | | | | | | | 1 |

**Table 2.4-1 Recreational Facilities by Location**

| General Recreational Facilities by Location | Baseball/Softball Field | Basketball Court | Bike Park | Bocce Courts | Community Gardens | Disc Golf | Exercise Equipment | Horseshoe Pits | Off-leash Dog Run | Pickleball Court | Playground/Play Equipment | Pump Track | Reservable Picnic Areas | Roller Hockey | Sand Volleyball Court | Skate Park | Soccer | Table Tennis | Tennis Court | Tot Lot Playground |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lower DeLaveaga Park and George Washington Grove | 2 softball | | | 2 | | | | 2 | | | 1 | | 7 (5 > 50 capacity) | | 1 | | | | | |
| Main Beach | | | | | | | | | | | | | | | 16 | | | | | |
| Mimi De Marta Park | | | | | | | | | 1 (fenced) | | | | | | | | | | | |
| Mitchells Cove | | | | | | | | | 1 (hour limitations on beach) | | | | | | | | | | | |
| Neary Lagoon Park | | | | | | | | | | | 1 | | | | | | | | 2 | |
| Ocean View Park | | 0.5 | | | | | | | 1 (open, non-fenced) | | 1 | | | | | | | | | 1 |
| Pacheco Dog Park | | | | | | | | | 1 (fenced) | | | | | | | | | | | |
| Poets Park and Beach Flats Community Garden | | | | | 2 (32 plots) | | | | | | 1 | | | | | | | | | |
| Westside Pump Track | | | | | | | | | | | | 1 | | | | | | | | |
| Riverside Gardens | | | | | 1 (11 plots) | | 1 | | | | 1 | | | | | | | | | |
| San Lorenzo Park | | | | | | 9 holes | | | | | 1 | 1 (fiberglass) | | | | | | | | 1 |
| Santa Cruz Riverwalk | | | | | | | 2 | | | | | | | | | | | | | |
| Sgt. Derby Park | | | | | | 3 holes | | | | 6 (painted on tennis courts) | 1 | | | | | 1 | | | 2 | |
| Trescony Park | | | | | 1 (54 plots) | | | | | | 1 | | | | | | | | | 1 |

**Table 2.4-1 Recreational Facilities by Location**

| General Recreational Facilities by Location | Baseball/Softball Field | Basketball Court | Bike Park | Bocce Courts | Community Gardens | Disc Golf | Exercise Equipment | Horseshoe Pits | Off-leash Dog Run | Pickleball Court | Playground/Play Equipment | Pump Track | Reservable Picnic Areas | Roller Hockey | Sand Volleyball Court | Skate Park | Soccer | Table Tennis | Tennis Court | Tot Lot Playground |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Tyrrell Park | | | | | | | | | | | | | | | | | | | | |
| University Terrace Park | | 1 | | | | | | | 1 (Fenced-in) | | 1 | | | | | | | | 2 | |
| Westlake Park | | | | | | | | | | | 1 | | | | | | | | | 1 |
| West Cliff | | | | | | | 1 | | | | | | | | | | | | | |
| **Total** | **8** | **5.5** | **1** | **5** | **5 (115 plots)** | **2** | **6** | **4** | **8** | **10** | **21** | **3** | **16** | **1** | **21** | **3** | **3** | **3** | **6** | **11** |

## COMMUNITY PARKS

Community parks are designed to serve the entire community. They are generally larger than neighborhood parks and offer unique facilities such as larger picnic areas, swimming pools, ball fields, tennis courts, and recreation centers. They also host larger community events and recreation facilities. The City's standard for community parks is 2.5 acres per 1,000 people, with a service radius of 1.5 miles. The City currently has six community parks (181 acres).

- DeLaveaga Park - Lower DeLaveaga Park, George Washington Park, Audrey Stanley Grove, DeLaveaga Disc Golf Course, and DeLaveaga Archery Range (100 acres)
- Depot Park, Bicycle Trip Bike Park, & Scott Kennedy Fields (9 acres)
- Harvey West Park (44.77 acres)
- Ken Wormhoudt Skate Park at Mike Fox Park (1.25 acres)
- San Lorenzo Park (11.12 acres)
- West Cliff (14.64 acres)



San Lorenzo Park

## REGIONAL PARKS

Regional parks serve the recreational needs of a regional population and are 150 acres in size or larger. They offer active and passive recreation with activities and amenities not found in neighborhood and community parks, such as large areas of open space, large picnic facilities, golf courses, lake boating, ball fields, and multi-use trails. An accepted national standard for regional parks is 20 acres per 1,000 people.

DeLaveaga Park could be categorized as a Regional Park because it is greater than 150 acres in size and includes active and passive recreation activities that serve the region. However, many of the activities that are provided can also be described under Community Parks because they serve the entire community and are similar in scale to other community park uses. Additionally, much of the area within DeLaveaga Park is wilderness area with steep slopes and sensitive habitat which will not be developed with regional serving facilities. Therefore, DeLaveaga Park has multiple functions that are reflected in the inventory in different categories. At 151 acres, the Golf Course has been categorized under Regional Park. Lower DeLaveaga Park, George Washington Park, Audrey Stanley Grove, DeLaveaga Archery Range, and DeLaveaga Disc Golf Course have been categorized under Community Park space. The remainder of land in DeLaveaga Park is listed under Open Space.



DeLaveaga Golf Course

## OPEN SPACES

Open spaces are natural areas that provide valuable wildlife habitats, scenic and recreational enjoyment, and an escape from the built environment. Open space lands are essentially unimproved and devoted to an open space use for the purposes of natural resource preservation, outdoor recreation, and public health and safety. The beauty of these areas compels resident and visitor uses such as walking, jogging, hiking, bird watching, and relaxing. Multi-use trails also provide mountain biking and horseback riding opportunities in DeLaveaga Park Wilderness Area and Pogonip Open Space, and a paved multi-use path enables bicyclists to access and pass through Arana Gulch Open Space. The City's parks system includes seven open spaces (1,315 acres):

- Arana Gulch Open Space (67.7 acres)
- Arroyo Seco Canyon (33.94 acres)
- DeLaveaga Park Wilderness Area (269 acres)
- Jessie Street Marsh (3.2 acres)
- Moore Creek Preserve (263.75acres)
- Neary Lagoon Wildlife Refuge (37 acres)
- Pogonip Open Space (640 acres)



Moore Creek Preserve

## BEACHES

The parks system includes four primary beaches (33 acres):

- Its Beach (approximately 1.5 acre portion, the remainder is owned by the California Department of Parks and Recreation)
- Cowell Beach (5 acres)
- Mitchell's Cove (0.4 acres)
- Main Beach (26 acres)



Its Beach

## COMMUNITY, RECREATIONAL, AND CULTURAL FACILITIES

Community, Recreational, and Cultural Facilities are buildings and other, larger facilities that serve the specific recreational needs and interests of individuals, neighborhoods, groups, and the community. Recreational facilities are located throughout the park system and differ in scale, function, operations, and primary use. Some facilities (like the Civic Auditorium) are freestanding; others are located in parks. Community, Recreational and Cultural Facilities are shown in Table 2.4-2.



Louden Nelson Community Center



Harvey West Clubhouse

**Table 2.4-2 Community, Recreational & Cultural Facilities**

| Community, Recreational, and Cultural Facilities | Address | Operations of City-Owned Community Recreational Facilities | Features |
|---|---|---|---|
| Beach Flats Community Center | 131 Leibrandt St | The facility is operated by Community Bridges. | 2,742 sq. ft. community center with a community room, computer lab, classroom, and kitchen. |
| Carmelita Cottages | 321 Main St | Leased to Santa Cruz Hostel Society until 2021. | Youth Hostel. |
| Civic Auditorium | 307 Church St | Operated by the Parks and Recreation Department. | Multi-purpose auditorium (34,739 sq. ft.) with stage and seating for total capacity of 2,021. Used for concerts, sporting events, expos, theatrical performances, movie screenings, conferences, and receptions. |
| DeLaveaga Park - Audrey Stanley Grove | 501 Upper Park Rd | Leased to SC Shakespeare for summer performances during July and August. Contract needs to be extended in 2018. Rented for private use in September and October. | Outdoor amphitheater, tech booth, ticket office, parking area for performances. 496 seats. |
| DeLaveaga Park - DeLaveaga Archery Range | DeLaveaga Park -- Access from Brookwood Dr entrance | Operated by the Santa Cruz Archery Club. Membership is necessary to use facilities. | Indoor and outdoor archery range. |
| DeLaveaga Park - DeLaveaga Disc Golf Course | Accessed from Upper Park Rd. | Operated by the DeLaveaga Disc Golf Club | 29 hole disc golf course. |
| DeLaveaga Park - DeLaveaga Golf Course | 401 Upper Park Rd | Maintained by the city. The Pro Shop, Golf Course, Driving Range, and Golf Course Lodge are operated by GSL, Inc. | 18 hole golf course w/ double-deck driving range and clubhouse (5,500 sq. ft.). Disc golf basket sleeves have been added to facilitate disc golf play during certain times of the week. |
| Depot Park Freight Building | 119 Center St | The Parks and Recreation Department rents the facility for private use and hosts programming. | Community Room (3,000 sq. ft.). |
| Harvey West Park - Kids Kottage and Wagner Cottage | 275 Harvey West Blvd | Kids Kottage is leased to County Office of Education for an alternative education program during the school year. The Parks and Recreation Department operates camp programs during the remainder of the year. The department also operates summer camp programs in Wagner Cottage. | Kids Kottage (1,500 sq. ft.) Wagner Cottage (1,000 sq. ft.) |
| Harvey West Park - Harvey West Pool | 275 Harvey West Blvd | The pool is leased to a concessionaire to run the facility. The concessionaire teaches swim lessons in the small pool from March through October. The large pool is open from June through August for open swim. | Pool house (3,450 sq. ft.), 25 meter long lap pool and a wading pool. |

**Table 2.4-2 Community, Recreational & Cultural Facilities**

| Community, Recreational, and Cultural Facilities | Address | Operations of City-Owned Community Recreational Facilities | Features |
|---|---|---|---|
| Harvey West Park - Harvey West Scout and Clubhouse | 326 Evergreen St | The Parks and Recreation Department rents the facility for private use. | Clubhouse (3,500 sq. ft.). |
| Louden Nelson Community Center | 301 Center St | Staffed and maintained by the Parks and Recreation Department and used for programming and private rentals. | Community Center (20,085 sq. ft.). Includes Teen Center, meeting and dance rooms, and an auditorium with theater seating and stage. |
| Museum of Natural History | 1305 East Cliff Dr | Leased to Santa Cruz Museum of Natural History to provide services. | Natural History Museum (3,500 sq. ft.). |
| Pogonip Clubhouse | Pogonip Open Space | Currently closed. | Historic clubhouse currently closed due to poor condition of building (8,000 sq. ft.). |
| Santa Cruz Wharf | 21 Municipal Wharf | Wharf operated by the Parks and Recreation Department. Retail and restaurant space leased to private businesses by the Economic Development Department. | Municipal wharf. Restaurants, retail, restaurants, fishing, boat rentals, and tours. |
| San Lorenzo Park Lawn Bowling | 137 Dakota St | Operated by the Santa Cruz Lawn Bowling Club. | 18,000 sq. ft. outdoor artificial turf lawn bowling area and 1,500 sq. ft. clubhouse. |
| Senior Citizen's Opportunity | 222 Market St | Leased to Senior Citizens Opportunity to provide services. | Senior Center (5,437 sq. ft). |
| Surfing Museum | 701 W. Cliff Dr | Operated by the Parks and Recreation Department. | Surfing Museum (630 sq. ft.). |

## TRAILS

Trails allow for a variety of forms of recreation. Not only are they located within parks and open spaces, but they also can serve as important links between parks, recreation facilities, and natural and urban areas. In total, the City provides nearly 35 miles of trails and more are planned. The Monterey Bay Sanctuary Scenic Trail Network is a paved multi-use trail project which will connect from Davenport to Monterey along the existing rail right-of-way. The Public Works Department is overseeing the segment through the city which will add 2.1 miles of paved, multi-use trails. The Public Works Department also recently oversaw the completion of a pedestrian/bicycle bridge crossing Branciforte Creek, which is the last segment along the Santa Cruz Riverwalk. Table 2.4-3 below lists the trails within the parks system.



Pogonip Open Space

**Table 2.4-3 City of Santa Cruz Trails**

| Location | Existing Trail Name/Segment | Hiking (Miles) | Hiking, Biking, and Horses - Non-Paved (Miles) | Hiking and Biking - Paved (Miles) |
|---|---|---|---|---|
| Arana Gulch | Coastal Prairie Loop Trail | 0.84 | | |
| | Marsh Vista Trail | 0.12 | | |
| | Multi-Use Path from Arana Creek to Agnes Street and Broadway | | | 0.73 |
| Arroyo Seco | Arroyo Seco from Grandview to paved path | | 0.37 | |
| | Paved path from bottom to Meder St | | | 0.63 |
| DeLaveaga Park | Branciforte Creek Trail | | 0.6 | |
| | La Corona Trail | | 1 | |
| | Park Way | | 0.3 | |
| | Redwood Lower Loop | | 1 | |
| | Upper DeLaveaga Loop Trail | | 1.5 | |
| | Enchanted Trail | | 1 | |
| | Old Vineyard Trail | | 0.7 | |
| | Brookwood Trail | | | 1 |
| Harvey West | Dos Fuentes | 0.18 | | |
| | Harvey West Trail | 0.33 | | |
| | Stage Coach | 0.22 | | |
| | Wagner Grove to Meadow Rd | 0.24 | | |
| Jessie Street Marsh | Between E. Cliff St and Lemos Ave | 0.15 | | |
| Moore Creek Preserve | Prairie View Trail | 1.1 | | |
| | Costa Vista Trail | 0.3 | | |
| | Terrace Loop Trail | 0.4 | | |
| | Vernal Ridge Trail | 0.3 | | |
| | East Meadow Trail | 0.25 | | |
| | Moore Creek Trail | 0.5 | | |
| Neary Lagoon | Trails and boardwalks | 0.85 | | |

**Table 2.4-3 City of Santa Cruz Trails**

| Location | Existing Trail Name/Segment | Hiking (Miles) | Hiking, Biking, and Horses - Non-Paved (Miles) | Hiking and Biking - Paved (Miles) |
|---|---|---|---|---|
| Pogonip Open Space | Brayshaw Trail | 0.5 | | |
| | Fern Trail | 0.8 | | |
| | Limekiln Trail | 0.3 | | |
| | Lower Meadow | 0.4 | | |
| | Ohlone Trail | 0.3 | | |
| | Prairie Trail | 0.3 | | |
| | Rincon Trail | 0.7 | | |
| | Spring Trail | 1.6 | | |
| | Spring Box Trail | 0.2 | | |
| | Harvey West Trail | 0.3 | | |
| | Lookout Trail | 0.5 | | |
| | Pognip Creek Nature Trail | 1.2 | | |
| | Emma McCrary | | 1.93 | |
| | Rincon Trail | | 0.2 | |
| | Rincon Connector Trail | | 0.2 | |
| | U-Con Trail | | 0.5 | |
| Santa Cruz Riverwalk | | | | 3.56 |
| West Cliff Dr. to E. Cliff Dr | Natural Bridges to E. Cliff Drive | | | 3.5 |
| Wharf | Walkway | 1 | | |
| Other Key Connections: | Bay Street Walkway | | | 0.33 |
| | Branciforte Creek Path | | | 1.21 |
| | Evergreen to Potrero Street | | | 0.36 |
| | Mission Street Ext. | | | 0.18 |
| | West Cliff to Depot Park | | | 0.25 |
| **Total Miles of Trails per Type** | | **13.88** | **9.3** | **11.75** |
| **Total Miles of Trails All Types** | | | | **34.93** |

## SCHOOL FACILITIES

School facilities provide recreational opportunities during the school's non-programming times. The City has an overarching reciprocal joint-use agreement with Santa Cruz City schools as well as joint-use agreements for specific facilities. The facilities are primarily used by the Parks and Recreation Department to facilitate specific recreation and sports programming. Santa Cruz City Schools also has facilities available for rent for public use. These include multi-purpose rooms, gyms, locker rooms, swimming pools, stadiums, practice fields, baseball fields, tennis courts, and theaters:

- Bayview Elementary
- Branciforte (B40) Middle School
- Branciforte Small Schools
- DeLaveaga Elementary School
- Harbor High School
- Gault Elementary
- Mission Hill Middle School
- Formerly Natural Bridges Elementary (Not currently in use)
- Santa Cruz High School
- Westlake Elementary School



Santa Cruz High School

## OTHER CITY RECREATIONAL AREAS AND FACILITIES

Other major City recreation destinations and facilities include:

- The San Lorenzo River is a major watercourse through the City and a major physical feature. The lower 2.5 miles are channelized for flood control. The Santa Cruz Riverwalk is a paved multi-use pathway along the levee. Many parks and facilities are located along the Santa Cruz Riverwalk, and, when considered together, they comprise a larger recreational corridor that provides access to a wide range of natural and developed recreational areas. This corridor contains San Lorenzo Park, Riverside Gardens Park, Ken Wormhoudt Skate Park at Mike Fox Park, Mimi De Marta Dog Park, Jessie Street Marsh, Ocean View Park, Main Beach, Kaiser Permanente Arena, and the Tannery Arts Center. The Riverwalk also connects to the Monterey Bay Sanctuary Scenic Trail and Branciforte Creek Trail. Most importantly, the river and surrounding vegetation provide natural habitat for wildlife. The San Lorenzo Urban River Plan (2003) guides future improvements and restoration efforts along the river. The plan recognizes that the river is a habitat area and a recreational area for the City.

- The Del Mar Theatre is located in Downtown Santa Cruz and is available for community use through the Economic Development Department during certain times of the year. The theater contains the 495-seat Grand Auditorium, and two smaller 140-seat theaters, and is equipped with state-of-the-art sound and projection facilities.

- The Tannery Arts Center was developed through a partnership between the City and Artspace Project. It is a world–class arts campus with 100 affordable housing live/work spaces. The campus includes the 200-seat indoor Colligan Theater which is run by the Jewel Theatre Company.

- Kaiser Permanente Arena is a temporary 2,500 seat indoor arena which is home to the Santa Cruz Warriors Development League basketball team. During their off-season, the facility can be used for tradeshows, conventions, meetings, and large scale events.

The Economic Development Department is conducting an Arena Market and Financial Feasibility Study to analyze market, location, size, operations, management, economic development benefits, and other factors for locating a permanent arena.

- The City's Water Department operates the Loch Lomond Recreation Area (LLRA) in Felton. Loch Lomond Reservoir's primary function is water storage for Santa Cruz residents. The LLRA provides a range of recreational opportunities including boat rentals, picnicking, fishing, hiking, and natural resources interpretive programming.
- Downtown Santa Cruz is the business and commercial center in Santa Cruz and has a semi-mall concept. The promenade contains benches, outdoor patio areas, and landscaping treatments. Abbott Square is an outdoor plaza, and the City, under the administration of the Economic Development Department, partnered with the Santa Cruz Museum of Art and History to create the inviting and interactive community gathering space.
- The City Hall Complex includes a rose garden and other landscaping treatments. The Parks and Recreation Department maintains the landscaping.
- The East Cliff Accent is a walkway connecting Seabright Avenue to 4th Avenue along the coastal bluff above Seabright State Beach. A stairway at 3rd Avenue provides access down to the beach. The Parks and Recreation Department primarily maintains the site furnishings, trash, and weeds. The Public Works Department recently completed a cliff stabilization project at Mariner Park Way.
- The City partnered with NOAA's Office of National Marine Sanctuary. NOAA leased City land for the construction of the 12,000 square foot Monterey Bay National Marine Sanctuary Exploration Center. One of the goals of the center is to educate visitors about the unique and fascinating coastal and marine environment. The center is located across Beach Street from the Santa Cruz Wharf which is the Gateway to the Monterey Bay National Marine Sanctuary.
- The City's paved pedestrian and trail network is primarily maintained by the Public Works Department. The Active Transportation Plan (2017) plans to further integrate the walkways and bikeways that connect the City's communities to employment, education, and recreation destinations.



Monterey Bay National Marine Sanctuary Exploration Center

## OTHER PARK AND RECREATION DEPARTMENT ASSETS

In order to maintain and administer the many parks, open spaces, beaches, and community recreational facilities in the City, the Parks and Recreation Department has a variety of other administrative, maintenance, and storage facilities. These facilities primarily include the following:

- Parks and Recreation Administrative Building
- Wharf Headquarters
- Wharf Maintenance Yard (leased)
- Golf Course Maintenance Yard
- Parks Maintenance Yard
- Lower DeLaveaga Park Office
- Ranger Station at Harvey West Park
- Junior Lifeguard Storage Building at Cowell Beach



Park and Recreation Administration Building

## B. OTHER COMMUNITY RECREATION AND FACILITY SERVICE PROVIDERS

Besides the various parks and facilities maintained by the City, there are numerous resource providers within the City and region. This section focuses on land and water used for recreation which is open or planned to be open for public access.

### UNIVERSITY OF CALIFORNIA SANTA CRUZ

The university is a 2,020 acre campus, and approximately half of the campus is located within the city limits. The campus offers amenities for active and passive recreation on the main campus, while the north and upper campuses currently are undeveloped open space. The main campus and recreational facilities are open to the public during daylight hours for walking, bicycling and visiting campus facilities, such as the Arboretum and Chadwick Gardens. Trails are located throughout the campus and provide connections to Wilder Ranch State Park, Pogonip Open Space, and Henry Cowell State Park.

### MONTEREY BAY NATIONAL MARINE SANCTUARY

Designated in 1992, the Monterey Bay National Marine Sanctuary is a federally protected marine area off of the California Central Coast. The shoreline length of 276 miles spans from Marin to the north, to Cambria to the south, and covers more than 6,094 miles of ocean. The sanctuary is very popular for kayaking, paddle boarding, boating, fishing, wildlife viewing, and other ocean-oriented recreational activities.

### PARKS & OPEN SPACES

- Antonelli Pond: 13.7 acre park adjacent to Moore Creek on the Westside of Santa Cruz; comprised of a large man-made pond, riparian habitat, and grasslands; managed by the Land Trust of Santa Cruz County
- Bonny Doon Ecological Reserve: 552 acre natural preserve in the Santa Cruz Mountains protecting several rare and endangered plant and animal species
- Cotoni-Coast Dairies National Monument: Nearly 6,000 acres near Davenport that were recently designated a national monument in 2017
- Santa Cruz Harbor: The Santa Cruz Harbor offers scenic and wildlife viewing walks, kayaking and boating opportunities, and important connections between recreational destinations

### COUNTY OF SANTA CRUZ PARKS NEAR SANTA CRUZ

- Hestwood Park
- Old Jail/ Octagon
- Santa Cruz Gardens Park
- Simpkins Family Swim Center
- Veterans Memorial Building
- Winkle Farm Park
- Brommer Street Park
- Coffee Lane Park
- Chanticleer Park
- Felt Street Park
- Floral Park

- Jose Avenue Park
- Moran Lake Park
- Twin Lakes Park



Simpkins Family Swim Center

## STATE PARKS & BEACHES

- Big Basin Redwoods State Park: More than 18,000 acre park featuring 81 miles of trails, old-growth forest of coast redwoods, and the majority of the Waddell Creek watershed; California's oldest State Park, established in 1902
- Castle Rock State Park: 5,242 acre, largely forested park with 32 miles of trails and popular with rock climbers because of its steep canyons and unusual rock formations
- Castro Adobe State Historic Park: Historic building standing as one of the best examples of a preserved rancho hacienda in the Monterey Bay
- The Forest of Nisene Marks State Park: 10,223 acre park with 40 miles of trails through secondary growth redwood forest
- Henry Cowell Redwoods State Park: 4,623 acre park with 15 miles of trails through a variety of forested areas
- Lighthouse Field State Beach: 38 acre site within the City of Santa Cruz and overlooking the ocean and popular Steamer Lane surfing hotspot
- Manresa State Beach: 138 acre beach near Aptos
- Natural Bridges State Beach: 65 acre park which is very popular for its Monarch Butterfly Natural Preserve
- New Brighton State Beach: 95 acre park near Capitola and consisting of a beach and campgrounds
- Santa Cruz Mission State Historic Park: Located near Santa Cruz's Mission Plaza and featuring the only building remaining of the original mission, which now houses a museum
- Seacliff State Beach: Beach in Aptos, known primarily for the fishing pier and the concrete ship, the *SS Palo Alto*, located at the pier's end
- Sunset State Beach: 1.5 mile long beach near Watsonville and just south of Manresa State Beach
- Twin Lakes and Seabright State Beaches: Long stretches of sandy beaches on either side of the Santa Cruz Harbor
- Wilder Ranch State Park: Around 7,000 acre park with 34 miles of trails through coastal terraces and valleys



Seacliff and Rio del Mar State Beaches

## C. LEVEL OF SERVICE ASSESSMENT

The supply of the City's parkland and recreational facilities was assessed considering how the City's existing park acreage compares with the City of Santa Cruz General Plan 2030's level of service goals as well as how the City's provision of recreation facilities compares to other California Central Coast cities. The Level of Service Assessment only considers parks, open spaces, beaches, and recreational facilities that each City owns.

### LEVEL OF SERVICE

The City of Santa Cruz General Plan 2030 established level of service (LOS) goals for the City's neighborhood parks and community parks to ensure parkland is equitably distributed, accessible, and adequately supplied. The acreage per population goal is a common standard to help plan for the amount of park space a community aspires to meet. It can also be used to assess if parkland is equitably distributed by population and geography. The service radius goal helps ensure that parkland is accessible from where people live and work. The City's standard is to provide neighborhood parks at a ratio of 2.0 acres per 1,000 people, with a service radius of ½ mile. The City's goal for community parks is 2.5 acres per 1,000 people, with a service radius of 1.5 miles. LOS goals were not established for regional parks, open spaces, beaches, and facilities.

### PARK ACREAGE

The City is currently underserved for neighborhood and community park space. To meet existing goals, a total of 67 acres of parks would need to be created to meet the forecasted population growth associated with the City of Santa Cruz General Plan 2030 growth estimates.

**Table 2.4-4 Park Acreage per Population**

| Population and Level of Service Targets | Neighborhood Parks | Community Parks | Combined |
|---|---|---|---|
| Existing Population | 63,364 | | |
| General Plan's Forecasted Population | 65,884 | | |
| Existing Park Acreage | 48.76 | 180.78 | 229.54 |
| General Plan LOS Target | 2 acres per 1,000 residents | 2.5 acres per 1,000 residents | 4.5 per 1,000 residents |
| 2017 LOS Acreage Goal | 126.73 | 158.41 | 285.14 |
| 2017 Acreage Deficiency (-) or Surplus (+) | -77.97 | 22.37 | -55.60 |
| 2030 LOS Acreage Goal | 131.77 | 164.71 | 296.48 |
| 2030 Acreage Deficiency (-) or Surplus (+) | -83.01 | 16.07 | -66.94 |

### PARK ACCESS

Most areas of the City have access to neighborhood park and community park space; however, there are still areas that are not as comprehensively served by all types of assets. Even if an area appears to be covered according to the radius thrown by a nearby park, some neighborhoods have limited access to parks because of barriers such as topography, waterways, or highways. Additionally, proximity of Community Parks needs to be considered, because they provide recreational amenities that serve the surrounding neighborhoods.

The City of Santa Cruz General Plan 2030's neighborhood park definition does not distinguish size. The City's standard in the General Plan 2030 is to provide neighborhood parks at a ratio of 2.0 acres per 1,000 people. Neighborhood parks are commonly considered greater than 1-2 acres in size. Parks less than 1-2 acres in size are often categorized as pocket parks or mini-parks. Due to the smaller size and often more limited recreational opportunity, mini-parks commonly have a ¼ mile service radius for access compared to the ½ mile in the City of Santa Cruz General Plan 2030 for neighborhood parks. This evaluation assumes that all neighborhood parks acreage serves the corresponding neighborhoods

regardless of size but will apply a ¼ mile service radius for neighborhood parks less than one acre in size.

Community Parks provide recreational opportunities to surrounding neighborhoods. Applying a 1.5 mile radius from Community Parks shows that all neighborhoods in the City have access to Community Park space. Community Parks contain amenities that serve the surrounding neighborhoods. Therefore, to identify areas of the City that are underserved for access to any park space at a neighborhood-level, it is also important to consider areas that are neither located within a half-mile of a neighborhood park nor a community park, as these areas have less access to recreational amenities within a comfortable walking distance.

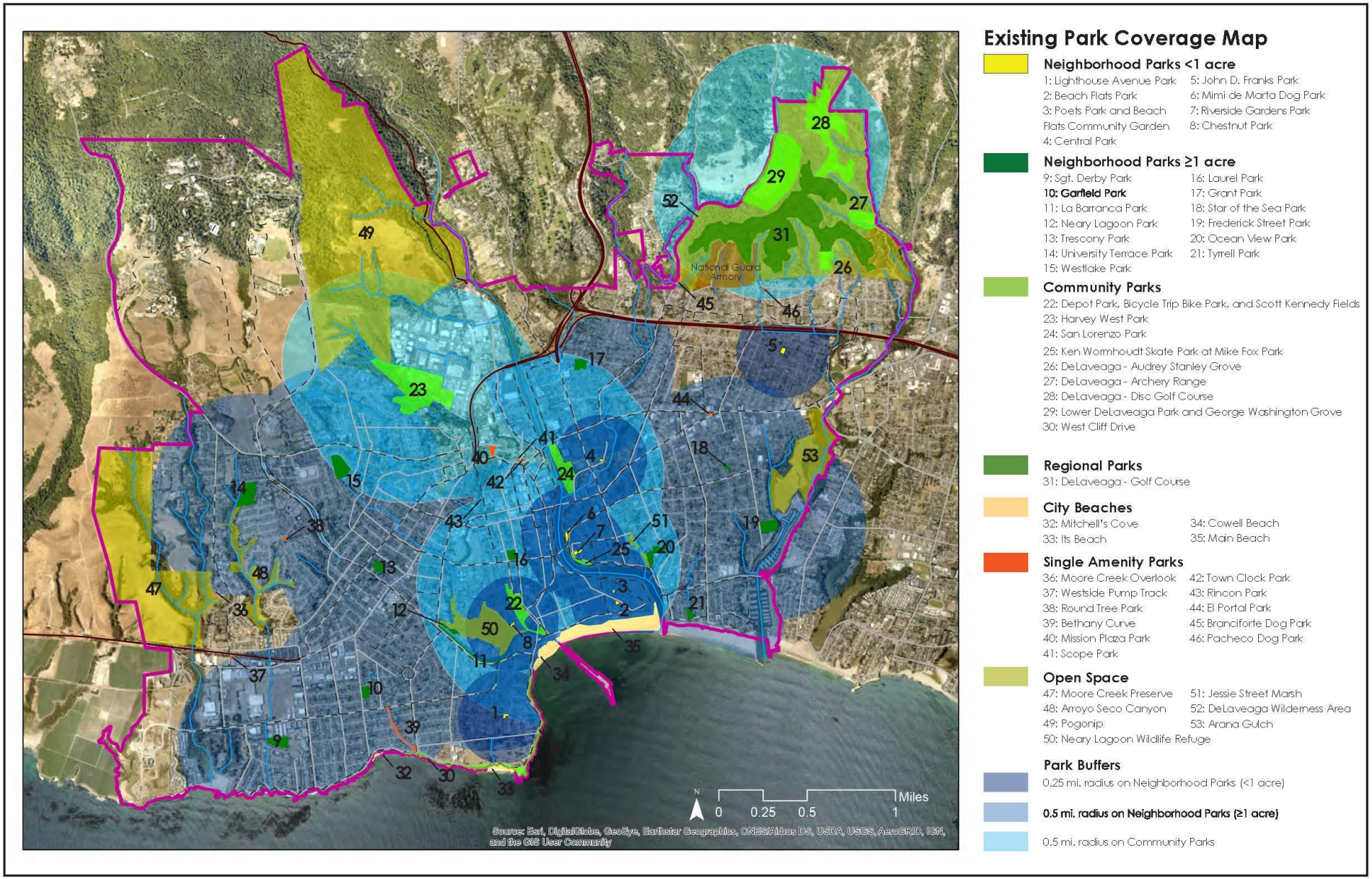


Harvey West Playground

Additionally, some neighborhood parks function as single-use facilities and do not provide a variety of recreational opportunities to serve the general population. Moore Creek Overlook, Westside Pump Track, Round Tree Park, Mission Plaza Park, Scope Park, Town Clock Park, Rincon Park, El Portal Park, Branciforte Dog Park, and Pacheco Dog Park serve very important roles in the parks system. However, they have not been included in the service mile radius due to their limited or specialized facilities. On the other hand, some single-use facilities are grouped with other nearby park assets and have been included in the service radius analysis. La Barranca Park and Mimi De Marta Dog Park are not considered single-use facilities because they are located within close proximity to other parks and serve a specific role in a broader mix of available uses.

The following exhibit, *Map A, Existing Park Coverage Map*, shows the access of residents to the parks, open spaces, and beaches owned by the City of Santa Cruz. The radii indicating walkable distances stop at major barriers such as freeways and rivers, when no pedestrian access across them is currently available. As shown in Map A, the areas with the most limited access opportunities include the portions of the Upper Eastside neighborhoods north of Soquel Avenue, the Carbonera Sphere neighborhood, and the areas on the west side near Shaffer Road and Grand View Street. Potential opportunities to improve access for the Upper Eastside include improving Joint Use Agreements with Santa Cruz City Schools and creating a small pocket park at the previous zoo site in DeLaveaga Park along Upper Park Road near the Pacheco Dog Park. For the west side areas near Shaffer Road and Grandview Street, the General Plan 2030 Goal LU1.1.4 describes that neighborhood parkland shall be considered on the 11-acre Swenson parcel during the planning process. The Carbonera Sphere neighborhood is more challenging given the lack of available land. Improvements could be explored to connect the neighborhood to Lower DeLaveaga Park if opportunities arise to work with adjacent property owners.

As Santa Cruz continues to grow, it will be necessary to evaluate park access and the corresponding wear and tear on existing facilities. If there is substantial growth in a specific neighborhood with limited park acreage or facilities, consideration should be given to providing additional neighborhood park amenities, either through expansion or rehabilitation of existing parks, or through purchase of new property.


Existing Park Coverage Map
Neighborhood Parks <1 acre
1: Lighthouse Avenue Park
2: Beach Flats Park
3: Poets Park and Beach Flats Community Garden
4: Central Park
5: John D. Franks Park
6: Mimi de Marta Dog Park
7: Riverside Gardens Park
8: Chestnut Park
Neighborhood Parks ≥1 acre
9: Sgt. Derby Park
10: Garfield Park
11: La Barranca Park
12: Neary Lagoon Park
13: Trescony Park
14: University Terrace Park
15: Westlake Park
16: Laurel Park
17: Grant Park
18: Star of the Sea Park
19: Frederick Street Park
20: Ocean View Park
21: Tyrrell Park
Community Parks
22: Depot Park, Bicycle Trip Bike Park, and Scott Kennedy Fields
23: Harvey West Park
24: San Lorenzo Park
25: Ken Wormhoudt Skate Park at Mike Fox Park
26: DeLaveaga - Audrey Stanley Grove
27: DeLaveaga - Archery Range
28: DeLaveaga - Disc Golf Course
29: Lower DeLaveaga Park and George Washington Grove
30: West Cliff Drive
Regional Parks
31: DeLaveaga - Golf Course
City Beaches
32: Mitchell's Cove
33: Its Beach
34: Cowell Beach
35: Main Beach
Single Amenity Parks
36: Moore Creek Overlook
37: Westside Pump Track
38: Round Tree Park
39: Bethany Curve
40: Mission Plaza Park
41: Scope Park
42: Town Clock Park
43: Rincon Park
44: El Portal Park
45: Branciforte Dog Park
46: Pacheco Dog Park
Open Space
47: Moore Creek Preserve
48: Arroyo Seco Canyon
49: Pogonip
50: Neary Lagoon Wildlife Refuge
51: Jessie Street Marsh
52: DeLaveaga Wilderness Area
53: Arana Gulch
Park Buffers
0.25 mi. radius on Neighborhood Parks (<1 acre)
0.5 mi. radius on Neighborhood Parks (≥1 acre)
0.5 mi. radius on Community Parks
National Guard Armory
N
0
0.25
0.5
1
Miles
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

## D. BENCHMARKING COMPARISON OF SIMILAR CITIES

The National Recreation and Park Association recommends benchmarking to similar communities to help assess existing conditions in the evaluation of recreation goal setting for a community. There are currently no nationally accepted standards for determining levels of service for the variety of services that every parks system provides. Given that geography, climate, culture, demographics, and other characteristics vary widely nationally, a community must determine its own standards that are appropriate to meet their own local needs. Each community must establish standards that are relevant to its community. Benchmarking is useful because communities with similar characteristics can be compared to help evaluate how the City is performing in relation to them.

The Santa Cruz Parks System is unique for a number of factors and no City offers a perfect comparison. Watsonville, Monterey, San Luis Obispo, Santa Barbara, and Ventura were chosen for comparison because they are located in the California Central Coast region. All have favorable cool-summer or warm-summer Mediterranean climates for recreation. Santa Cruz, Watsonville and Monterey are located in the Monterey Bay region. Like Santa Cruz, Santa Barbara's and San Luis Obispo's top employers are universities. Santa Barbara, San Luis Obispo, and Ventura are also similar to Santa Cruz in that they are the county seat. San Luis Obispo has a large number of open spaces, while Monterey, Santa Barbara, and Ventura manage larger coastlines in addition to open spaces. There is no doubt that there are many differences between the communities. However, when considered together, Santa Cruz is near the average level of population size, median income, age demographics, square miles of City, population density per square miles, and funds allocated to provide Parks and Recreation Department services. That said, the cities' park systems offer a good comparison for the type, level, and provision of recreation services. The following comparison was completed in 2016 and uses budget data from FY 2016-17.

**Table 2.4-5 Population Characteristics**

| Characteristics | Average of Comparable Cities | City of Santa Cruz |
|---|---|---|
| Population | 64,833 | 63,364 |
| <18 | 20% | 16% |
| >65 | 13% | 9% |
| Square Miles | 14 | 13 |
| Population Density Per Square Mile | 4,860 | 4,974 |
| Median Household Income | $57,752 | $61,533 |
| Park & Rec Department Operating Expense | $13,193,319 | $14,997,297 (Includes the operating budget for the Santa Cruz Wharf) |

### COMPARISON OF PARK ACREAGE

As seen in the table below, the Santa Cruz Parks System currently supplies slightly more park acreage (excluding beaches) per resident, approximately the same developed park acreage per resident, and slightly more open space per resident than the average of the other communities.

**Table 2.4-6 Park Acreage per Population**

| **Park Acreage** (Excluding Beaches) | Average of Comparable Cities | City of Santa Cruz |
|---|---|---|
| Population | 64,833 | 63,364 |
| Total Park Acreage (Acres) | 1,493 | 1,696 |
| Total Park Acreage (Acres)/1,000 Population | 23 | 27 |
| Developed Park Acreage | 236 | 239 |
| Developed Park (Acres)/1,000 Population | 4 | 4 |
| Open Space Acreage | 1,161 | 1,315 |
| Open Space Acreage (Acres)/1,000 Population | 18 | 21 |

## SPORTS FIELDS

The comparative analysis also considers the number of sports fields provided. The table below provides information on the number of fields that are lighted, grass or synthetic, and whether or not the baseball outfields are also used for soccer. It is important to note that there can be conflicts with sports programming, primarily in the spring, when the end of the baseball season conflicts with the beginning of the soccer season. For baseball, the majority of fields remain grass.

Comparison of the selected communities revealed that, for soccer, on average, half of the fields are synthetic turf and half are lighted. Seventy-five percent of the City of San Luis Obispo's fields are synthetic. All of San Luis Obispo's soccer fields are synthetic. Santa Cruz, Monterey, and Ventura have soccer fields located in the outfields of the diamond fields. Santa Cruz has the highest number of lighted fields.

Despite the number of ball fields reported, many of the communities are planning for additional field space. The City is particularly impacted in field space for soccer, and the overlap of baseball and soccer seasons has created difficult programming challenges to meet growing demand on shared fields. Harvey West and Scott Kennedy fields cannot accommodate additional needs for sports programming. As sports trends in soccer, lacrosse, and field hockey grow as seen at the State-level, there will be an even greater need for new field space.



Scott Kennedy Fields at Depot Park

**Table 2.4-7 Sports Fields Comparison**

| **Sports Fields** (Excluding Joint Use Agreements with School Districts) | | **avg.** | **Average LOS for Comparable Communities** | **City of Santa Cruz** | **LOS for City of Santa Cruz** |
|---|---|---|---|---|---|
| Diamond fields | Total | 8 | 1 per 8,104 | 8 | 1 per 8,000 |
| | #Grass | 6 | N/A | 8 | N/A |
| | #Synthetic | 2 | N/A | 0 | N/A |
| | #Lighted | 4 | N/A | 8 | N/A |
| Soccer Fields | *Total* | 4 | 1 per 16,208 | 3 | 1 per 21,121 |
| | *#Grass* | 2 | N/A | 2 | N/A |
| | *#Synthetic* | 2 | N/A | 1 | N/A |
| | *#Lighted* | 1 | N/A | 2 | N/A |
| | *#Located in outfield* | 1 | N/A | 2 | N/A |

## OUTDOOR FACILITIES

In terms of outdoor facilities, as seen in the following tables, Santa Cruz provides a high number of community garden plots, dog park areas, playgrounds, tot-lots, sand volleyball courts, skate parks, disc golf, baskets, and reservable picnic areas. Santa Cruz is also the only City to provide a BMX bike park and pump tracks.



Westside Pump Track

Santa Cruz provides less tennis courts than the other communities. Santa Barbara, Ventura, San Luis Obispo, and Monterey provide a tennis center with at least six courts. Santa Cruz and Santa Barbara have striped pickleball courts but nets are not currently provided.

In terms of swimming pools, Santa Barbara, Ventura, and San Luis Obispo offer 50 meter long pools that are part of a larger swim center and allow for the possibility of competitions. Santa Cruz seasonally offers 25 meter lap lanes; however, the County of Santa Cruz provides a larger pool complex and 50 meter long lap lanes at Simpkins Family Swim Center. The more populated City of Ventura's Aquatic Center includes a recreation pool, water playground pool, two water slides, a 50 meter competition pool with two one-meter and two three-meter diving boards, locker rooms, and picnic areas. The less populated City of Monterey has a very large indoor swim center which is described under Indoor Facilities.

Santa Cruz offers a high number of playground facilities. Santa Cruz does not currently provide larger playground destinations such as Monterey's renowned Dennis the Menace Park.

Santa Cruz's Ken Wormhoudt Skate Park, Santa Barbara's Skaters Point, and San Luis Obispo's SLO Skate Park are the largest facilities at greater than 14,000 square feet in size and offer concrete bowls and street features.


Ken Wormhoudt Skate Park

**Table 2.4-8 Comparison of Outdoor Facilities in Comparable Communities**

| Common Outdoor Facilities | Average of Comparable Communities | Average LOS For Comparable Communities | City of Santa Cruz | Santa Cruz LOS |
|---|---|---|---|---|
| Basketball Courts | 6 | 1 per 10,130 | 5.5 | 1 per 11,521 |
| Playground | 18 | 1 per 3,684 | 21 | 1 per 3,017 |
| Sand Volleyball | 8 | 1 per 7,906 | 21 | 1 per 3,017 |
| Tennis Courts (Outdoor only) | 12 | 1 per 5,403 | 6 | 1 per 10,561 |
| Skate Park | 1 | 1 per 46,309 | 3 | 1 per 21,121 |
| Reservable Group Picnic Area | 14 | 1 per 4,767 | 16 | 1 per 3,960 |

**Table 2.4-9 Comparison of Less Common Outdoor Facilities in Comparable Communities**

| Less Common Outdoor Facilities | Median of Comparable Communities | Median LOS for Comparable Communities | City of Santa Cruz | City of Santa Cruz LOS |
|---|---|---|---|---|
| Community Garden Plots | 117 | 1 per 555 | 115 | 1 per 551 |
| Dog Park | 1 | 1 per 64,883 | 8 | 1 per 7,921 |
| Wading Pool | 1 | 1 per 64,883 | 1 | 1 per 63,364 |
| Swimming Pool | 1 | 1 per 64,883 | 1 | 1 per 63,364 |
| Disc Golf Course Baskets | 0 | N/A | 59 | 1 per 1,074 |
| BMX Park | 0 | N/A | 1 | 1 per 63,364 |
| Pump Track | 0 | N/A | 3 | 1 per 21,121 |
| Pickleball Courts (Painted/ no permanent nets) | 0 | N/A | 10 | 1 per 6,336 |
| Tot-Lot | 5 | 1 per 12,967 | 11 | 1 per 5,760 |
| Golf Course | 0.5 | 1 per 129,766 | 1 | 1 per 63,364 |

## INDOOR FACILITIES

The Cities compared provide a range of indoor recreation facilities. Not all the Cities provide each type of facility. Each City provides a community center and community rooms. Each City also provides teen and/or senior services out of the community center or has a separate facility to provide those services. Santa Cruz's Louden Nelson Community Center is the largest community center. Santa Cruz's Civic Auditorium is the largest auditorium. Santa Barbara and Monterey provide fitness centers. Monterey's Sports Center is one of a kind and offers two heated indoor pools, a water slide, sauna, a three court gymnasium, group exercise studios, and weight and cardio training areas. Santa Barbara has a large recreation center and a large gym. The City of Watsonville provides a high proportion of community facility space to the youth and seniors and provides a childcare center. Santa Barbara has a large number of facilities that can be rented out for weddings and private events.



Cabrillo Festival at the Civic Auditorium

**Table 2.4-10 Comparison of Indoor Recreation Facilities in Comparable Communities**

| Indoor Recreation Facilities by City | Size (sq. ft.) | Community Center/ Meeting Rooms | Event Rental | Fitness Center | Gymnasium | Auditorium | Senior Center | Youth Center | Recreation Center | Pool |
|---|---|---|---|---|---|---|---|---|---|---|
| *City of Monterey* | | | | | | | | | | |
| Casanova Oak Knoll Park Center | 5,110 | X | | | | | | | | |
| Hilltop Park Center | 18,400 | X | | | | | | | | |
| Monterey Sports Center | 71,255 | | | X | X | | | | X | X |
| Monterey Youth Center | 14,000 | | | | | | | X | | |
| Scholze Park Center | 9,437 | X | | | | | X | | | |
| *City of Santa Barbara* | | | | | | | | | | |
| Cabrillo Pavilion Arts Center | 15,000 | X | X | | | | | | | |
| Carrillo Street Gym | 10,000 | | | X | | | | | | |
| Carrillo Recreation Center | 20,000 | X | X | | | | | | | |
| Casa Las Palmas | 2,000 | X | X | | | | | | | |
| Chase Palm Park Center | 3,200 | X | X | | | | | | | |
| Chase Palm Arts and Crafts Center | 1,000 | X | | | | | | | | |
| Franklin Neighborhood Center | 12,000 | X | | | | | | | | |
| Louise Lowry Davis Center | 4,000 | X | | | | | | | | |
| MacKenzi Park Adult Building | 2,000 | X | | | | | | | | |
| Twelve 35 Teen Center | 3,500 | | | | | | | X | | |
| Westside Community Center | 2,000 | X | | | | X | | | | |
| *City of San Luis Obispo* | | | | | | | | | | |
| Ludwick Community Center | 14,000 | X | | | X | | | | | |
| Meadow Park Building | 3,400 | X | | | | | | | | |
| SLO Senior Citizens Center | 6000 | | | | | | X | | | |
| Historic Jack House and Gardens | 3,000 | | X | | | | | | | |
| *City of Watsonville* | | | | | | | | | | |
| Callaghan Park Cultural Center | 3,400 | | | | | | | X | | |
| Gene Hourlaris and Waldo Rodriguez Youth Center | 11,000 | | | | | | | X | | |
| Marinovich Community Center | 10,000 | X | | | | | | | | |

**Table 2.4-10 Comparison of Indoor Recreation Facilities in Comparable Communities**

| Indoor Recreation Facilities by City | Size (sq. ft.) | Community Center/ Meeting Rooms | Event Rental | Fitness Center | Gymnasium | Auditorium | Senior Center | Youth Center | Recreation Center | Pool |
|---|---|---|---|---|---|---|---|---|---|---|
| Ramsay Park Family Center | 2,800 | X | | | | | | | | |
| Senior Center | 10000 | | | | | | X | | | |
| Childcare Center | 2,670 | | | | | | | X | | |
| Veteran Memorial Building | 6,000 | | X | | X | X | | | | |
| Muzzio Park Community Center | 2,800 | X | | | | | | X | | |
| *City of Ventura* | | | | | | | | | | |
| Ventura Ave Adult Center | 10,000 | | | | | | X | | | |
| Barranca Vista Center | 3,500 | X | | | | | | | | |
| Westpark Community Center | 11,000 | X | | | | | | | | |
| *City of Santa Cruz* | | | | | | | | | | |
| Beach Flats Community Center | 2,742 | X | | | | | | | | |
| Civic Auditorium | 34,739 | X | X | | X | X | | | | |
| Depot Freight Building | 3,000 | X | X | | | | | | | |
| Harvey West Kids Kottage and Wagner Cottage | 2,500 | X | | | | | | | | |
| Harvey West Scout and Clubhouse | 3,500 | X | X | | | | | | | |
| Louden Nelson Community Center | 20,085 | X | X | | | X | X | X | | |
| Senior Citizens Opportunity | 5,437 | X | | | | X | X | | | |

## E. CONDITION OF PARKS AND RECREATION FACILITIES

Numerous studies have been conducted in recent years to study the condition of the larger recreational facilities in the parks system.

### FACILITY CONDITION ASSESSMENT (2013)

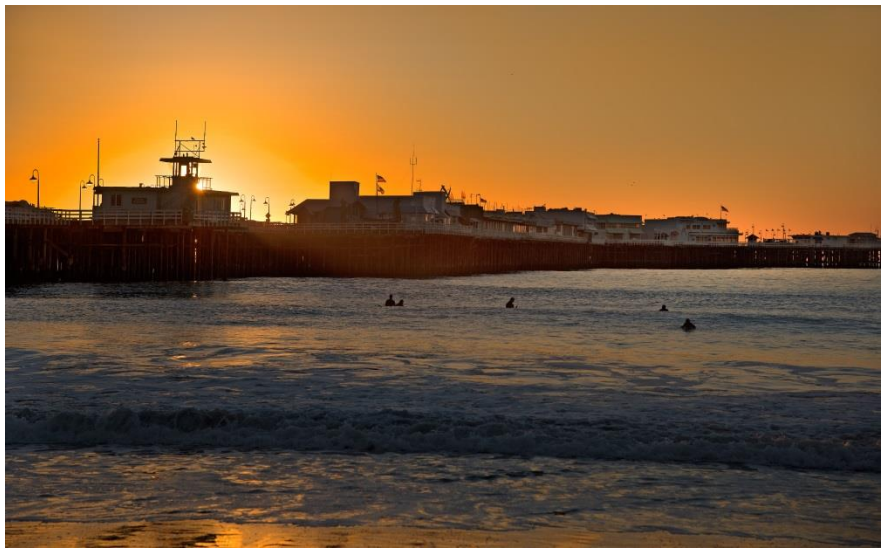
The Public Works Department hired a consultant to conduct a Facility Condition Assessment (2013) which included the study of building system needs including foundations, superstructures, exterior enclosure, interior construction, interior finishes, conveying systems, plumbing, HVAC, and fire protection and electrical. The following recreation facilities were identified as in need of building system improvements and needs were projected to 2018, as indicated in the table below:

**Table 2.4-11 Facility Condition Assessment Costs**

| Parks and Recreation Buildings | Total Needs in 2018 |
|---|---|
| Civic Auditorium | $4,745,316 |
| Harvey West Clubhouse | $337,397 |
| Harvey West Poolhouse | $196,464 |
| Harvey West Ranger Station | $63,829 |
| Wagner Cottage | $69,333 |
| Golf Course Cart Storage | $447,309 |
| Golf Course Clubhouse | $499,399 |
| Louden Nelson Community Center | $2,774,057 |
| Senior Citizen's Opportunity | $548,795 |
| Parks Yard Maintenance Garage | $140,350 |
| Parks Yard Office | $161,645 |
| DeLaveaga Park Office | $14,696 |
| Wharf Headquarters | $285,423 |
| Parks and Recreation Admin Building | $424,033 |
| **Total** | **$10,708,048** |

### SANTA CRUZ WHARF ENGINEERING REPORT (2014)

The Santa Cruz Wharf Engineering Report (2014) evaluated the Santa Cruz Wharf and found that it is generally in good condition but there is a need for pile replacements, general improvements to the pavement and substrate, and improvements to increase public safety, weight bearing capacity, sewer, fire protection, and landings. The estimated costs of the improvements are $16,000,000.



Santa Cruz Wharf

### POGONIP CLUBHOUSE REHABILITATION PLAN (2000)

The Pogonip Clubhouse Rehabilitation Plan (2000) includes interior, exterior, structural, mechanical, and electrical evaluations. Costs to complete the plan are currently estimated at $7,000,000.

### PLAYGROUND INSPECTIONS

The City's park playgrounds and tot lots were visited and inspected for compliance with California playground safety regulations, per the California Department of Public Health, on Tuesday, December 23rd, 2014 and Sunday, March 29th, 2015. These were not full inspections with formal testing, but visual inspections for apparent problems.

### PLAYGROUND EQUIPMENT

The playground equipment is generally new and well maintained in all of the parks.



Riverside Gardens Playground

### FALL PROTECTION

Engineered wood fibar is used extensively in Santa Cruz playgrounds for fall protection. This fibar meets the criteria for fall protection for most playground heights if of sufficient depth and maintained. Engineered wood fibar is wood shredded to specific dimensions to increase its fall protection. The depth of fibar was not determined in the site visits as that would have required digging. In the play areas that use rubber matting, the matting needs to be annually tested for retention of fall attenuation properties. As matting ages, it loses its softness and ability to absorb impacts.

### ACCESSIBILITY

For surfacing, most playgrounds had rubber matting extending to the transfer deck but engineered wood fibar elsewhere. Engineered wood fibar is considered an accessible surface, but must meet the requirement of no more than ½" change in level from surface to surface to be considered accessible. To maintain this grade difference, ramps must be installed extending from the adjacent walks into the engineered wood fibar. As the fibar settles, the ramp becomes more exposed but maintains an accessible route into the playground. Of note for future playground renovation and construction, accessibility of engineered wood fibar is being challenged in courts, though no resolution has been reached to date.

Play equipment met the criteria for accessibility for the apparent dates of installation. Going forward, Santa Cruz should be aware of new criteria that require all equipment reachable from a transfer station or ramp to be accessible upon exit- i.e. must be on accessible surfacing. Existing criteria includes:

- One of each type of play equipment to be accessible by transfer or ramping,
- A percentage, based on number of components, of accessible by transfer or ramping.
- A percentage, based on number of components, of ground level play.

### RECREATIONAL FACILITIES AND SITE FURNISHING CONDITIONS

Staff inspected the site furnishings and recreational facilities at each park, ranking each site furnishing or recreational facility from very good to very poor based on conditions relating to cosmetic defects, rusting and warping, and noted known structural and functional issues. Tables are provided for each park in Chapter 4, Section 4.2. In general, most site furnishings are in the good to very good condition. Harvey West Park Ball Fields is notable because the facilities have extensive issues with a high cost of repair.

## F. SAFETY AND SECURITY

Illegal camping, drug-use, gang activities, and criminal misconduct stem from challenging social, mental health, economic, and moral issues. The impacts from these and other illegal activities on the City's parks system



are prevalent and often pose environmental and safety issues and consume many City resources to mitigate them. The City has recently begun fencing and locking some of its parks and open spaces to deter illegal activities. For example, a temporary curfew limiting access to Cowell Beach is currently in effect. Other steps have included installing security cameras, increasing volunteer and staff clean-up days, imposing temporary closures of restrooms and park areas, developing maintenance protocols to find discarded hypodermic needles, and changes to park policies and programs to try to increase legal use in order to deter illegal activities.

## G. ORGANIZATIONAL STRUCTURE AND ROLES

The Parks and Recreation Department's three divisions help oversee parks system assets. The Recreation Division manages sports and beach programming and events, class, and teen and senior programming as well as the Civic Auditorium, Louden Nelson Community Center, and facility rentals and maintenance. The Administration Division supports programs and reservation rentals and creates policies and plans. The Parks Division oversees the maintenance and operation of the DeLaveaga Golf Course, Urban Landscaped Medians, Arana Gulch, the Santa Cruz Wharf and Cowell and Main Beaches, and the Park Rangers unit. Additionally, parks and open spaces are grouped under three management zones: the east, west, and central zone.

Though the recommendations from this Parks Master Plan 2030 focus primarily on core areas of the Parks and Recreation Department, it is important to note that the provision of recreation facilities is a multi-departmental effort. The following lists just some of the major roles other departments play:

- City Manager's Office:
    - Administers larger scale temporary and special use permits in parks, beaches, and open spaces.
    - Oversees important community studies and projects.
    - Coordinates GreenWharf projects and relationships with UCSC academic partners.
- Economic Development Department:
    - Administers contracts with businesses on the Santa Cruz Wharf and assists drafting leases with new vendors and concessionaires.
    - Manages the development of the Santa Cruz Wharf Master Plan and the Kaiser Permanente Siting Feasibility Study.
- Planning:
    - Planning and Community Development:
        - Often takes the lead on major planning efforts
        - Reviews new parks development applications to ensure code compliance.
- Public Works:
    - Oversees water quality efforts such as the tule removal and water quality testing at the Neary Lagoon Wildlife Refuge and along the San Lorenzo River and Main and Cowell Beaches
    - Removes vegetation from the San Lorenzo River corridor.
    - Manages the construction and maintains multi-use pathways such as the construction of the Arana Gulch Multi-Use Trail, the Santa Cruz Riverwalk, and the Monterey Bay Marine Sanctuary Scenic Trail segment through Santa Cruz.
    - Assesses condition of buildings and funds improvements.
    - Assesses cliff erosion and stabilization along West Cliff and East Cliff Drives.
    - Maintains the parking area at Depot Park.
    - Reviews engineering plans and makes recommendations for new development projects.
- Police Department:
    - The Parks Unit was created in 2006 following a voter-approved sales tax initiative in the city of Santa Cruz known as Measure H. The unit works closely with the Park Rangers to maintain a safe environment in neighborhood parks, open spaces and waterways.

## H. EXISTING PARKS MASTER PLANS

The City has many master or management plans that help guide future uses and corresponding management actions for specific parks, open spaces, and beaches. Not all park assets have management plans. Some of the Management Plans could be updated to accommodate new facilities and activities to meet current needs and desires.

- Arana Gulch Master Plan (2006): The plan guided the development of the multi-use trail project which was completed in 2014. It also guides natural restoration of the property.

- Cowell and Main Beach Management Plan (2014): Guides beach maintenance operations, safety operations, recreation programming, commercial uses, and flood and drainage discharge operations for Cowell and Main Beaches.

- DeLaveaga Park Master Plan (1960): The plan includes ambitious recreational projects, many of which have been implemented. Projects include campgrounds, a small train track, a fishing lake, golf course, softball fields, a children's wading pond, tennis courts, a natural science center, a rifle and archery range, among others.

- DeLaveaga Golf Course Master Plan (2002): The plan recommends a variety of improvements, including constructing a new clubhouse to accommodate larger events, installing a new irrigation system to conserve water, adding solar to the upper deck of the golf course to provide shade and conserve energy, performing tree management work to reduce dead and diseased trees, redesigning and updating the sand traps, leveling the tees, grading the fairways, increasing the parking areas, and improving the maintenance yard.

- Depot Park Master Plan (2001): The plan guided uses and improvements to Depot Park were completed in 2005.

- Jessie Street Marsh Management Plan (1998): The plan aims to restore the marsh and improve access. A major component of the plan would be creating a tidal exchange between the fresh water marsh and the San Lorenzo Urban River. An interpretive trail would connect from East Cliff Drive to Lemos Avenue.

- Moore Creek Preserve Interim Management Plan (2002): Guides natural restoration activities and trail alignments, design, and use.

- Neary Lagoon Management Plan (1992): Guides activities to manage hydrology, water quality, vegetation, wildlife, mosquitoes, cultural resources, public use and safety, infrastructure, and aesthetics.

- Pogonip Clubhouse Rehabilitation Plan (2002): The plan guides the rehabilitation of the historic Pogonip Clubhouse.

- Pogonip Master Plan (1998): The plan envisions the restoration of the historic clubhouse, a Homeless Garden farming operation and support facilities, an outdoor education camp, improvements to trails, interpretive programs, parking improvements, and natural restoration activities.

- San Lorenzo Urban River Plan (2003): The San Lorenzo Urban River Plan provides a number of recommendations for the locations and designs of plazas, unpaved nature loops, native planting treatments, interpretive signage, bird watching platforms, and art. The plan recommends that restoring the river is the top priority.

- Santa Cruz Wharf Master Plan (under review): The Santa Cruz Wharf Master Plan guides future restoration and expansion including the development of a landmark building, an events pavilion, a gateway entrance sign, a welcome center, a small boat landing area, and increased pedestrian and bicycle access.

# I. NATURAL RESOURCES

## EXISTING NATURAL RESOURCES

The City's parks and open spaces contain several diverse, native plant and wildlife communities/habitats. Habitats include freshwater marsh, redwood forest, mixed evergreen forest, coastal scrub, grassland/coastal prairie, oak woodland, and riparian woodlands/corridors. Some of these habitats are considered sensitive because they are vulnerable to disturbance or do not recover easily once disturbed. Sensitive areas also include springs and seeps, nesting and breeding sites such as standing dead trees, riverbanks, movement and migration corridors, pathways to perennial streams, overwintering sites (i.e., Monarch butterfly), and foraging areas.

Riparian (streamside), and other wetland habitats (brackish and freshwater marshes), with their wide variety of plants and readily available water, are vital for wildlife such as waterfowl, fish, and amphibians. These habitats provide a drinking source and dense, green foliage for protection, shelter, and food. Perennial or seasonal water bodies are breeding areas for some amphibian and other wildlife species. Most wildlife species depend on external sources of water and will often travel long distances to reach it. Excessive human use in these areas can result in trampling, soil compaction, erosion, destruction of vegetation, alteration of water quality and temperature, introduction of non-native and invasive plant species, and frequent disturbances to wildlife.

Some of these habitats are protected by federal and state laws and require special permits for new improvements. City parks and open spaces containing rare, threatened, or endangered species as listed by Federal and/or State agencies are shown on the following tables. More information on sensitive habitats and species can be found in the City of Santa Cruz General Plan 2030, individual park master plans, and past studies.

**Table 2.4-12 Native Habitats within City Open Spaces**

| Open Space | Brackish or Freshwater Marsh[2] | Redwood Forest | Mixed Evergreen Forest | Coastal Scrub | Grassland Coastal Prairie[2] | Riparian Woodland | Oak Woodland[2] | Eucalyptus Groves[1] |
|---|---|---|---|---|---|---|---|---|
| Pogonip Open Space | | X | X | X | X | X | X | |
| Moore Creek Preserve | | X | X | X | X | X | X | |
| DeLaveaga Wilderness Area | X | X | X | X | X | X | X | X |
| Neary Lagoon Wildlife Refuge | X | | | | | X | | |
| Jessie Street Marsh | X | | | | X | X | X | X |
| Arana Gulch Open Space | X | | | | X | X | X | X |
| Arroyo Seco Canyon | | | X | | | X | | X |
| San Lorenzo River | X | | | | | X | | X |

[1] Eucalyptus is a non-native tree species, but some eucalyptus groves in the City provide overwintering habitat for the Monarch butterfly.

[2] Sensitive habitat, as identified under City, State, and/or Federal policies.

**Table 2.4-13 Special Status Plants and Animals Known within City Open Spaces**

| Open Space | San Francisco Popcorn Flower | Santa Cruz Tarplant | Gairdner's Yampah | Santa Cruz Clover | Robust Spineflower | CA Red-legged Frog | Southwestern Pond Turtle | Ohlone Tiger Beetle | Dusky-footed Woodrat | Monarch Butterfly[2] | Steelhead/Coho Salmon and Tidewater Goby |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Pogonip Open Space | X | | X | X | X | X | X | X[1] | X | | |
| Moore Creek Preserve | X | | | | | X | X | X | X | X | |
| DeLaveaga Wilderness Area | | | | | | | | | X | X | |
| Neary Lagoon Wildlife Refuge | | | | | | | X | | X | | |
| Jessie Street Marsh | | | | | | | | | | | |
| Arana Gulch Open Space | | X | | | | | | | X | X | |
| Arroyo Seco Canyon | | | | | | | | | X | X | |
| San Lorenzo River | | | | | | | | | | | X |

[1]Ohlone Tiger Beetle last observed in 2004.

[2]Overwintering site.

## RESOURCE MANAGEMENT

Selecting effective management strategies requires understanding natural ecological processes at a specific site. Management measures often include eliminating or restricting activities that destroy vegetation, restoring grasslands and meadows that were formerly maintained by natural processes, managing vegetation to benefit aquatic species, conservation grazing, perimeter fire management/fuel reduction, and controlling/ removing invasive, non-native vegetation. The City is also currently updating its Climate Action Plan and Climate Adaptation Plan which provide guidance for incorporating conservation and resiliency into management policy and actions.

**Table 2.4-14 Resource Assessments, Guidance Documents, and Open Space Restoration Activities**

| Open Space | Natural Resource Assessments | Current Management Activities |
|---|---|---|
| Pogonip Open Space | Park-wide biotic assessment, 1996<br>Pogonip Master Plan, 1998<br>Various focused work area assessments, 1999 to 2017 | Prairie management (mowing and invasive plant control).<br>Rare plant survey and habitat management.<br>Ohlone Tiger Beetle survey. |
| Moore Creek Preserve | Property-wide baseline environmental assessment, 1995<br>Moore Creek Preserve Interim Management Plan, 2001 | Prairie management (grazing and invasive plant control).<br>Rare plant survey and habitat management.<br>Ohlone Tiger Beetle survey. |
| DeLaveaga Wilderness Area | Focused work area assessments from 2010 to 2017. No comprehensive biotic assessment has been performed. | Coastal prairie mowing. |
| Neary Lagoon Wildlife Refuge | Neary Lagoon Management Plan, 1990<br>Focused work area assessments | Marsh vegetation management. |
| Jessie Street Marsh | Jessie Street Marsh Management plan, 1998 | Marsh vegetation management. |
| Arana Gulch Open Space | Biotic assessment, 1996<br>Arana Gulch Master Plan, 2006<br>Habitat management plan, 2013<br>Invasive Weed Work Plan, 2015 | Prairie management (grazing, invasive plant control, revegetation planting).<br>Rare plant survey and habitat management. |
| San Lorenzo River Corridor | San Lorenzo Urban River Plan, 2003 | Riparian management. |

# CHAPTER 3: COMMUNITY OUTREACH & NEEDS ASSESSMENT

**WHAT WE NEED & WANT**

3.1 Community Outreach
3.2 Emerging Trends



Neary Lagoon Wildlife Refuge

# SECTION 3.1: COMMUNITY OUTREACH


A. Introduction
B. Quantitative vs. Qualitative Data
C. Community Telephone Survey 2015
D. Community Meetings
E. Stakeholder Interviews and Focus Groups
F. Internal Department-Wide Meeting
G. Public Input Questionnaire and Email Correspondence
H. 1st Joint Study Session with Parks and Recreation Commission and City Council
I. Parks Master Plan Subcommittee Meetings
J. Community Email Survey 2016
K. 2nd Joint Study Session with Parks and Recreation Commission and City Council
L. Community Outreach Summary


## A. INTRODUCTION

Parks and recreation services play a critical role in the quality of life for residents and visitors. The *Santa Cruz Parks Master Plan 2030* (Parks Master Plan 2030) will help guide future improvements to the parks system to improve the overall experience for park users. The Parks Master Plan 2030 outreach process provided an opportunity to engage community members and solicit their feedback to help inform the recommendations. Community input not only helps the City evaluate existing conditions and current and future needs, but also identify opportunities from the perspectives of park users.

Community input was gathered through a variety of methods, including a community telephone survey, community meetings, focus groups, questionnaires, stakeholder interviews, department-wide meetings, public meetings, and a supplemental quantitative email survey to receive representative input from the general community on topics where specific interests conflict.

## B. QUANTITATIVE VS. QUALITATIVE DATA

Collection of data is provided in two forms as part of this outreach process: quantitative and qualitative. Quantitative data provides usable statistics through the generation of numerical data, formulating facts and uncovering patterns in research. Qualitative research reveals trends and opinions through non-statistical data analysis that provides explorative findings which inform further decision making.

The Parks Master Plan 2030 planning process provides quantitative data through statistically valid, random telephone and email surveys that utilized a prepared questionnaire. Qualitative data was collected through information gathered from interviews, community and departmental open houses, and questionnaires that were distributed at City parks, community events, and online. The qualitative data provides subjective information with additional detail in user interests. It was provided by respondents who chose to engage in the outreach process, rather than from a random sampling.

Comparing the quantitative and qualitative data collected through community outreach enables the planning process to identify emerging patterns and consistent themes and issues regarding park system use in Santa Cruz.

## C. COMMUNITY TELEPHONE SURVEY 2015

In 2015, the City of Santa Cruz commissioned Godbe Research to conduct a telephone survey of residents to inform the Parks Master Plan 2030. The 2015 survey was conducted with the following research objectives:

- Gauge satisfaction with the overall quality of life in Santa Cruz
- Understand leisure time activity and sports preferences
- Assess the usage and importance of parks, trails, and recreation facilities
- Gauge satisfaction with specific services and facilities
- Determine attitudes towards DeLaveaga Municipal Golf Course and Harvey West Swimming Pool

- Understand resident support for financial funding of programs and facilities
- Identify any differences in opinion due to demographic and/or voter behavioral characteristics.

## METHODOLOGY OVERVIEW

- Data Collection: Telephone Interviewing
- Universe: Adults 18 years of age or older
- Fielding Dates: January 6 – January 11, 2015
- Interview Length: 15.7 minutes
- Interview Language: English and Spanish
- Sample Size: 304
- Margin of Error: ± 5.06%

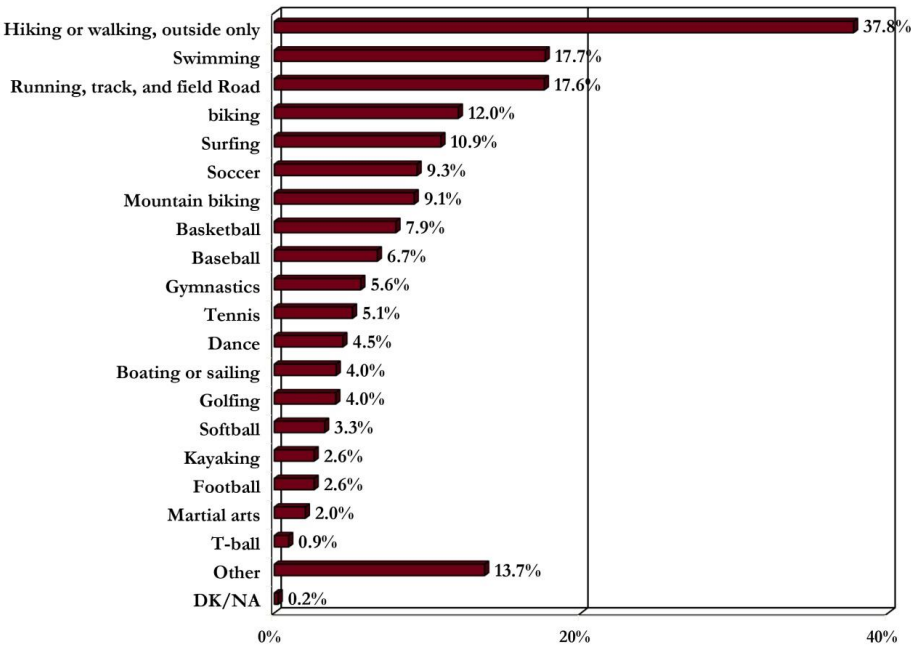
## KEY FINDINGS

### Quality of Life

- Santa Cruz residents enjoy their quality of life. More than 9 out of 10 respondents indicated that they were satisfied with the quality of life in Santa Cruz (92.4%).

### Sports and Recreational Activities

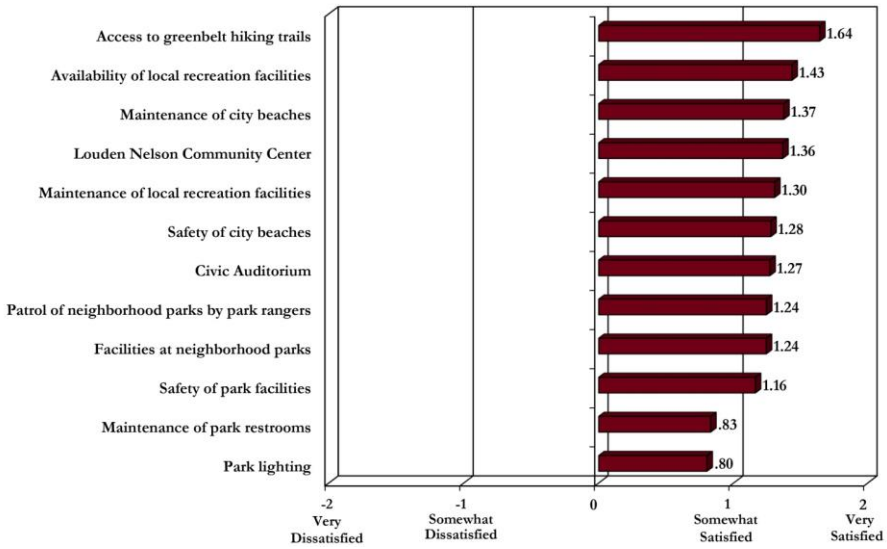
- Santa Cruz is a very active community. Respondents indicated that the top two preferences for leisure time activities include going to the beach and outdoor sports or athletic activities.
- More than three quarters of respondents indicated that a member of their household participates in an outdoor activity. The top preference for an outdoor recreation activity is hiking or walking outside.
- Respondents with children in their household tended to indicate at higher levels that they enjoyed “Basketball,” “Baseball,” “Surfing,” “Swimming,” and “T-ball” when compared to those residents without children in the household.



Recreational Activity Preferences from 2015 Phone Survey

### Parks and Recreation Facilities

- A vast majority of respondents have visited City parks, trails, or recreation facilities in the past 12 months. About 46% of the households had used a walking or hiking trail in the past 12 months, 45% had used the beaches, and 43% had used a city park.
- Santa Cruz residents are highly satisfied with the parks and recreation services provided by the City of Santa Cruz. Of the services listed, park lighting and maintenance of park restrooms were the only services that fell below the somewhat satisfied ranking.



Satisfaction Responses from 2015 Phone Survey

- The availability of recreational activities such as walking, hiking, jogging, swimming, surfing, road cycling, and mountain biking are relatively more important to Santa Cruz residents than organized sports such as basketball, baseball, softball, football, and volleyball.
- The variety of recreation options is important to Santa Cruz residents.
  - All but one of the 18 sites and facilities reached or exceeded the level of somewhat important.
  - Two-thirds of the residents or more rated 8 of the 14 sports and recreational activities tested in the survey as at least "somewhat important."
  - More than 90% of respondents indicated importance for "City beaches," "Outdoor sports fields," "Open space parks," and "Trails."
  - More than 80% of residents placed importance on "Swimming pool," "Civic auditorium," 'Children's play areas," and "Community gardens."
  - More than 70% of survey respondents stated they felt "Gymnasium," "Reservable picnic areas or Harvey West Clubhouse," "Senior Center," "Teen center," "Louden Nelson Community Center," and "Dog parks" were important.
- A significant plurality of respondents (47.3%) preferred continuing to subsidize the DeLaveaga Golf Course, while a quarter (25.7%) preferred leasing the course to a private golf management company.
- Just over half of the respondents (50.9%) indicated that the Harvey West Swimming Pool should be open year round, while about a quarter (26.7%) felt the current schedule was adequate.
- A significant plurality of respondents (48.4%) believe that the parks should not be locked at night, while 38% believe they should be locked.

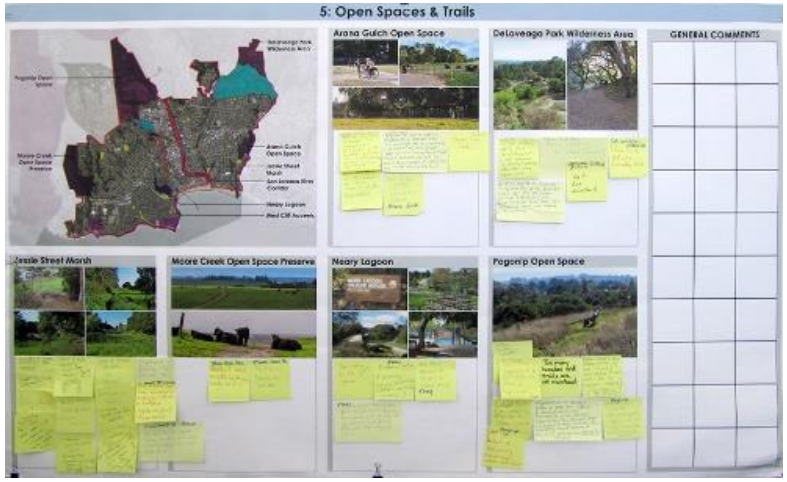
The Godbe report is available in Appendix 5.2 with a link to the report's appendices.

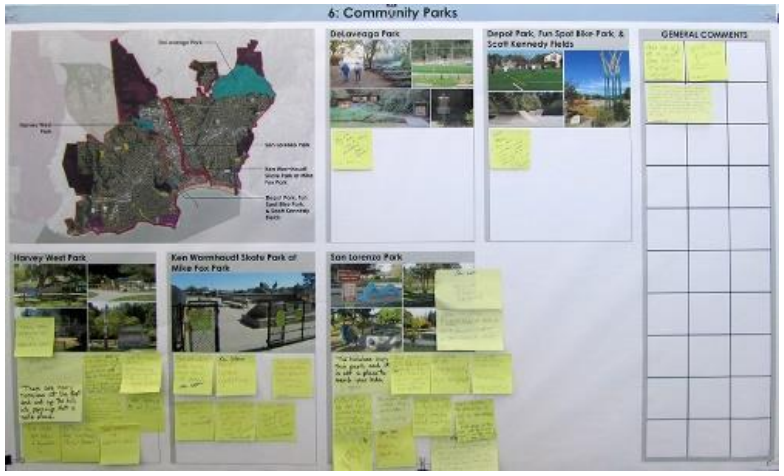
## D. COMMUNITY MEETINGS


March 29th Community Meeting

Two open house meetings were held on March 26 and 29, of 2015, at the Louden Nelson Community Center. Approximately 60 community members attended the meetings. Community members were invited to review 12 exhibit posters and provide input by placing sticky notes onto

the exhibits or completing a questionnaire if they had more lengthy comments or suggestions. Staff, public officials, and the consultant were available to discuss topics and ideas. Spanish translators were available for Spanish translation. Appendices 5.3 and 5.5 contain presentation materials and a complete list of comments received during the community outreach process. Comments followed by a (C) were received during the community meetings.




Two of twelve exhibit posters with sticky note comments from meetings

## E. STAKEHOLDER INTERVIEWS AND FOCUS GROUPS

From January 2015 to April 2015, staff and the consultant met with a variety of key staff members who manage the parks and recreation facilities as well as interested community members to hear perspectives on parks and recreation topics. Focus group discussions were held with organized sports field users, Friends of Parks and Recreation, and other interested community members. Appendix 5.6 includes comments received from stakeholder interviews and focus group meetings.

## F. INTERNAL DEPARTMENT-WIDE MEETING

An internal open house meeting was held with parks maintenance and recreation personnel. Parks and Recreation staff have a unique perspective on the parks system. Not only are they park users, but they are also the day-to-day face of the Parks and Recreation Department. They hear feedback from park users regarding the parks and recreation facilities during their maintenance and recreation programming activities.

## G. PUBLIC INPUT QUESTIONNAIRE AND EMAIL CORRESPONDENCE

Staff and the consultant created an English and Spanish version of a public input questionnaire. Community members were asked about their ideas and observations regarding parks and recreation facilities in Santa Cruz. The questionnaire was distributed by staff at parks and facilities. An online version was created and signs were posted at parks to inform park users of the opportunity to provide feedback. Staff had booths at six community events to answer questions and collect input through the questionnaires. Nearly 500 questionnaires and emails were received. Appendices 5.4 and 5.5 contain the general city-wide and park-specific questionnaires and the comments received during the outreach process. Comments followed by a (Q) are specifically from the questionnaire while comments followed by an (L) are from email and letter correspondence.



City staffed booth at the Santa Cruz Mountain Biking Festival on April 11, 2015

**KEY FINDINGS**

- Many community members describe a favorable impression of the upkeep of the parks system. Some expressed concern that maintenance should be a higher priority than expansion.
- A very high number of comments expressed concerns regarding illegal activity, safety, and cleanliness in the parks system and the desire for more enforcement.
- Sports field user groups and other community members expressed the need for more field space to accommodate off-season play and to limit use conflicts between baseball and soccer. Programs would expand if there were more fields to play-on. Harvey West fields could use renovation. Lacrosse is growing in demand and it would be difficult to accommodate the sport with the existing field space.
- Off-leash dog use is a popular activity in Santa Cruz and there is a desire for more opportunities. Some respondents expressed concerns about off-leash dog use at beaches and open spaces.
- There is a general desire for more recreational amenities and facilities throughout the parks system and more interesting playground features.
- The San Lorenzo River Corridor/Santa Cruz Riverwalk is a very important resource for community members. Many preferred more environmental restoration and learning activities; however, others requested more activities for recreation.
- Pickleball is a rapidly growing recreational activity and there is demand for more courts.
- Many expressed a desire to clean-up and add more amenities and events to San Lorenzo Park.
- Respondents shared that the Beach Flats Neighborhood area needs a permanent community garden facility.
- Mountain biking is a popular activity and there is a need for skill building areas and separated trails with obstacles. Concerns were raised regarding conflicts between bike riders and hikers, and impacts to the environment.
- Pump track bike riding is a growing recreational activity in the area and there is a desire to see more opportunities.
- Many expressed the need for more restrooms or the renovation of existing restrooms.
- Preservation and restoration of the City's greenbelts are important to the community.
- Harvey West Pool remains an important facility to teach kids how to swim and there is a need to expand the duration of the season.
- The Pogonip Clubhouse remains an important resource and there is a desire to see it restored.
- The City's beaches should remain clean and free from loose litter and debris, especially during the tourist season. Respondents noted that water quality at Main and Cowell Beaches needs to be improved.
- Jessie Street Marsh remains a challenging site and is in need of improvement.
- Parks and recreation facilities should be accessible for all users.
- More art and interpretive displays should be added to the parks.

## H. 1ST JOINT STUDY SESSION WITH PARKS AND RECREATION COMMISSION AND CITY COUNCIL

On October 13, 2015, a Joint Study Session was held to provide staff with direction on topics where contrasting opinions were received during the outreach process. The high-level topics within the presentation included Safety and Illegal Activity, Neighborhood Parks, Community Parks, Open Space, Existing Facilities, and New Facilities. As part of the outcome of the meeting, a general recommendation was to continue to work through the topics with a subcommittee comprised of two Parks and Recreation Commission members and two City Council members. Below is a summary of the discussion that followed the presentation.

### KEY DIRECTION

### Parks Management

- Parks services must have resiliency regardless of the economy. Parks need to be funded to provide benefits to residents and visitors. Consider capacity issues in relation to staffing when seeking new development. Update the existing parks system before expanding the system further. There should be a strategic funding component of the Parks Master Plan 2030. Seek funding endowments.
- Parks and Recreation management should allow parks to evolve and be flexibly responsive to changing demands in recreation.
- Continue to seek ways to improve recreation on existing lands instead of purchasing new land. Utilize edges of existing open spaces to create more recreational opportunities rather than acquiring new land.
- Ensure that underserved communities are provided enough resources, parks, and facilities.

### Parks and Recreation Facilities

- Use some of the greenbelt open space for active use. Land was originally designated for both open space and active use but the active use element has not been implemented successfully.
- Fully utilize existing parks.
- Increase the provision of sports fields. Continue the shared use of parks and sports fields. Seek creative uses of new and existing infrastructure such as locating sports fields on top of parking structures. Provide practice space throughout the City for sports teams.
- Increase mountain biking opportunities and partner with the industry to hold events. Protect hiking trails and reduce conflicts.
- Differences in opinion were expressed regarding acquiring Antonelli Pond and Lighthouse Field for the City's park system. Consider a partnership to improve maintenance of Lighthouse Field.
- Add more restrooms to parks. Some prefer the use of porta-potties for cost savings.
- Improve coordination for litter pick-up on beaches and expand the ranger program to patrol them.
- Support pickleball expansion and create dedicated courts.
- Create City-owned community gardens in every neighborhood, especially the Beach Flats Neighborhood. Consider roof-top gardens.
- Prioritize revisiting the Jesse Street Marsh Master Plan. Hold a neighborhood meeting to discuss options.
- More pump tracks including the Benchlands at San Lorenzo Park.
- Improve playgrounds.
    - Replace the wood chips with sand or rubber matting at playgrounds.
    - Build a themed 'Dennis the Menace' playground at San Lorenzo Park.
- Create a legal, supervised campground for the homeless to sleep to deter sleeping in parks.
- Civic Auditorium is not a high priority.
- Golf Course is highly subsidized and should be phased out unless it can bring in more revenue in the next five years.

- Use the Fire Department Training Structure as some kind of joint facility that can be used for recreation. For example, creating a ropes course.
- Expand the Harvey West pool use by adding times when the Simpkins Family Swim Center is not open for recreational swimming.
- Restore the Pogonip Clubhouse. Explore public-private partnerships. Release a request for proposal to explore options.
- Create more off-leash dog use areas.
- Create a Coastal Recreation Zone to showcase the natural resources and coastline and improve the coordination between multiple agencies.
- Support the Riverwalk project and activate the entire length of the river with art and lighting.
- Renovate Harvey West Park as it is currently underutilized.
- Establish better connectivity between existing parks by identifying gaps to close them.
- Recognize that natural areas are valued and are utilized through their preservation.
- Consider all users in design and expansion of system (ADA, seniors, etc.).

### Safety and Security

- Safety and security are paramount. Increasing ranger patrols, lighting, activating parks with new amenities (low cost if possible), and park hosts should be explored as a way to help address safety issues. Park hosts could be tied to new restrooms to keep them clean and safe.

Appendix 5.7 contains the presentation from the Joint Study Session.

## I. PARKS MASTER PLAN SUBCOMMITTEE MEETINGS

The Parks and Recreation subcommittee meetings were held on January 13, March 28, and April 4, of 2016, to provide staff direction on contentious issues and help develop policies and actions for the plan. The following feedback was received during the meetings:

**KEY DIRECTION**

### Visioning

- Parks and Recreation enhances the quality of life of residents and visitors. Connectivity is important as the City moves in a sustainable direction. The City's natural heritage should be preserved and protected while providing experiences for a diverse community.

### Parks and Recreation Facilities

- New off-leash areas should be fenced-in. A target for off-leash dog use areas should be created for each area of the City.
- DeLaveaga Park needs improved connectivity.
- Consider adding lights to Depot Field to optimize field space. More opportunities are needed for organized sports groups.
- Harvey West Park needs renovation.
- Renovate San Lorenzo Park and create a variety of opportunities, especially for families and youth. Create a safer environment. Increase programming, such as yoga in the park, and hold more events to draw people.
- Moore Creek Open Space Preserve needs improved access to the open space. Explore creating a parking area off of Highway 1.
- Pogonip is an open space and should not be used to locate sports fields. Restore the clubhouse. Minimize conflicts between hikers and bikers.
- The Santa Cruz Riverwalk is an important community asset and needs continued efforts to improve the area.
- The coastal area needs a more cohesive, consistent identity and needs a vision and plan to improve the long-term management and coordination between multiple agencies.
- The beach areas need to remain free of litter and debris and safe from illegal activity. Availability of bike parking should be increased and cyclists should feel confident they can park their bikes without fear of theft.

- The Louden Nelson Community Center is an important resource that needs some renovation. The park does not always feel safe for families.
- Need to use the plan to help fund improvements to facilities.

### Safety and Security

- Park hosts could be a great program to help care for parks and could potentially create workforce housing opportunities. Avoid landlord tenant situations and instead provide hook-ups for an RV/Trailer.
- Volunteer docents could help monitor and care for parks.

Appendix 5.8 contains the agendas and presentations made at the March 28th and April 4th meetings.

## J. COMMUNITY EMAIL SURVEY 2016

The outreach process identified several issues that needed more feedback from a representative sample of the community to inform the recommendations in the plan, resulting in a second survey being conducted in 2016. The first set of questions followed the same general format as the initial survey. The second set of questions allowed for more detailed feedback on specific areas and topics.

### METHODOLOGY OVERVIEW

- Data Collection: Online interviews from email invitation
- Universe: Adults 18 years of age or older
- Fielding Dates: September 29 to October 12, 2016
- Interview Language: English and Spanish
- Sample Size: 314
- Margin of Error: ± 5.06%

### KEY FINDINGS

### Quality of Life

- At 72.4%, the reported satisfaction level of respondents in the 2016 survey was lower than the 2015 survey rate of 92.4%, though still quite high.

### Sports and Recreational Activities

- Santa Cruz continues to be a very active community with 89.5% reporting that their household participates in fitness, athletic or sports activities in the 2016 survey compared to 77.5% in 2015.
- Comparing both surveys, the activities that respondents or members of their household participate in were very similar. Hiking or walking was the highest ranked. Swimming, running, road biking, mountain biking, surfing, and soccer scored in the medium tier.

### Parks and Recreation Facilities

- As in 2015, a vast majority of respondents have visited City parks, trails, or recreation facilities in the past 12 months with only 0.8% using facilities less than once a year and 2.8% unsure of usage.
- The 2016 survey allowed for a more detailed response on park usage, with 78.4% of respondents indicating they visit a park, trail, beach and recreational facility at least a few times a month, and nearly 50% indicating a few times a week.
- Beaches had the highest percentage of usage at 82.7% followed by walking and hiking trails at 80.5%, parks at 75.6% and bike paths or lanes at 46.2%.

### Parks and Recreation Satisfaction & Preferences

- Respondents were generally satisfied with the maintenance of local recreation facilities, with 62% being either very or somewhat satisfied, though restroom maintenance satisfaction was lower at 42.3%

- Regarding safety of facilities, only 52.5% replied satisfied with park safety, though 65.5% were satisfied with safety at City beaches. Park lighting satisfaction was less positive, with a total satisfaction rate of 50.5%. Patrol of neighborhood parks by park rangers also received a lower rating at 44.9%.
- The availability of local recreational facilities received a high satisfaction rating of 72.5%.
- 66.2% of respondents were satisfied with facilities at neighborhood parks.
- Satisfaction for access to greenbelt hiking trails was high at 70.3%, though satisfaction ratings on mountain bike trails was lower at 44.4%.

### Importance of Recreational Activities & Frequency

- In line with usage responses, walking, hiking and jogging were extremely important activities for survey participants with 99.4 % of respondents ranking this as very important or somewhat important. Other sports ranking greater than 50% in importance were mountain biking and soccer.
- Facilities ranking highest in importance in descending order were open spaces with park amenities, undisturbed open spaces, paved trails, unpaved trails, children's play areas, outdoor sports fields, community gardens, mountain bike trails, and fenced and unfenced off-leash dog areas.

### Park Planning Preferences

Survey results were very mixed on park planning preferences.

- For sports fields, there was more support than other activities with 52.3% of respondents favoring an increased number of sports fields. When asked where these fields should be built, contributors split evenly between using Pogonip, buying industrial land, and partnering with the school district for joint-use of its facilities.
- Three questions addressed the use of greenbelts as future resources for park planning. Responses on the question of building sports fields, trails, playgrounds and park amenities in the greenbelts were 52.3% in favor with 30.9% opposed. Regarding trail use in these spaces, 75.7% of respondents supported creating additional trails. When asked what type of trails, 49.2% were in favor of multi-use trails; 26.1%, hiking only; and 11.1%, downhill mountain biking, separating mountain bikers from hikers. 0% indicated downhill trails with berms and obstacles.
- Respondents were asked for their opinions on the use of San Lorenzo Park in a series of seven questions. Only 16.3% wanted to keep the park as is. All questions regarding changes in events or features received favorable responses with the strongest support for hosting more events and programs, expanding facilities and activities, creating a food truck court and renovating the playground. Improved San Lorenzo River access was supported by 62.9% of respondents.
- Other survey responses included:
    - Respondents were neutral on the question of striping tennis courts to accommodate pickleball with 21.1% favoring and 25.9% opposing.
    - There was strong support for more restrooms (79.1%).
    - Many respondents (42.2%) felt that they have sufficient off-leash dog areas near their neighborhood compared to 21.6% who felt they do not.
    - Responses on fencing and locking parks at night were inconclusive with 42.1% having mixed opinions.
- When asked if they would be willing to contribute financially to supporting programs and facilities, 80.2% of the respondents responded favorably.

The Godbe Report can be referenced in Appendix 5.2.

## K. 2ND JOINT STUDY SESSION WITH PARKS AND RECREATION COMMISSION AND CITY COUNCIL

On February 7, 2017, a study session was held to receive feedback on the draft Parks Master Plan 2030. Feedback was received prior to the meeting that there were concerns regarding some of the draft recommendations and priorities. The Joint City Council and Parks and Recreation Commission approved a motion to work through identified issues, refine and establish priorities, clarify recommendations through a series of Parks and Recreation Commission meetings and return to Council with the revised plan and action plan for final review and adoption by the summer 2017. Policies would be added to the plan to increase fruit tree plantings. Councilmembers and Commissioners provided feedback on the draft and process.

**KEY DIRECTION**

### CEQA Process

- Review the environmental review process so that there is clarity for the public, City Council, and Commission.
- Place more attention on separating the recreation and open space sections of the plan.
- Environmental review should be done for new trails. Need to ensure that the trails neither restrict wildlife movement across corridors nor degrade habitats.

### Implementation Chapter

- Improve the link between the recommendations section and the funding strategies in the PMP. Both chapters should have more continuity to findings and data from the PMP process. Need to map community's future.
- Implementation strategy needs improvement.
- More discussion on how to reach the standards for acreage per capita for parks since SC is short in acreage.
- Important that the long-term plan can change with time.
- Remove cycling from active recreation and place in passive recreation.
- Consider hiring a grant writer for the department.
- Explore an endowment fund.
- Happy to see the Wharf and Civic are separate projects outside of the Parks Master Plan.
- Parks are underfunded. Need to partner with more stakeholders and look at the State's funding models.
- Need to have a firewall between Ranger's budget and the Parks and Recreation Department budget to ensure that programmatic cuts do not affect park services because of an increase in overall spending on the Ranger's budget.
- More strategic about how we seek State funding.
- Look at multiple locations for pickleball. Do not focus on a tournament facility. Concern for converting tennis courts to pickleball courts.
- Teach more youth skateboarding.
- Clarify the goal for Harvey West Pool.
- Create equal access for the public for recreational activities.
- Support for mountain biking in Pogonip but not at the Spring Trail (which is not being recommended in the draft). Supportive of providing more connectivity, such as from Harvey West Park to Pogonip Open Space.
- Off-leash areas near hiking trails help dogs release energy before a hike and the B-40 off-leash dog use area works well and could be considered near the Golf Club Drive to Spring Trail connection in Pogonip Open Space.
- Bike valet for special events.
- Supports community fruit gardens and orchards.
- Look further into the trade-offs and environmental effects of synthetic turf fields.
- Improve the tie-in of the Santa Cruz Riverwalk recommendations.
- More attention needs to be given to Lighthouse Field and the City's intentions.
- Public spaces need to be a shared-use to include all people.
- Interested in linear park to connect East and West Cliff Drives - stretches across the City.

- Focus on health equity and be purposeful. Don't only think about an aging population but also consider our youth. Do the people who access the programs reflect our population?
- Public safety is important. When increasing the Ranger's monitoring, where are populations displaced to?
- Partnerships are an important theme and one could be envisioned for the Pogonip Clubhouse.
- Use existing facilities in a more robust way.
- Mountain biking access will require careful consideration.
- Mountain biking is welcome but not everywhere.
- More money needs to be set aside for restrooms and the purchase of the Beach Flats Community Center.
- Extend the hours of the Harvey West Pool.
- Offer valet bike parking Downtown.
- Consider a linear park on Pacific Avenue with moveable street furniture.
- Improve the relationship between existing master plans and the recommendations.
- Protect our precious resources. New trails may inspire future generations of stewardship but there are also real concerns for erosion and damage to the environment. Biking community needs more self- policing.
- Incorporate comments from the River Summit into the plan.

**Conservation and Stewardship Chapter**

- Seek more native plant restoration throughout the parks system.
- More natural restoration.
- Find more balance between the community and environment.
- Work with UCSC to improve policies and actions.
- The plan represents the commercialization of the parks system and does not discuss natural restoration sufficiently.

## L. COMMUNITY OUTREACH SUMMARY

The community outreach process produced a sampling of information and feedback for the City of Santa Cruz. It created an opportunity for residents to be heard and to offer their views, input, and desires. Staff estimates that more than 1,600 members of the public participated in the process. The information received from both the quantitative data and qualitative input informed the Parks Master Plan 2030 "Recommendations, Goals, Policies and Actions" which will ultimately help meet the needs and wants identified during the process. Additional information was collected after the draft Parks Master Plan 2030 was released to the public.

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# SECTION 3.2: EMERGING TRENDS

A. Introduction
B. Demographic Trends
C. Recreation Trends
D. Programming Trends
E. Additional Park & Recreation Trends

## A. INTRODUCTION

In order to set goals and make appropriate recommendations for the future development and maintenance of Santa Cruz's parks, open spaces, beaches and facilities, it is critical to understand emerging trends amongst local user groups as well as national trends in parks and recreation.

A variety of resources were referenced to more fully understand the trends in parks and recreation. These include reports from the National Recreation and Park Association, California State Parks, Learning Resources Network, Outdoor Resources Review Group, Outdoor Industry Association, Recreation & Tourism Initiative, relevant online journals, and Roper ASW.

## B. DEMOGRAPHIC TRENDS

As discussed in section 2.3 Community Profile, Santa Cruz has a diverse population. Though there is a large percentage of residents aged 18 to 64, there are significant populations in other age groups as well. By anticipating the needs of each age group, resources and efforts can be focused to ensure there are minimal gaps in service to the community.

### ADULTS & YOUNG ADULTS

Adults and young adults are actively participating in newer recreational experiences, including extreme sports and adventure sports. They are generally waiting longer to marry and start families, so recreational activities are more friend- and group-oriented than in past generations, where they have been more family-oriented.



Cowell Beach

## UNDER 18

The younger generation is becoming more sedentary and solitary due to technology.[1] For future generations, it is important to encourage outdoor recreation for social and health benefits.



Junior Lifeguard Program at Cowell Beach

## BABY BOOMER GENERATION

As the Baby Boomer generation retires, they continue to be very active and are especially looking for amenity-rich and meaningful recreation experiences. In particular, they are drawn to conservation and heritage initiatives.[2]



Touring Pogonip Open Space through the Walking Adventure Group Program

## SENIORS

Adults aged 65 and older comprise nearly ten percent of the City's population. This population is growing and it will be important to tailor facilities and programs to meet their needs and interests. Seniors are increasingly active, with a particular desire for both pedestrian and bicycle trails. An increase in active seniors may require a necessary expansion in therapeutic recreation and exercise programs.



Line dancing class for seniors at Louden Nelson Community Center

## C. RECREATION TRENDS

### HEALTH, FITNESS, & LIFE-LONG SPORTS

According to the National Park & Recreation Association, walking, running, biking, and swimming continue to dominate the list of top ten recreational activities. This is in part due to an increased concern for health and fitness. Rather than joining a gym, many are participating in these low-cost individual activities that can start in childhood and continue into adulthood with little financial commitment. These activities are key in the effort to combat childhood obesity as well. Parks and Recreation departments are creating programs and events for both children and adults to provide incentives for exercising.



Pick-up basketball game at Laurel Park

### TEAM SPORTS

Another continuing trend is participation in team sports, which also provides an excellent outlet for increased health and fitness. In particular, there is a participation increase in soccer, lacrosse, field hockey, and rugby, while there has been a decrease in participation in softball and baseball.


Scott Kennedy Fields, Depot Park

### ADVENTURE SPORTS AND RECREATION

As previously mentioned regarding trends amongst adults and young adults, adventure sports are becoming very popular. In particular, there is a new trend towards extreme and adventure sports. The Outdoor Industry Association noted an increase in the popularity of adventure racing, traditional and off-road triathlons, stand-up paddling, kayak fishing, trail running, kayaking, and mountain biking. To accommodate these new sports, facilities and appropriate programming within existing parks and facilities should be considered. Santa Cruz has been a leader in many of these trends.


Emma McCrary Trail, Pogonip Open Space

## D. PROGRAMMING TRENDS

### MULTI-GENERATIONAL PROGRAMMING

In the past, parks and recreation programming has often been geared towards younger children. Now there is an emerging trend toward programs and events for all age groups. This includes multi-generational programs and events for families to enjoy collectively as well as more targeted niche programs specifically aimed at teens, adults, and the elderly.[3]



Ping-pong at the Depot Park Freight Building

### ENVIRONMENTAL PROGRAMS & EDUCATION

Santa Cruz has been at the forefront of environmental responsibility. And now, with recent droughts and concerns regarding climate change, there continues to be a strong desire for environmental programs and education as well as ensuring that any changes and developments to new and existing parks consider environmental implications. One element of environmental education is the installation of interpretive signage for flora, fauna, and natural processes along trails and waterways – a request that was persistently reiterated by community members and key stakeholders during the outreach process.



Interpretive panel at the Santa Cruz Riverwalk

## SPECIAL OUTDOOR EVENTS FACILITIES

The National Recreation and Park Association noted a growing attendance in major special events, such as concerts, festivals, fairs, and parties. To accommodate these events, it is important to have enough group picnic areas, outdoor stages and amphitheaters, and indoor auditoriums with up-to-date equipment that are accessible to all user groups.



Food Truck Event at San Lorenzo Park Benchlands

## OUTDOOR EDUCATION

Along with the trend towards health and fitness recreation, there is also a trend towards activities with a learning or educational component. From the environmental standpoint, this corresponds with the previously mentioned interpretive signage. From the recreational perspective, as emerging sports gain popularity, new park and facility users can be recruited by offering instruction and skills classes.



Example of an outdoor classroom for educational programs

## COOPERATIVE PROGRAMMING

In order to attract participants, cooperative, consortium based programs should be offered, which allow several communities or organizations to form partnerships to jointly offer programs. These programs can utilize and share the best resources that the communities or organizations can collectively offer. This can eliminate duplicate programming and attract a larger group of participants to each program.

## ADAPTIVE & INCLUSIVE PROGRAMMING

Outdoor and adventure programming for persons with disabilities is a growing trend amongst recreation providers. Along with programs tailored towards those with disabilities, programs designed for inclusive participation provide opportunities for those with and without disabilities to recreate side by side. People without disabilities tend to have more positive impressions and greater acceptance of people with disabilities after engaging in inclusive outdoor recreation programs.[4]

## E. ADDITIONAL PARK & RECREATION TRENDS

### ACCESS

With an increasingly urban population that relies on public transportation and alternative means of transit, such as bicycles, as a primary mode of transport, the development of comprehensive transportation and bicycle trail networks is crucial. Creating direct linkages between parks and facilities will help to maintain and encourage their usage as well.

There is a continuing trend to provide increased park and facility access for those with disabilities. At the most fundamental level, this involves removing existing physical barriers at parks and facilities. But this trend also incorporates increasing opportunities for inclusive participation in recreational activities by providing equipment that is accessible to those of all mental and physical abilities.[5] For instance, playgrounds can integrate play equipment with features that appeal to and are accessible to those with and without disabilities, allowing for inclusive play.



Magical Bridge Playground Palo Alto

### MARKETING

The trend in marketing and information distribution is towards utilization of technology, which has become the primary means by which most people gather information about use of parks and facilities as well as programming and special events.[6] This includes having an easily navigable and comprehensive website with maps, brochures, and online registration. Potential park, facility, and program users can be reached by utilizing email newsletters and social media as well.

### MANAGEMENT

There are also trends in the management of parks and recreation departments towards smooth, cost efficient operation and streamlined interaction with the public. According to the Learning Resources Network, there is a trend in registration patterns towards people registering in-person and on the day of events.[7] With so many competing options for recreation, people often do not sign up in advance, wanting to leave themselves open to possible alternative opportunities. This inundation of day-of registrants needs to be accommodated with better customer service so that the parks and recreation department's programs can successfully compete for participants.

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[1] California State Parks Planning Division (see reference 1).
[2] California State Parks Planning Division (see reference 1).
[3] Learning Resources Network. (2015). *Top Trends in Recreation Programming, Marketing and Management.* Retrieved from http://www.lern.org/blog/2014/07/07/top-trends-in-recreation-programming-marketing-and-management/
[4] Williams, R., Vogelsong, H., Green, G., and Cordell. K (2004). Outdoor Recreation Participation of People with Mobility Disabilities: Selected Results of the National Survey of Recreation and the Environment. *Journal of Park and Recreation Administration, 22:2,* 85-101. Retrieved from http://srs.fs.usda.gov/trends/pdf/ORDisabilities04.pdf
[5] Williams et al (see reference 6).
[6] Learning Resources Network (see reference 5).
[7] Learning Resources Network (see reference 5).

# CHAPTER 4: IMPLEMENTATION

**WHERE WE'RE GOING & HOW WE'RE GETTING THERE**

4.1 Goals, Policies & Actions
4.2 Asset Inventory & Specific Recommendations
4.3 Funding Strategies
4.4 Ongoing Planning & Updates



Bird’s Eye View of Depot Park, Bicycle Trip Bike Park, and Scott Kennedy Fields

# SECTION 4.1: GOALS, POLICIES & ACTIONS


A. Vision
B. Goals from the Santa Cruz General Plan 2030
C. Theme Framework
D. Goals, Policies, & Actions
E. Summary


## A. VISION

*The Santa Cruz Parks Master Plan 2030* (Parks Master Plan 2030) envisions a quality park system that connects the surrounding greenbelts to the Pacific Ocean, preserves and protects its natural heritage, enhances its cultural and recreational environments, and provides a diversity of experiences that enrich lives and support a healthy community.

## B. GOALS FROM THE SANTA CRUZ GENERAL PLAN 2030

The goals from the Parks, Recreation, & Open Space chapter of the City of Santa Cruz General Plan 2030 were referenced continuously during the development of the goals, policies, and actions for the Parks Master Plan 2030 in order to ensure compatibility and comprehensive coverage. Concurrently, the Parks Master Plan 2030 expands upon the City of Santa Cruz General Plan 2030 goals in order to more fully support the Vision statement above. The General Plan 2030 goals are included here for reference:

- **Goal PR1**: Ample, accessible, safe, and well-maintained parks, open space, and active recreational facilities
- **Goal PR2**: High-quality, affordable recreational programs, activities, events, and services for all
- **Goal PR3**: Well managed, clean, and convenient public access to open space lands and coastline
- **Goal PR4**: An integrated system of citywide and regional trails

## C. THEME FRAMEWORK

The City developed a framework of six themes for the Parks Master Plan 2030 that act as indicators of a healthy, balanced, and functional parks system.






Grant Park

These themes are used as both a filter and framework for synthesizing the information gathered during the outreach phase into the goals, policies, and actions of the Parks Master Plan 2030. In short, they provide the context for developing goals that align with the City's vision.




### THEME 1: DESIGN EXCELLENCE

The City will set a standard of design excellence with the aim of creating an engaging, long-lasting, safe, comfortable, and sustainable park system. By holding the design of the City's parks and facilities to a high standard, assets will attract and retain more users from the community.

### THEME 2: PLAY, COMMUNITY HEALTH, & INTERACTION

Parks and public spaces will encourage and support play, health, and interaction. The City will provide places to engage in a multitude of recreational activities, including supporting new trends in recreation. The physical infrastructure of parks and facilities will support and promote public health. Parks will provide opportunities for people to engage in activities together as well as to be active independently.

### THEME 3: STEWARDSHIP & SUSTAINABILITY

The City will protect and conserve natural resources while providing opportunities for the community to both support and learn from the natural environment. Impacts from recreational use will be minimized and additional efforts will be undertaken to restore and expand natural habitats.

### THEME 4: CONNECTIONS AND ACCESS

The City's network of parks, open spaces, beaches and public spaces will continue to make all assets accessible to residents and visitors of all ages and abilities. A trail system will link the various destinations. Access will be maintained to the open spaces and beaches, and efforts will continue to ensure that use of these areas neither diminishes the quality of the experience nor degrades the environment. The City will continue to seek new opportunities to provide and enhance connections and access for recreation, supporting an active and healthy lifestyle and encouraging the use of alternative modes of transportation across the city.

### THEME 5: PARTNERSHIPS

The City will strive to partner with schools, the university, other public agencies, and private service providers to provide recreation and natural restoration services to improve efficiency and coverage. Partnerships will help reduce redundancies within the existing parks system, freeing up resources that can be directed towards assessing and meeting unmet needs.

### THEME 6: GOOD GOVERNANCE

In order to practice good governance, the City will be transparent and accountable in its decision-making process, while being responsive to the community's needs and open to community participation. Good governance will aid in promoting the community's confidence in the City to not only expand the parks system, but to also manage, maintain, and improve the existing resources and programs.

## D. GOALS, POLICIES, & ACTIONS

The following seven goals were developed during the Parks Master Plan 2030 process to guide the future development and maintenance of the City of Santa Cruz's parks, open spaces, beaches, and recreational facilities. These goals are based on community input, direction from the City Council and Parks & Recreation Commission, and an understanding of current needs as well as emerging trends in recreation. The goals also serve to comprehensively address each of the themes detailed above, and the icon for the applicable theme or themes will be noted in relation to each goal. Ultimately, the implementation of these goals will be achieved through the identified policies and actions enumerated below.

**PARKS MASTER PLAN 2030 GOALS**

**GOAL I. Design**

- Provide attractive and sustainably maintained parks and facilities throughout the City.

**GOAL II. Distribution**

- Provide ample parks and facilities throughout the City.

**GOAL III. Facilities**

- Provide parks and facilities to meet the existing and emerging needs of residents and visitors of all ages and abilities.

**GOAL IV. Conservation & Stewardship**

- Protect the City's natural resources, wildlife habitat, and environment.

**GOAL V. Safety**

- Maintain a safe, clean, and comfortable environment for all park users.

**GOAL VI. Connectivity and Access**

- Provide an integrated park system with clean, convenient access to parks, open spaces, and the coastline.

**GOAL VII. Administration & Management**

- Establish, maintain, and operate parks, facilities, and programs in a manner that is cost effective and manageable while engaging the community in a manner that maximizes involvement and support.

**GOAL I. DESIGN**

**Provide attractive and sustainably maintained parks and facilities throughout the City.**

Well-designed and engaging parks and facilities attract users and foster community involvement and interaction. Throughout the outreach process, the Santa Cruz community has indicated a desire for improvements in quality, maintenance, and amenities at existing parks and facilities. Some of these improvements are more focused on sustainability, such as conserving resources, creating habitat, and reducing erosion and sedimentation. Other desires focused on creating attractive and interesting parks, facilities, and programs that offer unique and egalitarian access. National trends suggest that park users are looking for more unique experiences and programming is becoming more multi-generational. Feedback received during the outreach process supports these trends.




**POLICY A. Design, upgrade, and maintain parks and facilities with sustainable features and green building best management practices.**



Use native, drought-tolerant planting that enhances biodiversity

ACTION 1. Use sustainable landscaping design and maintenance practices to conserve water, prevent erosion and run-off, and provide habitat and food sources.

a. Investigate and implement the use of recycled water for irrigation.
b. Update irrigation systems to be weather-based, monitored, and controlled remotely.
c. Continue to conduct landscape audits for all parks, and incorporate results into budgetary decisions for upgrading systems and scheduling irrigation.
d. Replace turf in non-recreational areas with water-conserving landscapes, native plantings, and demonstration gardens. Include educational displays describing the environmental benefits.
e. Select materials and native plants to enhance biodiversity and attract pollinators and birds in parks.
f. Increase the number of trees and tree canopy to increase carbon sequestration, reduce heat island effect, and provide habitat.
g. Expand the dedication planting program to plant more trees.


Solar panels can be installed on facilities


Drinking fountains with water bottle fill

h. Increase the number of bioswales and continue to implement stormwater erosion best management practices to reduce runoff, erosion, and sedimentation.
i. Incorporate edible and medicinal landscaping treatments within parks and establish community gardens and orchards.

ACTION 2. Employ energy conserving practices to reduce energy use and produce clean energy.

a. Install computer controlled, energy-efficient lighting in parks and facilities. Minimize light spillover and wildlife impacts.
b. Install solar products or panels to provide clean energy for lights, new shade structures, or on larger facilities such as Harvey West Pool, the Golf Course Driving Range's deck, and/or the Louden Nelson Community Center.
c. Implement the Climate Action Plan's short-term and long-term projects.

ACTION 3. Use water conserving practices to reduce potable water use.

a. Install additional waterless urinals and low flow fixtures in parks and facilities.
b. Investigate water capture and reuse for large water users such as the DeLaveaga Golf Course.
c. Consider installing composting toilets in remote restrooms.
d. Install recycled water systems in facilities for watering adjacent landscapes.
e. Increase the number of drinking fountains with water bottle fill station features.

**POLICY B. Design, renovate, and maintain parks to be attractive and functional, increase longer-term use, optimize space, and enhance the unique identity for each park.**



Picnic shelter at San Mateo Shoreline Park




Custom fence and gate at Riverside Gardens

ACTION 1. Enhance man-made and natural settings when renovating parks through the use of complementary materials, colors, and features and the compatible placement, size, and layout for site furnishings, landscaping, pathways, plazas, artwork, and architectural features. Highlight key natural features in the design.

ACTION 2. Consider design features and site furnishings that add character and are not replicated in every other community.

ACTION 3. When feasible, replace asphalt pathways with decorative, permeable, hardscaped pathway surfaces.

ACTION 4. Create colorful and artistic expressions of landscape and garden design.

ACTION 5. Consider the function of landscaping in relation to the surrounding setting.

a. Install native plants in areas abutting open spaces, waterways, or other natural surroundings.
b. Install ornamental plantings along streets, at entrances, along primary pathways, around plazas, or other architectural features.

ACTION 6. Ensure that new parks have at least one street frontage for increased visibility, safety, and access.

ACTION 7. Work with the Arts Commission to incorporate interactive art and interpretive signage to highlight cultural, art, and historic elements within parks. Consider developing an Art in the Parks program.

ACTION 8. Carefully coordinate the site furnishings, plazas, pathways, passive and active recreational features and spaces, and landscaping to create meaningful experiences, minimize conflicts between new and existing uses, and optimize use.



Bench at San Lorenzo Park incorporates art with a function

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| ACTION 9. | Increase the number of bike parking spaces throughout the parks system. |
| ACTION 10. | Provide an adequate level of service of restroom facilities and renovate existing restrooms to maintain a clean, safe, inviting appearance. Place restrooms at larger or more extensively used neighborhood parks. |
| ACTION 11. | Develop and periodically update a site materials, colors, and site furnishings list to ensure continuity in overall park style and design. |
| ACTION 12. | Maintain a signage program and other features that help maintain a united identity for the parks system as a whole. |
| ACTION 13. | Increase the replacement of the deteriorating concrete garbage cans with decorative or BearSaver cans to improve appearance and increase recycling. |
| ACTION 14. | Invest in quality materials and newer designs, technologies, and products that will use less resources over time and ensure that preventative maintenance schedules are followed to maintain their appearance and function. |

**POLICY C. Improve accessibility for all users to all parks and facilities.**



Access ramp to beach

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| ACTION 1. | Improve access for disabled users.<br>a. Consider improvements to increase beach and open space access for disabled users.<br>b. Increase accessible parking near facility and park entrances and trailheads.<br>c. Consider Universal Design principles when locating new recreational facilities to accommodate use by all users. |
| ACTION 2. | Consider the needs of seniors in circulation and park design and expand recreational facilities for seniors. |
| ACTION 3. | Provide fitness facilities for all users and encourage multi-generational play spaces. |
| ACTION 4. | Seek additional community garden space in higher density or lower income areas. |
| ACTION 5. | Increase bilingual services, programs, and signage, especially in areas where English may not be the primary language for larger populations of residents. |

**GOAL II. DISTRIBUTION**

**Provide ample parks and facilities throughout the City.**




All neighborhoods and residents in the City should have equal access to quality parks and facilities. During the outreach process, some residents expressed concern about a lack of parks or facilities within close proximity to their neighborhood. Therefore, as new opportunities arise, the City will look at the distribution of existing parks and facilities. As the following policies and actions illustrate, the City will purchase or lease new property where it is most needed, and explore partnerships to improve opportunities for recreation. National trends indicate an increase in health and fitness sports that are easy and inexpensive to participate in, while the Godbe surveys conducted in the Santa Cruz community showed that walking, hiking, and jogging are three of the most popular activities amongst residents. Additionally, studies find that children under 18 are becoming more sedentary and solitary because of technology, so it is important to encourage outdoor recreation for social and health benefits. To support the national trend and findings of the Godbe surveys as well as empower children to recreate outdoors, it is crucial to provide easy access to nearby parks and facilities.

**POLICY A. Distribute recreation amenities evenly throughout the community.**



Opportunity to add amenities and furnishings at Round Tree Park

ACTION 1. Continue to seek opportunities to purchase or lease additional parkland: 1) in areas that lack existing parks and amenities in close proximity, 2) larger properties that can accommodate a variety of recreational facilities, 3)underutilized land, 4) higher density growth areas, 5) or properties with significant cultural heritage.

ACTION 2. Explore opportunities for partnerships to use land within or adjacent to the City to help provide facilities to meet unmet needs. Examples include improving the joint-use agreements with the school district to allow public use of outdoor recreational areas during non-school hours, working with UCSC to provide pickleball striping at the tennis courts at 207 Natural Bridges Drive, and partnering with the County to provide recreational facilities on the vacant, adjacent parcel near the lawn bowling facility at San Lorenzo Park.

ACTION 3. Evaluate all lands, regardless of size, for the development of small parks and facilities.

ACTION 4. Improve the Joint Use Agreements with the School District to improve access and more clearly define roles and responsibilities, funding, enforcement, and repair to ensure facilities and play areas remain open and in good condition during agreed upon public use times.

**GOAL III. FACILITIES**

**Provide parks and facilities to meet the existing and emerging needs of residents and visitors of all ages and abilities.**

Of equal importance to the quantity and distribution of parks and facilities is the quality of their amenities. These amenities should meet residents' current and anticipated needs, while also providing unique and interesting experiences that encourage repeated use. The following policies reflect feedback from the community outreach process as well as unmet needs identified by the City. Both suggest a need for more sports fields, bike amenities, indoor recreational space, and off-leash dog areas. The City also plans to develop diverse and iconic playgrounds that serve users of all abilities. National studies suggest that adults and young adults are creating new alternative recreational experiences faster than ever before, so it is crucial for parks and facilities to have the flexibility to meet these new and emerging trends in order to best serve the community as a whole. Additionally, the number of seniors will continue to grow, creating an increased desire for facilities and programs that cater to their needs.




**POLICY A.** **When adding new uses to neighborhood parks, consider how the use meets unmet needs of the community in addition to meeting needs of the surrounding neighborhood.**

**POLICY B.** **Scale recreational facilities to neighborhood parks that are compatible with the neighborhood character.**



Playground at Trescony Park

ACTION 1. Continue to hold neighborhood meetings to help inform the addition, modification, or removal of recreational facilities.

ACTION 1. Provide neighborhood park uses including, but not limited to, off-leash dog use areas, ball fields, skateboard parks, tennis courts, basketball courts, ping-pong tables, playgrounds and tot-lots, climbing and exercise equipment, slack-lining, pickleball courts, community gardens, pump tracks, bocce courts, disc golf courses, horseshoe pits, picnic areas, sand volleyball courts, when designed to minimize impacts to the surrounding neighborhood.

ACTION 2. Considerations in design should include minimizing potential impacts of light spillover, attenuating noise, and providing appropriate tree screening.

**POLICY C.** **Consider increasing the scale and uniqueness of each type of recreational facility located in a community park setting. Provide uses and experiences that are not common in neighborhood parks in order to draw use from the whole community.**

**POLICY D.** **Accommodate the need for more active sports fields for club, league, and casual play.**



Youth club baseball game at Lower DeLaveaga Park

**POLICY E.** **Develop playgrounds that meet a broad range of physical, creative, and social needs for all demographics.**




Magical Bridge Playground in Palo Alto is designed and built for children of all abilities

ACTION 1. Conduct an athletic field feasibility study to explore locations and options for additional multi-use field space (i.e. can accommodate soccer, football, lacrosse, rugby, field hockey, baseball, softball, etc.) and the use of synthetic turf to increase the duration of play.

ACTION 2. Explore or expand more cooperative agreements with the Santa Cruz City School district and UC Santa Cruz for the use of sports fields.

ACTION 3. Ensure sports fields have adequate drainage and lighting to increase the duration of play. Carefully consider health, environmental, and long-term costs when determining whether or not to convert grass to synthetic turf fields.

ACTION 4. Expand opportunities for informal sports play.

ACTION 1. Renovate and maintain playgrounds to create more unique and interesting play experiences. Incorporate:

a. Universal Design principles so parks and facilities are more inclusive and available to all users.
b. Natural playgrounds (water, rocks, trees, etc.).
c. Interactive playgrounds.
d. Multi-dimensional playgrounds.
e. Themed playgrounds.
f. Sand and water play.
g. Play structures that offer more than one type of play and allow children of varying abilities to play together.
h. Complementary facilities for adults, such as adult play/exercise equipment near playgrounds.



Sensory harp at Magical Bridge Playground



Natural willow branch play structures at Mission Bay Playground in San Francisco

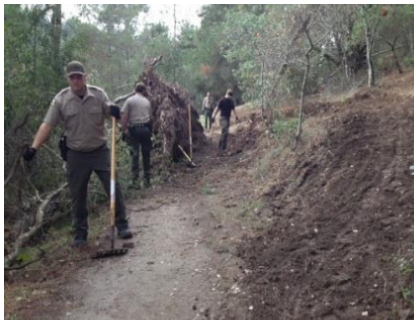
ACTION 2. Assure accessibility and safety on all City playgrounds.

a. Use playground surfacing that meets criteria of accessibility and safety.
b. Consider fencing playgrounds.
c. Provide signage about play equipment and safety rules.
d. Separate tot and school-age play areas.

**POLICY F. Enhance trail programs, trails, and infrastructure.**



Bridge building and trail maintenance



Emma McCrary Trail



Moore Creek Preserve

ACTION 1. Develop, improve, and enhance trails to provide for a range of uses.

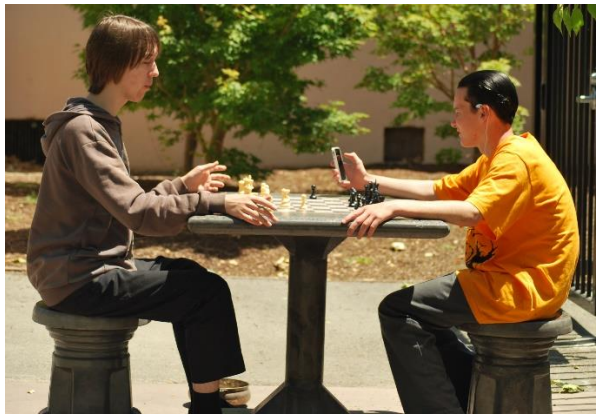
a. Evaluate new trail uses through a public process to determine if they are appropriate for a specific open space, and help the City provide for a range of trail uses. Collect usage data on existing trails and study impacts to wildlife and habitat to inform the decision-making process.
b. Expand the trail network and connections.
c. Seek partnerships with UCSC, State Parks, non-profits, and private property owners to improve network connectivity, signage and trail designations.
d. Rate and sign trails with the difficultly level, rules, and etiquette and provide wayfinding markers with accurate mileage.
e. Incorporate natural features such as fallen trees or rocks for seating and to block ad-hoc trails.
f. Realign trails or perform design improvements to address run-off, erosion, steepness of grade, and/or use conflict issues.
g. Provide access to areas with scenic views or historical significance.
h. Conduct trail assessments that will inform and help plan for future maintenance projects, grant applications, volunteer efforts. Increase the number of partnerships to help maintain the trails.
i. Create and maintain sustainable design guidelines and maintenance standards for existing trails.
j. Consider creating spurs from multi-use trails to enable mountain bikers to reach more advanced features and terrain to accommodate a variety of skill levels. Consider adding a technical downhill trail with jumps and obstacles for mountain bikers and adequately sign the trailhead with maps and signage indicating features and the difficulty level.



Santa Cruz Museum of Natural History's Nature Ranger Program

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| ACTION 2. | Provide opportunities for classes, tours, and practice space.<br>a. Seek programming and locations to host children's classes to learn "bike smarts".<br>b. Increase skills clinics for advanced riders.<br>c. Consider working with an outside provider to hold horseback riding classes within an appropriate open space during the summer months.<br>d. Hold more natural and historical interpretive tours and volunteer days. |

**POLICY G. Accommodate new and emerging trends and satisfy unmet needs.**






Outdoor chess and table tennis tables at Louden Nelson Community Center



Seasonal pump track in the San Lorenzo Park benchlands

ACTION 1. Provide activities that improve physical activity and mental health for all ages, abilities, and interests.

a. Provide outdoor game tables such as chess, checkers, table tennis, or foosball.
b. Continue to promote outdoor fitness and health initiatives and increase the distribution and number of outdoor exercise facilities.
c. Seek opportunities for community garden space, particularly on the east side of San Lorenzo River and in the Beach Area.
d. Seek opportunities and partnerships for the use of a walking track.
e. Consider locations for adding climbing wall and slack-lining facilities to be placed in equally distributed locations.
f. Consider adding a tennis court facility on the east side of the San Lorenzo River.
g. Identify a location for a pickleball facility with 6 to 10 courts and/or smaller facilities that can be located in different areas of the City.
h. Increase the number of wildlife interpretive signage and viewing areas.
i. Seek opportunities for the installation of a ropes course in a natural or urban setting.
j. Consider establishing a drone course only after further study demonstrates use of the facility would not result in significant impacts to sensitive habitat areas and wildlife including disturbance or harm to nesting birds. Prohibit recreational use of drones and/or establishment of a recreational drone course within sensitive habitat areas or near wildlife nesting areas that could cause disturbance or harm to breeding or nesting wildlife.



k. Provide spaces for intergenerational programming and activities to increase the interactions between older and younger generations.

l. Develop more bike parks, pump tracks, and jump facilities with features and amenities to meet a variety of skill levels.

ACTION 2. Expand concessions in parks and recreational facilities.

a. Continue to evaluate and monitor locations for mobile food vendors and determine if site furnishings or other amenities can be added to support successful locations.

**POLICY H. Upgrade, acquire and develop new community recreational facility buildings to accommodate new and emerging recreational trends and satisfy unmet needs.**



Roller derby bout at Kaiser Permanente Arena

ACTION 1. Prioritize upgrading and optimizing existing community recreational facilities.

ACTION 2. Capitalize on opportunities for partnerships and joint-use agreements to develop new community recreational facilities when rare opportunities are presented.

ACTION 3. Expand partnerships and concessionaire agreements to allow for outside providers to provide a recreational service on City land.

ACTION 4. Continue to seek community recreational facilities to host community events and programming. Continue to provide large gathering areas for family celebrations and group functions.

ACTION 5. Consider partnerships to allow for public recreational uses in the permanent Kaiser Permanente Arena during the Santa Cruz Warriors off-season.

a. Evaluate potential Parks and Recreation programming uses, events, designs, and costs during the planning phases of the arena.
b. Explore mechanisms to facilitate Parks and Recreation Department programming to facilitate multi-purpose sports and events throughout the year.

**POLICY I.** **Seek opportunities to enhance off-leash dog use experiences while minimizing conflicts with other park uses and wildlife.**



Example of fenced off-leash dog area with separate areas for smaller and larger dogs

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| ACTION 1. | New formal off-leash dog use areas in parks will be completely fenced and located in an underutilized area. |
| ACTION 2. | Identify a location for a fenced off-leash dog use area for the Lower Westside neighborhood. |
| ACTION 3. | Provide amenities and features that enhance the experience for dogs and their owners such as drinking fountains, shade structures, seating, picnic tables, and play features. |
| ACTION 4. | Consider creating separate, smaller facilities for smaller dogs or for dog training to reduce dog conflicts. |
| ACTION 5. | Increase enforcement of off- leash and dog access laws. |
| ACTION 6. | Clearly sign rules and etiquette to minimize conflicts. Educate users of the importance of cleaning-up waste to reduce odor impacts to the park and surrounding property owners. Work with the County Animal Shelter to provide animal behavior classes at dog parks. |
| ACTION 7. | Review the existing day-use access areas for domestic animals onto beaches and open spaces. Consider creating a licensing program to manage off-leash dog use. |
| ACTION 8. | Consider locations for off-leash dog use near open spaces to allow dogs to release energy before embarking on designated hiking trails. |

**GOAL IV. CONSERVATION & STEWARDSHIP**

**Protect the City's natural resources, native wildlife habitats and plant communities, and environment.**




Santa Cruz has an incredible wealth of open space and natural resources to manage and protect. During the outreach process, community members expressed a strong desire to preserve existing open spaces. Though the City's natural areas provide the majority of habitat within the City's park system, urban parks can also serve an important role in providing habitat and connectivity across the greater landscape. Many urban parks are located adjacent to open spaces, riparian areas, water bodies, or the coastline. Some species have adapted to human influences and development and find habitat at an urban park or facility, such as a bird nesting under a bridge. Other species may make use of urban parks as migratory habitat or for passage to other habitat areas. A park's location may be important in terms of greater connectivity, enabling wildlife to cross, shelter, drink, and/or feed. It is important to consider the role of urban parks for increasing biodiversity. Restoration plans will help identify, prioritize and implement long-term projects. The provision of recreational facilities within open spaces requires additional consideration to minimize impacts to the environment. National trends suggest an increased interest in environmental programs and education, which will help engender environmental stewardship in current and future generations. As the baby boomer generation retires, they continue to be active and are drawn to conservation causes, so they can be enlisted to help with volunteer and educational efforts.

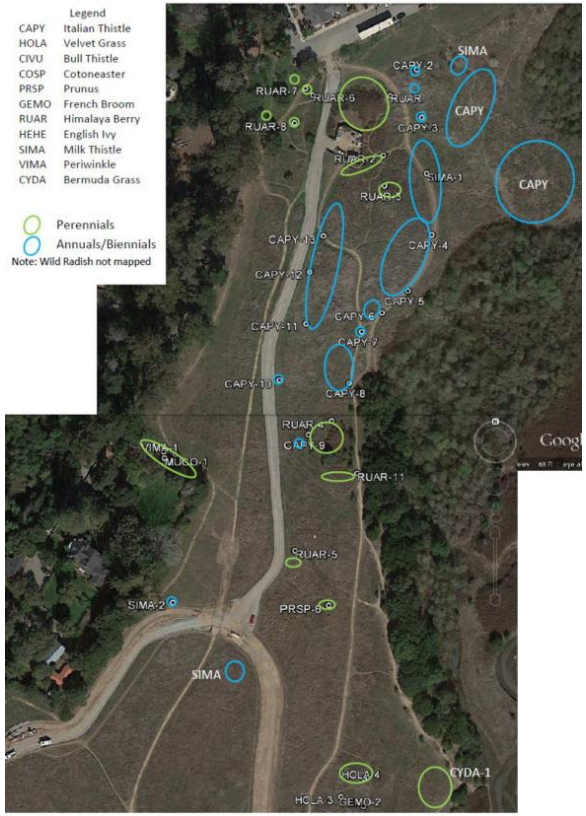
**POLICY A. Maintain and enhance natural habitats to increase biodiversity and sustain long-term ecological function.**

ACTION 1. Understand and maintain the diversity of native plant communities.

a. Map and describe plant communities; analyze successional trends; and formulate site-specific vegetation management goals, targets, restoration methods, and monitoring protocols for parks and open spaces.
b. Periodically update the inventory of invasive plants and input data into Cal-Mapper, Cal-Flora to help track the spread of invasive plants at a regional level.

ACTION 2. Understand and maintain the diversity of native wildlife.

a. Identify wildlife usage, movement patterns, and habitat features with high value to wildlife and formulate site-specific management goals for parks and open spaces.



Example of invasive weed mapping, Arana Gulch, Area C


Measuring grass height along transect lines to determine if targets were met

b. Inventory critical and sensitive wildlife habitats and develop management strategies for their protection.
c. Collect data to identify how urban parks can be landscaped and contain features to help improve habitat and connectivity across the City for specific species.
d. Consider programs and partnerships to increase the documentation of local wildlife such as through eBird, iNaturalist, Bio Scan, and other wildlife data collection sources to increase the amount of data available for informing management decisions.

ACTION 3. Develop and implement restoration work plans to restore natural processes and control invasive species.

a. Identify habitat specific restoration actions to be implemented within each park/open space, including a yearly schedule and long-term timeline based on existing Master Plan policies and actions. Utilize an adaptive management approach to guide and prioritize specific restoration activities with the goal being the establishment of functional ecosystems. Use SMART principles (specific, measurable, achievable, results-focused, and time-bound) as a framework. Prioritize restoration objectives with the number one priority being the conservation of rare, threatened, or endangered species and their supporting habitats. Undertake projects in areas that would increase public exposure and education. Develop a condensed work plan for each site that is practical to use in the field for maintenance staff and volunteers. Create clear guidelines for City personnel, contractors, and volunteers that reflect the conditions of specific projects and sites to ensure that sensitive resources are not mistakenly damaged during restoration activities.



Cattle grazing at Moore Creek Preserve to restore the coastal terrace prairie and improve habitat for the endangered Ohlone tiger beetle



Partnering with the Santa Cruz Museum of Natural History's Earth Stewards Program to teach students job skills in the natural restoration field

b. Conduct periodic training sessions for City personnel, contractors, and volunteers on best management practices to prevent the entry of invasive plants and maintenance of existing native plants.
c. Seek partnerships with agencies, schools, universities, organizations, and community groups to help learn, fund, perform, or study restoration activities.
d. Maintain an adopt-a-park program and engage and support community members who wish to commit to a longer-term undertaking. Provide guidance and assistance to ensure work is performed in accordance with a restoration plan.
e. During future organizational reviews and strategic planning, consider the creation of an Open Space Maintenance and Restoration Division.
f. Increase the number of large clean-up days to remove waste from illegal camping activities. Continue to provide training to participants to reduce the risk from public hazards. Provide ongoing, steady, monitored maintenance to prevent the large scale build-up of trash. Ensure that clean-up efforts avoid damaging bird nests.
g. Develop a funding strategy for the long-term implementation of the work plans.
h. Seek partnerships to study, enhance, and expand wildlife corridors, increase habitat value, control invasive plant species, and educate the public whenever possible.
i. Work with county, state, and federal agencies to identify and control feral or pest populations that have a negative impact on plants and/or wildlife.

ACTION 4. Improve habitat within urban parks and facilities.

a. Identify and convert non-usable turf fields to native gardens. Base landscaping treatments on appropriate native communities, taking into account geology and other microsite conditions. Create park specific planting lists and incorporate Xerces Society planting recommendations to increase habitat for pollinators.



Community members team-up to remove invasive species at Tyrrell Park




Native planting along the Santa Cruz Riverwalk

b. Consider certifying landscaping through the National Wildlife Federation's Garden for Wildlife Program and post signs to increase awareness of the importance of gardens for butterflies, bees, birds, and other wildlife.
c. Increase the tree canopy and/or provide plants and features that provide habitat value in public right-of-ways, drainage areas, or on other lands managed by the Parks and Recreation Department.
d. Inventory trees and increase the tree canopy to increase bird nesting opportunities, improve air quality, decrease heat island effect, and increase carbon sequestration.
e. Explore the installation of habitat enhancement structures in parks, such as owl boxes near turf fields to help control gophers.

ACTION 5. Use native species occurring naturally on similar sites in ecological restoration projects when feasible.

a. Use seed and cuttings collected from the same geographic area to revegetate or enhance degraded areas.
b. Prevent the spread of *Phytophthora* in city parks and open spaces.
c. Use fill, mulch, plants, and seed mixtures that are free of non-native plants and disease in ecological restoration projects.
d. Work with nurseries to grow native plants needed for ecological restoration projects.
e. Use site appropriate native or sterile plants for erosion control. Do not use invasive, non-native plant species.
f. Use plant material that is ecologically and visually appropriate to the surrounding wild landscape and appropriate to the stage of plant community development at the site.



Downtown Tree Walk

ACTION 6. Maintain and expand tree canopy coverage and manage forest diseases, when necessary, to protect native biological diversity and critical ecosystem functions.

a. Assess impacts and determine strategies to address areas if infested by high priority insects and diseases; utilize best phytosanitary management practices to control the spread of disease and infestations; support research to guide land management decisions; utilize nursery stock from nurseries that implement best management practices and test for *Phytophthora*; and pursue partnerships with public agencies to implement treatments.

b. Complete an inventory to quantify the number of trees on public lands including streets, parks, and open spaces. Increase the City's urban tree canopy by 10% between 2008 and 2020.

c. Promote the Urban Forestry Program to provide new trees for public property, celebrate Arbor Day, and increase the number of neighborhood tree plantings. Coordinate the preservation of trees whenever possible. Expand the Heritage Tree Grant Program.

**POLICY B. Manage greenbelt and open spaces for conservation and to minimize recreational use impacts.**



The endangered Ohlone tiger beetle





Livestock grazing to control invasive plant species at Neary Lagoon Wildlife Refuge

ACTION 1. Protect and enhance the habitat and populations of special status plant and animal species.

a. Monitor locations and conditions of special status plants and wildlife and their habitats within a park or open space.
b. Conduct surveys for special status plants and wildlife during the appropriate season before significant site-specific development or any unusual anticipated increase in use. Modify the project or use to avoid impacting such plants or wildlife.
c. Ensure resource conservation and environmental sensitivity in project design and construction.
d. Evaluate new uses for potential impacts to watershed, riverine, stream, and riparian environments.
e. Protect areas with special status species from negative human activities and other impacts such as erosion, trampling, and litter. Examples of protective measures include trail rerouting, educational signs, and fencing.
f. Give priority to protection of special status species.
g. Continue to partner with wildlife agencies in managing special status species.

ACTION 2. Protect, maintain and enhance habitat features that are important to native wildlife and native plant communities.

a. Avoid, minimize, or off-set impacts on wildlife and native vegetation when planning trails and other facilities.
b. Revegetate plants native to the specific habitat in buffer/setback areas adjacent to creeks and wetlands.
c. Minimize potential erosion from new trails using sustainable design features and improve existing eroding trails.
d. Monitor the impacts from new improvements to identify remediation solutions and to inform future decision-making.



Volunteers repair erosion on the U-Con Trail, Pogonip Open Space



Youth Trail Crew repairing a puncheon crossing

e. Leave snags and fallen trees in areas where they do not pose a fire or physical hazard, to provide cover and nesting sites for animals, and nursery conditions for forest seedlings.
f. Evaluate the wildlife habitat value associated with human-made structures before altering or removing them and avoid or mitigate any impacts.
g. Discourage human intrusion into sensitive wildlife habitats by appropriate placement of facilities and trails.
h. Identify and eliminate barriers (e.g. remove unnecessary fences, old barbed wire, and other barriers) and provide safe crossings (e.g. protect existing and promote additional wildlife crossings and use wildlife friendly fencing) to enhance wildlife movement.
i. Reduce conflicts between wildlife and humans through notification and education, control of human access and, as a last resort, control of wildlife presence or movement in concert with State and/or Federal agencies.
j. Where consistent with riparian and wetland protection, provide views or low impact access.
k. Evaluate new uses for potential impacts to watershed, riverine, stream, and riparian environments.
l. Work with local and regional agencies to implement strategies to reduce or mitigate impacts of uses and development on the City's watershed lands.
m. Conserve creek, riparian, and wetland resources in accordance with the City-wide Creeks and Wetlands Management Plan, San Lorenzo Urban River Plan, Moore Creek Interim Management Plan, Jessie Street Marsh Management Plan, and the Neary Lagoon Management Plan.
n. In the CEQA review process for new projects, evaluate and mitigate potential impacts to sensitive habitat (including special-status species and nesting birds) for sites located within or adjacent to these areas.

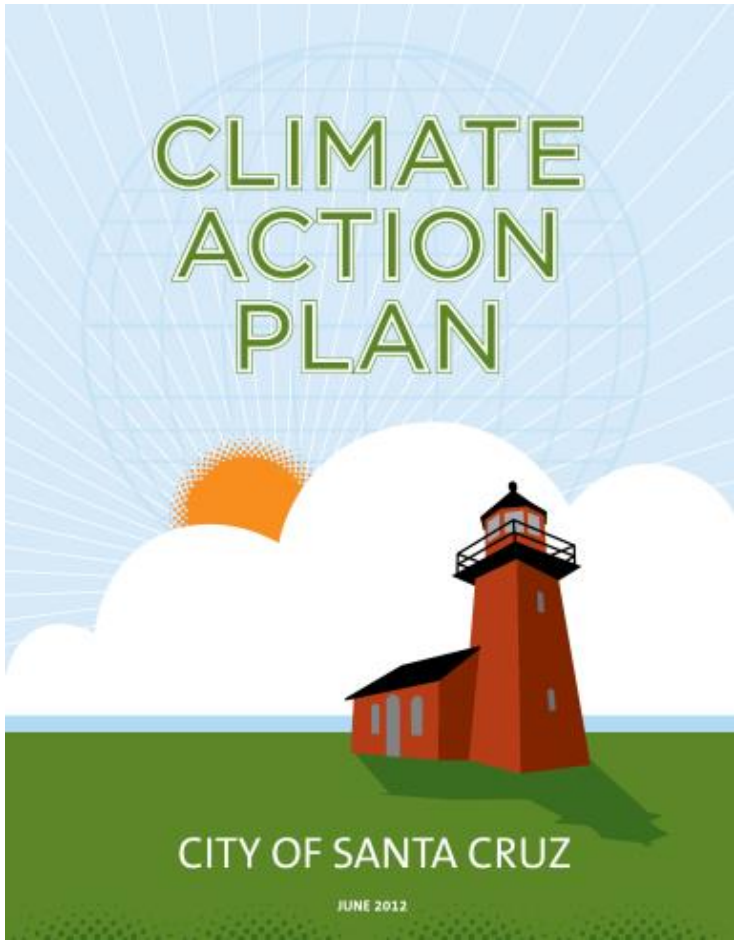

Bioswale near the Cowell Beach parking lot

o. Maintain a trash management policy and continue to install new receptacles designed to prevent trash from subsidizing predator and pest populations (corvids, gulls, rats, raccoons).
p. Continue to conform to the City's Integrated Pest Management Program.
q. Protect coastal roosts and rookeries in the course of activities that could disturb or disrupt breeding or result in loss of habitat, such as construction activities, recreational activities, or special events.
r. Implement site design and erosion control measures for new trails and other facilities in areas subject to high erosion hazards or adjacent to streams and wetlands.

ACTION 3. Protect waterbodies, including creek systems, riparian environments, and wetlands from uses that would degrade their value to native species.

a. Reduce erosion and sedimentation from roads and trails.
b. Increase the number of bioswales to increase percolation, entrap and filter sediments, and reduce stormwater runoff from developed areas.
c. Decrease illegal camping and access to non-designated areas.

**POLICY C. Support and seek funding for long-term projects.**




| | |
|---|---|
| ACTION 1. | Continue to partner with the Resources Conservation District to reduce stormwater run-off, sedimentation, and erosion. |
| ACTION 2. | Pursue reclaimed water, water capture, and water recharge projects to decrease erosion and sedimentation and conserve water. |
| ACTION 3. | Continue to implement the Climate Action Plan and Climate Adaptation Plan. |
| ACTION 4. | Continue to improve partnerships with local, state, and federal agencies and organizations to help address regional challenges such as habitat fragmentation, connectivity, global warming, invasive species control, fishery management, and water pollution. |
| ACTION 5. | Seek grant funding opportunities for specific projects but ensure funding is available to maintain restored areas to prevent issues from remerging after the project is complete. |

**POLICY D. Provide more environmental education to the public.**



Parks & Recreation's Camp Spot Rocks in Neary Lagoon

ACTION 1. Provide youth with environmental education programs.

a. Collaborate with City schools and others on outdoor classroom programs. Special emphasis should be provided in engaging youth in meaningful ways to learn and appreciate the local plants and wildlife. Build wild elements into parks and open spaces, formal and informal play areas, with materials that encourage inquiry and dialogue with nature.

ACTION 2. Provide interpretive programs for the public.

a. Provide more interpretive signage in parks and open spaces and along waterways.
b. Continue the downtown tree walk tour.
c. Consider the development of park docent program.
d. Provide interpretive education programs led by park rangers and/or docents. Partner with organizations and hold classes and interpretive walks.
e. Continue to partner with the Santa Cruz Museum of Natural History to provide interpretive tours within the City's open spaces.

**GOAL V. SAFETY**

**Maintain a safe, clean, and comfortable environment for all park users.**

For the community to enjoy the City's parks and utilize their amenities, park users need to feel safe and comfortable. Throughout the outreach process, residents repeatedly provided feedback concerning a perceived lack of safety and cleanliness in the parks and open spaces, which has affected usage of parks and playgrounds. Therefore, the City proposes to improve the safety and cleanliness in the parks by mitigating the impacts of illegal activities through design treatments to help create more visible, navigable, and activated parks. At the same time, increased enforcement of rules and presence of rangers, police, park hosts, and mental health services in parks will help to deter illegal activities.




**POLICY A. Mitigate impacts of illegal activities on park use.**


Camp clean-up with Rangers


Levee damage caused by illegal camping

ACTION 1. Use defensible space design treatments to deter illegal behaviors.
- a. Increase lighting and visibility in parks and on trails.
- b. Increase visibility into parks by maintaining clear lines of site and eliminating hidden nooks and enclaves.
- c. Activate underutilized spaces by providing additional programming and facilities to encourage lawful uses.
- d. Make parks easily navigable with way-finding elements.
- e. Explore fencing, locking, and temporary closures of areas of concern.

ACTION 2. Explore rules and policies regarding park uses (drones, off-leash dogs, camping, and closures).

ACTION 3. Develop a caretaker or park host program to help care for open spaces and community parks.

ACTION 4. Explore partnerships and programs to provide information and referrals about mental health, drug abuse, and homeless services.

ACTION 5. Increase resources to remove trash and debris from illegal camping.

**POLICY B. Increase patrols and enforcement.**



Increased park ranger presence in downtown Santa Cruz

ACTION 1. Increase park ranger/police presence and interaction.

a. More patrolling earlier in the morning and later in the evening.
b. More alternative methods of patrol (bikes, motorcycles, etc.).

ACTION 2. Increase enforcement of park rules.

**GOAL VI. CONNECTIVITY AND ACCESS**

**Provide an integrated park system with clean, convenient public access to parks, open spaces, and the coastline.**

The network of parks, open spaces, beaches, and trails provide access and connectivity across the City. They provide opportunities for recreation, a buffer from the more urban environment, a means for alternative transportation, and critical natural resources. The beaches and open spaces embody the City's unique sense of place and identity. In many areas of the City, trails provide nearly continuous links between parks, open spaces, and the beaches. National trends indicate a move towards more interconnected park systems through trails, connector parks, and greenways, allowing easier park and facility access to residents of all ages and abilities. A greater emphasis on pedestrian and bicycle pathways also aligns with national trends indicating an increase in the popularity of health and fitness recreation. The City will continue to resolve gaps in the park system through partnerships and land acquisition. Some neighborhoods are disconnected and it is important that all neighborhoods have access to quality parks and facilities as described under Goal II. Distribution.




**POLICY A. Continue to integrate, expand, and improve the connective and accessible network of parks, open spaces, and trails.**

ACTION 1. Continue to seek opportunities to purchase or lease additional land to enhance recreational corridors and extend network connectivity. Seek properties and improvements that fill gaps within the trail system, expand recreational opportunities along existing corridors, or provide important habitat and wildlife connections.

ACTION 2. Implement the San Lorenzo Urban River Plan and enhance and maintain the recreational value of the riverfront.

ACTION 3. Help develop and implement an integrated design, land-use, recreation, cliff stabilization, and landscape plan for West Cliff and East Cliff Drives to enhance public safety, access, connectivity, preservation, and recreational enjoyment along the coastline.



Monterey Bay Sanctuary Scenic Trail Master Plan

ACTION 4. Support and help implement and maintain the Monterey Bay Sanctuary Scenic Trail multi-use path. Seek opportunities for additional parkland along the corridor. Consider adding complementary features and design treatments at existing parks along the trail such as by placing wayfinding signage and maps, benches, trash receptacles, drinking fountains, picnic areas, shade structures, artwork, or plazas adjacent to the trail.

ACTION 5. Acquire new open space when there are opportunities to increase access and improve public safety and management. If the opportunity presents itself, support the acquisition and management of Lighthouse Field.

ACTION 6. Work with the Public Works Department to help implement the Active Transportation Plan and connect major parks throughout the City with smaller loop options and spur trails that connect to the bike and pedestrian system through the City and to the regional network.

ACTION 7. Support a Felton-Santa Cruz recreational trail and transportation/commuter corridor.

ACTION 8. Provide and maintain trails within parks and appropriate open space areas.

ACTION 9. Develop trailhead locations.

a. Provide well signed trails with maps.
b. Provide parking.

**POLICY B.** **Protect, maintain, and enhance publicly accessible coastal, riverfront, and open space areas to ensure they maintain a safe, quality appearance. Provide recreational and educational experiences that reflect the unique sense of place and identity of Santa Cruz.**



Multi-use trail project at Arana Gulch Open Sace

| | |
|---|---|
| ACTION 1. | Ensure staffing-levels are adequate to patrol, maintain, and clean the coastal, riverfront, and open space areas. |
| ACTION 2. | Evaluate existing and develop new rules, policies, and programs to ensure they promote a safe and clean environment. |
| ACTION 3. | Ensure existing facilities and site furnishing are updated and new ones are added in a manner that ensures a quality appearance that maintains continuity over time as projects are phased-in. |
| ACTION 4. | Continue to partner with agencies, organizations, and community members to keep the coastal, riverfront, and open space areas pristine and attractive. |
| ACTION 5. | Maintain and improve access and the recreational value of the coastal, river front, and open space areas while ensuring that new uses, facilities, or site furnishings do not diminish their intrinsic qualities and natural resources. |

**GOAL VII. ADMINISTRATION & MANAGEMENT**

**Establish, maintain, and operate parks, facilities, and programs in a manner that is cost effective and manageable while engaging the community to maximize involvement and support.**




Well-managed parks, facilities, and programs attract more use and participation from residents, which helps to generate community support for the parks system. During the outreach process, key stakeholders suggested the need to increase both maintenance staff and park rangers to provide a better experience for park users. In order to increase staffing and accomplish many of the improvements outlined in this Parks Master Plan 2030, a sustainable funding mechanism must be developed. National trends indicate an increase in the use of technology for promoting and registering for programs and events as well as providing basic information to park visitors, so utilizing the City's website and email lists is critical in communicating efficiently and cost-effectively with the public. Technology can help to reduce administrative costs to allow more funds for improvements to parks, facilities, programs, and staffing.

**POLICY A. Administer parks and recreation facilities to continue to deliver quality parks and recreation services.**



Youth Trail Crew Program and Park rangers

ACTION 1. Develop maintenance and safety standards for parks and facilities and evaluate staffing levels to achieve goals.

a. When acquiring new facilities, consider long-term staffing and maintenance costs.
b. Increase full-time staff to improve park maintenance
c. Increase the number of park rangers to allow more focus on natural resource management, park maintenance, and interpretation in addition to law enforcement and illegal camp clean-ups.
d. Hire a grant writer.

ACTION 2. Work with the Parks and Recreation Commission to establish and maintain annual short-term and long-term priorities for capital improvement projects that are proposed to the City Council. Develop and maintain conditions assessments to help inform the review process which include information on year of installation, maintenance costs and issues, replacement costs or alternatives, safety concerns, and other relevant data.

ACTION 3. Coordinate efforts with CA State Park and other recreation providers to ensure public use areas are adequately maintained.

**POLICY B. Continue to improve community outreach and communication.**




WebTrac, on the City of Santa Cruz website, allows for online registration

**POLICY C. Develop a sustainable funding mechanism for the maintenance and operation of City parks, open space, beaches and facilities.**




Friends of Parks & Recreation homepage

ACTION 1. Publicize park programs and facilities.

a. Continue to utilize website for marketing events, programs, and classes.
b. Utilize emerging technologies to publicize events, programs, classes, and park and facility improvements.
c. Consider developing an outdoor tour cell phone application where park users can take tours and learn about the history, environment, and things to do and see when they visit each park and open space.

ACTION 1. Increase funding for parks.

a. Consider a ballot initiative or other alternative financing options to augment Parks and Recreation Department funding.
b. Expand partnerships with private organizations.
c. Develop maintenance agreements with other entities.

ACTION 2. Develop, implement and adopt a parks program and increase volunteer efforts.

ACTION 3. Consider the establishment of a parks endowment fund.

ACTION 4. Consider prioritizing projects which are economic generators and draw use from residents and visitors.

ACTION 5. Utilize and support Friends of Parks and Recreation (FOPAR) to help in their fundraising, scholarship, and funding of smaller special projects to improve the parks system.

ACTION 6. Evaluate fees and use rates to reflect the current costs to provide services. During the fee study, consider the viability of use passes to help offset maintenance costs.

## E. SUMMARY

The goals, policies, and action items developed during the Parks Master Plan 2030 process will guide the future development of the City of Santa Cruz's parks, open spaces, beaches, and recreational facilities. Many reflect long-standing goals and others are based on community input, direction from the City Council and Parks & Recreation Commission, and an understanding of current needs as well as emerging trends in recreation, the action items represent the broad spectrum of values, needs, and desires of the Santa Cruz community.

In addition to the overarching goals, policies, and actions just presented, specific recommendations for individual parks, open spaces, beaches and facilities evolved out of the outreach process. The following section, 4.2 Asset Inventory and Specific Facility Recommendations, outlines the recommendations for each park, open space, beaches, or facility in the park system. The general policies and actions in the previous sections would also apply to each of these facilities.



# SECTION 4.2: ASSET INVENTORY & SPECIFIC FACILITY RECOMMENDATIONS

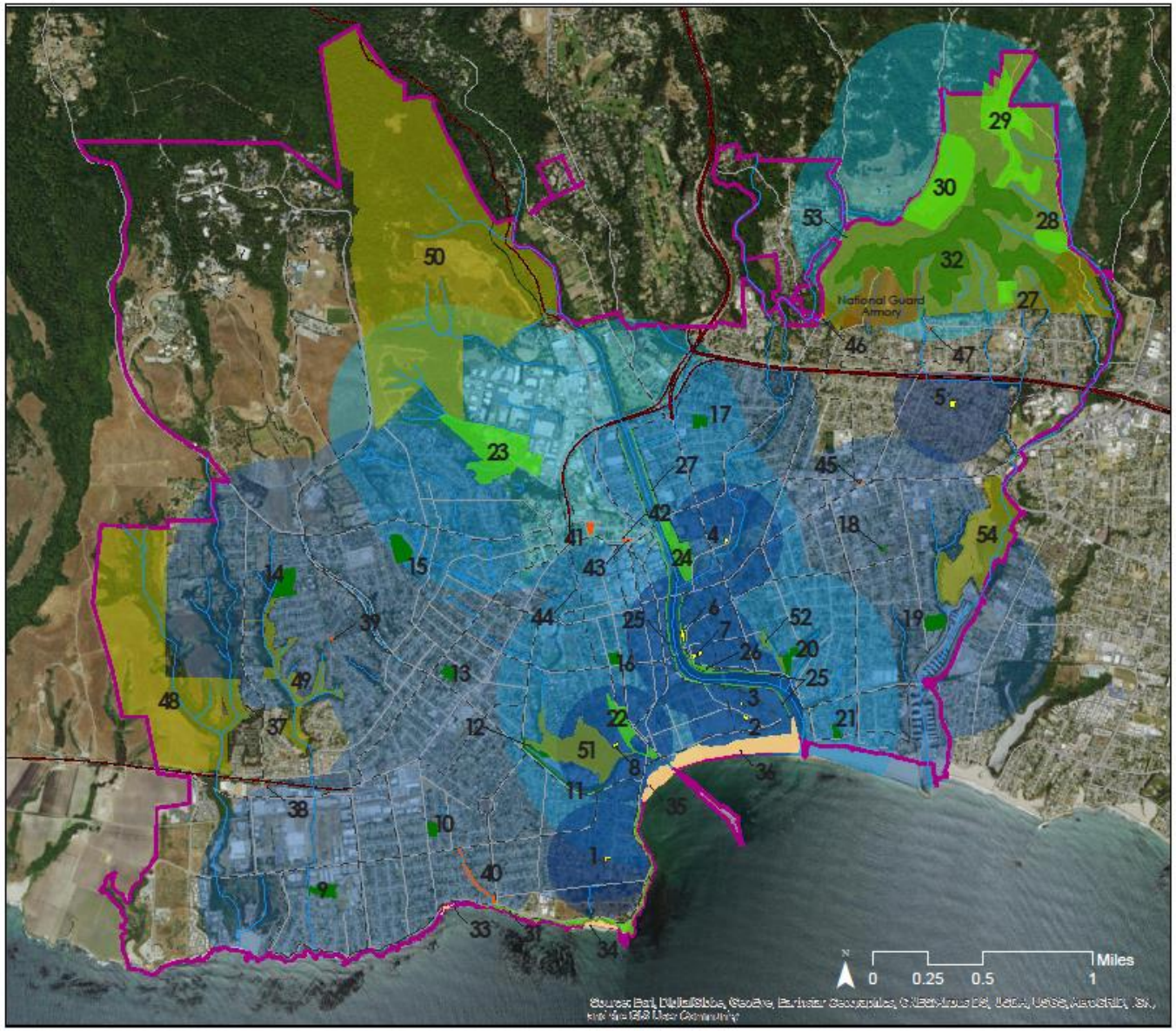
In addition to broader goals for the park system, the *Santa Cruz Parks Master Plan 2030* (Parks Master Plan 2030) has specific recommendations for each location. These recommendations are based on the input received during the community outreach process, input from City staff on current usages and condition of the facility, and opportunities to meet unmet needs of the community.

The following pages contain detailed descriptions of each of the City's assets. Each assessment includes recommendations, location or access point, proposed classification, size, master plan where applicable, a general description, photos and maps, and a table describing and assessing the condition of the asset's features.

For ease of use, the facilities are shown in alphabetical order:

- Arana Gulch Open Space
- Arroyo Seco
- Beach Flats Community Center
- Beach Flats Park
- Bethany Curve
- Branciforte Dog Park
- Carmelita Cottages
- Central Park
- Chestnut Park
- City Hall Complex
- Civic Auditorium
- Cowell & Main Beaches
- DeLaveaga Park – Audrey Stanley Grove
- DeLaveaga Park – DeLaveaga Archery Range
- DeLaveaga Park – DeLaveaga Disc Golf Course
- DeLaveaga Park – DeLaveaga Golf Course and Maintenance Yard
- DeLaveaga Park – DeLaveaga Wilderness Area
- DeLaveaga Park – Lower DeLaveaga Park and George Washington Grove
- DeLaveaga Park – Lower DeLaveaga Park Office
- Depot Freight Building
- Depot Park, Bicycle Trip Bike Park, and Scott Kennedy Fields
- Downtown Santa Cruz
- East Cliff Accent
- El Portal Park
- Frederick Street Park
- Garfield Park
- Grant Park
- Harvey West Park
- Harvey West Park – Harvey West Pool
- Harvey West Park – Kids Kottage and Wagner Cottage
- Harvey West Park – Ranger Station
- Harvey West Park – Scout and Clubhouse
- Its Beach
- Jessie Street Marsh
- John D. Franks Park
- Ken Wormhoudt Skate Park at Mike Fox Park
- La Barranca Park

- Laurel Park
- Lighthouse Avenue Park
- Louden Nelson Community Center
- Mimi de Marta Dog Park
- Mission Plaza Park
- Mitchell's Cove
- Moore Creek Overlook
- Moore Creek Preserve
- Museum of Natural History
- Neary Lagoon Park
- Neary Lagoon Wildlife Refuge
- Ocean View Park
- Pacheco Dog Park
- Parks and Recreation Administration Building
- Parks Maintenance Yard
- Poets Park and Beach Flats Community Garden
- Pogonip Clubhouse
- Pogonip Open Space
- Rincon Park
- Riverside Gardens Park
- Round Tree Park
- San Lorenzo Park
- San Lorenzo Park Lawn Bowling
- Santa Cruz Riverwalk
- Santa Cruz Wharf, Wharf Headquarters, and Maintenance Yard
- Scope Park
- Senior Citizens Opportunity (222 Market Street)
- Sgt. Derby Park
- Star of the Sea Park
- Surfing Museum
- Town Clock
- Trescony Park
- Tyrrell Park
- University Terrace Park
- West Cliff
- Westlake Park
- Westside Pump Track




## Existing Park Coverage Map

**Neighborhood Parks <1 acre**

1: Lighthouse Avenue Park
2: Beach Flats Park
3: Poets Park and Beach Flats Community Garden
4: Central Park
5: John D. Franks Park
6: Mimi de Marta Dog Park
7: Riverside Gardens Park
8: Chestnut Park

**Neighborhood Parks ≥1 acre**

9: Sgt. Derby Park
10: Garfield Park
11: La Barranca Park
12: Neary Lagoon Park
13: Trescony Park
14: University Terrace Park
15: Westlake Park
16: Laurel Park
17: Grant Park
18: Star of the Sea Park
19: Frederick Street Park
20: Ocean View Park
21: Tyrrell Park

**Community Parks**

22: Depot Park, Bicycle Trip Bike Park, and Scott Kennedy Fields
23: Harvey West Park
24: San Lorenzo Park
25: San Lorenzo Riverwalk
26: Ken Wormhoudt Skate Park at Mike Fox Park
27: DeLaveaga - Audrey Stanley Grove
28: DeLaveaga - Archery Range
29: DeLaveaga - Disc Golf Course
30: Lower DeLaveaga Park and George Washington Grove
31: West Cliff Drive

**Regional Parks**

32: DeLaveaga - Golf Course

**City Beaches**

33: Mitchell's Cove
34: Its Beach
35: Cowell Beach
36: Main Beach

**Single Amenity Parks**

37: Moore Creek Overlook
38: Westside Pump Track
39: Round Tree Park
40: Bethany Curve
41: Mission Plaza Park
42: Scope Park
43: Town Clock Park
44: Rincon Park
45: El Portal Park
46: Branciforte Dog Park
47: Pacheco Dog Park

**Open Space**

48: Moore Creek Preserve
49: Arroyo Seco Canyon
50: Pogonip
51: Neary Lagoon Wildlife Refuge
52: Jessie Street Marsh
53: DeLaveaga Wilderness Area
54: Arana Gulch

**Park Buffers**

0.25 mi. radius on Neighborhood Parks (<1 acre)

0.5 mi. radius on Neighborhood Parks (≥1 acre)

0.5 mi. radius on Community Parks

## Arana Gulch Open Space



**Location:** Mentel Ave. @ Agnes St., Brommer St. @ 7th Ave., and Broadway @ Frederick St.

**Proposed Classification:** Open Space

**Size:** 67.7 acres

**Master Plan:** Arana Gulch Master Plan (2006)

Arana Gulch Open Space was developed to include a multi-use path which connects Brommer Street, Broadway, and Agnes Street. The multi-use path was constructed to be ADA compliant, allowing for members of the public with mobility difficulties to access an open space. Bridges cross Arana Creek and Hagemann Gulch, offering elevated and unique perspectives of the open space. The open space also includes roughly a mile of hiking trails. Interpretive signage was installed to educate visitors about the unique habitat and history of the property. Grazing is conducted onsite to help restore the SC tarplant and coastal prairie. Many visitors enjoy watching the cattle graze. The open space also overlooks the Santa Cruz Harbor. The City has adopted a Habitat Management Plan and works with a technical advisory group to help guide restoration efforts.

**Recommendations:**

1. Continue to implement the Habitat Management Plan and restore the Santa Cruz tarplant population and coastal prairie, woodland, and riparian areas.
2. Explore the Joint Use Agreement with the Santa Cruz Port District to allow for the public use of the restroom facility near the harbor yard, or explore opportunities to add a porta-potty on the west side of the Hagemann Bridge entrance.
3. Provide educational tours to improve awareness and seek scientific partnerships to inform restoration efforts.

| Feature | | Condition | Description |
|---|---|---|---|
| Site Access | Parking | Very Good | Off-street parking is provided at the intersection of Broadway and Frederick Street. |
| | Entrance Sign | Very Good | Three large trailhead signs with trail map. |
| | Trail | Very Good | Multi-use trail is pervious concrete and hiking trails are bare ground. |
| Site Furnishings | Benches/Seating | Very Good | Two wood, nine recycled plastic. |
| | Bike Parking | Very Good | Four U racks. |
| | Combined Garbage & Recycling | Very Good | Three metal BearSaver cans. |
| | Interpretive Signs | Very Good | Seven interpretive signs, six steel frames, one large wooden sign. |

## Arroyo Seco



**Location:** Access at University Terrace Park and Grandview St. near Escalona Dr.

**Proposed Classification:** Open Space

**Size:** 33.94 acres

**Master Plan:** Meder Canyon Management Plan (1999)

Arroyo Seco Canyon is a natural ravine with an approximately one mile long multi-use path (bike-pedestrian)/maintenance road connecting University Terrace Park to Grandview Street. The top section is paved. Public Works maintains the majority of the property. Parks and Recreation primarily performs vegetation and trail maintenance activities along the lower trail section. In 1980, a concept plan which included rest stops and access improvements was approved. Implementing the plan did not receive support during future neighborhood meetings and the project was not pursued. The Meder Creek Management Plan was developed by Public Works and provides recommendations for maintenance and restoration activities. Recreational improvements could include the removal of invasive plants, formalizing the ad-hoc trail connections from the neighborhoods to the east which connect down to the trail, and providing exercise equipment, benches, and interpretive and park signage. Additional neighborhood input is needed before moving forward.

**Recommendations:**
Improve connections to lower and adjacent neighborhoods and consider installing benches, exercise equipment, interpretive and park signage, and other small amenities at key locations.

## Beach Flats Community Center



**Location:** 133 Leibrandt Ave.

**Proposed Classification:** Community, Recreational, and Cultural Facility

**Size:** 2,742 sq. ft.

The community center has a community room, computer lab, classroom, and kitchen. It is operated by the non-profit organization Community Bridges who provides programs and services for summer recreation, environmental education, application assistance, after school programs, advocacy, parent education, and food and nutrition.

**Recommendations:**
None.

## Beach Flats Park




**Location:** 122 Raymond St.

**Proposed Classification:** Neighborhood Park

**Size:** 0.22 acres

Beach Flats Park is one of two small parks serving the Beach Area neighborhood. It is a well-used park located adjacent to the Beach Flats Community Center. The small stage is used for events and parties.

**Recommendations:**

1. An outdoor table game such as table tennis or foosball could be incorporated into the park. The proximity to the Beach Flats Community Center could allow for ball check-outs. An outdoor table tennis game is popular with community members at Laurel Park, which is adjacent to the Louden Nelson Community Center, and at Garfield Park.
2. Add bicycle parking racks as the park currently has none.
3. The matting of the playground area will require replacement in the 1-2 year timeframe.

| Feature | | Condition | Description |
|---|---|---|---|
| Recreational Facilities | Playground | Good | One metal structure with slide and swing set with fibar fill. |
| | Tot-lot | Fair | One structure with swings and bucket swings. Fenced-in with rubber matting (in need of replacement in the 1-2 year timeframe). |
| Safety and Security | Lighting | Good | Five light poles. |
| Site Access | Pathway | Good | Concrete. |
| | Entrance sign | Very good | One metal. |
| Site Furnishings | Art | Very good | Mural. |
| | Benches/Seating | Very good | Five metal. |
| | Drinking fountain | Good | One metal. |
| | Event electrical hook-ups | Very good | Two hook-ups. |
| | Garbage | Good | One concrete. |
| | Recycle | N/A | One toter. |
| | Picnic tables | Fair | Four wood tables. |
| | Stage | Good | Small wood stage. |

## Bethany Curve



**Location:** Delaware Ave. to West Cliff Dr.

**Proposed Classification:** Neighborhood Park

**Size:** 3.4 acres

Bethany Curve is a passive creekside walking trail connecting Delaware Avenue to West Cliff Drive. It contains benches, artwork, and dog play features. The vegetation includes non-native weeds and ice plant. Native, drought tolerant landscaping could be planted along the trail to both beautify the park as well as provide nectar-producing plants for Monarch butterflies which overwinter in the surrounding area. Increasing native habitat could also benefit migrating birds that visit the park. The Parks and Recreation Department can solicit volunteers to help plant and maintain the garden areas. Bethany Curve should be included in the analysis of a West Cliff Drive Master Plan. It is located along West Cliff Drive and midway between the restroom facilities at the State's Lighthouse Field and Natural Bridges State Park and could be evaluated as a potential location for a low-profile restroom facility. Special attention would need to be given to design and the view corridor.

**Recommendations:**
Include the park in the planning analysis of a West Cliff Drive Master Plan. The park could be beautified by planting native gardens which could improve habitat for migrating birds and Monarch butterflies. The pathways could be renovated. The dog play features could be relocated to an off-leash dog use area.

| Feature | | Condition | Description |
|---|---|---|---|
| Site Access | Pathway | Fair | Pathway extends from Delaware Ave to West Cliff Dr. |
| Site Furnishings | Art | Very good | One metal structure. |
| | Benches/Seating | Fair | Sixteen wooden benches. Most benches are in good condition. Some need refinishing. |
| | Dog features | Good | One set of steps, one ramp and bridge, and one set of hoops. |
| | Garbage | Fair | Four small metal cans. Two concrete cans show rust and warping of metal. |
| | Interpretive signs | Good | One interpretive sign near West Cliff Dr. |

## Branciforte Dog Park



**Location:** Creekside Ln. @ Branciforte Dr.

**Proposed Classification:** Neighborhood Park

**Size:** 0.22 acres

Branciforte Dog Park is a fenced-in dog park which is next to the Carbonera Sphere and Upper Eastside neighborhoods. The off-leash dog use area is located at the trail head to the Enchanted Trail, DeLaveaga Park, which allows off-leash dog use on the trail below the sand pit area. It is very hot during the summer months and there is full exposure to sunlight.

**Recommendations:**
Dog play features, shade structures, and seating could be added to enhance the experience for dogs and/or owners.

| Feature | | Condition | Description |
|---|---|---|---|
| Recreational Facilities | Off-leash dog use | Very good | A fenced off-leash dog use with two tunnel features. Wood chips are used for the surface. No shade structures or trees. |
| Site Access | Parking | Fair | Dirt parking area. |
| | Entrance sign | Very good | One metal sign on a wood post. |
| Site Furnishings | Garbage | N/A | One plastic garbage can. |
| | Picnic tables | Good | One picnic table. |

## Carmelita Cottages



**Location:** 321 Main St.

**Proposed Classification:** Community, Recreational, and Cultural Facility

**Size:** N/A

Carmelita Cottages is currently leased to the non-profit organization Santa Cruz Hostel Society. Up to 45 guests can stay in five of the renovated Victorian cottages. More than 10,000 guests stay in the hostel each year. The current lease expires in 2021 and will need to be renewed prior to expiration.

**Recommendations:**
None.

## Central Park



**Location:** 301 Dakota St.

**Proposed Classification:** Neighborhood Park

**Size:** 0.16 acres

Central Park's small size and street frontage limits the type of recreational facilities that can be located there. The park currently has a small landscaped area that is often saturated and prone to flooding during the rainy season due to poor drainage. There is a small playground area with relatively limited features. It could be expanded into the grassy area. Picnic tables, exercise equipment, or other small features could be added to create more opportunities for recreation.

**Recommendation:**
Improve the playground area and add picnic tables.

| Feature | | Condition | Description |
|---|---|---|---|
| Recreational Facilities | Playground | Fair | Swings, roundabout, spring toys, small climbing rock feature. |
| Site Furnishings | Benches/Seating | Very good | Two recycled plastic benches. |
| | Garbage | Fair | One concrete garbage bin. |
| | Recycle | N/A | One toter. |

## Chestnut Park



**Location:** Southern terminus of Chestnut St.

**Proposed Classification:** Neighborhood Park

**Size:** 0.28 acres

Chestnut Park is located at the southeastern edge of Neary Lagoon Wildlife Refuge. The park was upgraded to include new playground equipment, picnic tables, BBQ pits, and a new half-court basketball facility in 2016.

**Recommendations:**
Add signage.

| Feature | | Condition | Description |
|---|---|---|---|
| Recreational Facilities | Basketball court | Very good | Half court. |
| | Playground | Very good | Play structure with slides and fibar fill. |
| Site Access | Pathway | Very good | Decomposed granite surface. |
| Site Furnishings | BBQ pits | Very good | Two metal bbq pits. |
| | Benches/Seating | Very good | Six recycled plastic benches. |
| | Bike parking | Very good | Nine U racks. |
| | Drinking fountain | Very good | One metal drinking fountain. |
| | Garbage & Recycle | Very good | One BearSaver can. |
| | Picnic tables | Very good | Two recycled plastic tables. |

**City Hall Complex**




**Location:** 809 Center St.

**Proposed Classification:** Other

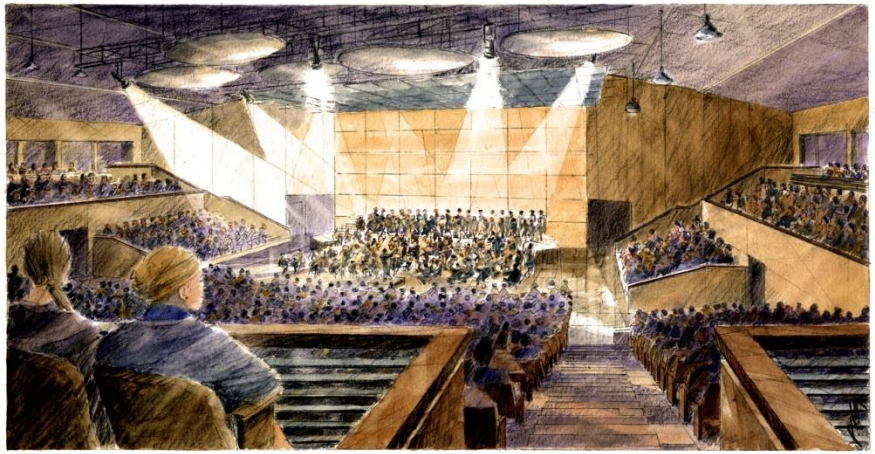
**Size:** N/A

The Parks and Recreation Department maintains the gardens and water fountains for the City Hall complex. Recent improvements have included replacing turf with garden areas and the installation of decomposed granite pathways and decorative rock features.

**Recommendations:**
None.

## Civic Auditorium



Conceptual rendering of the Civic Auditorium as an arts, cultural, and entertainment venue

**Location:** 307 Church St.

**Proposed Classification:** Community, Recreational, and Cultural Facility

The Civic Auditorium was opened in 1940 and is a multi-purpose auditorium (34,739 sq. ft.) with a stage and seating for total capacity of 2,021. It is configured with a large flat floor space with 1,105 fixed seats surrounding the floor in a u-shape layout with a stage at one end. Additional seating can be placed on the floor. The facility is used for concerts, sporting events, expos, theatrical performances, movie screenings, conferences, and receptions. It has five primary tenants which include the Cabrillo Festival of Contemporary Music, the Santa Cruz Symphony, the Santa Cruz Ballet Theatre's Nutcracker, the Santa Cruz Follies, and the Santa Cruz Derby Girls. The City conducted a Concept Design Study in 2014 and a Business Planning Study in 2015 which recommended improvements to the building systems and modifications to improve the facility as an arts, cultural, and entertainment venue.

**Size:** 34,000 sq. ft.

**Recommendations:**

1. Move forward with the studies recommendations and renovate and operate the facility as an arts, cultural, and entertainment venue.
2. Explore the possibility of setting-up an indoor pickleball league until the Civic Auditorium is renovated.

### Cowell & Main Beaches



**Location:** Beaches to the east and west of the Santa Cruz Wharf

**Proposed Classification:** Beach

**Size:** 31 acres

**Management Plan:** Cowell and Main Beach Management Plan (2014)

Cowell and Main Beaches are popular local and tourist destinations. The proximity to the Santa Cruz Wharf and Santa Cruz Boardwalk create a wide range of recreational activities for visitors to explore. A number of hotels and restaurants support locals and tourism. A small parking area, a Jr. Lifeguard storage building, and restrooms are located at the east end of Cowell Beach. A ramp, stairs, and an ADA accessible walkway provide access down to the beach from the parking area. The Santa Cruz Wharf is located between Cowell and Main Beaches. The Santa Cruz Boardwalk is located along the northern edge of Main Beach and a walkway extends along Beach Street from the Santa Cruz Wharf to the Boardwalk. Restrooms are located next to Ideal Bar and Grill near the entrance to the Wharf. The City's Junior Lifeguard Program uses Cowell Beach and a surf equipment rental concessionaire rents beach recreational items daily during the summer months. Two volleyball courts are located below the Dream Inn on Cowell Beach. Sixteen public volleyball courts are located on Main Beach. The Santa Cruz Seaside Company maintains an additional two volleyball courts on Main Beach. Beach areas are rented for private events. Illegal behavior and safety issues at Cowell Beach prompted the City to implement a beach curfew which limits access from midnight until one hour before sunrise to crossing the dry sand portion of the beach to reach the wet sand portion of the beach and water. The curfew is in effect until 2019. No curfew exists for Main Beach. The high use of the beach during the summer months necessitates the need for the City to operate beach clean-up and grooming on a regular basis. The City continues to study and improve the poor water quality issues at Cowell and Main Beaches.

**Recommendations:**

1. Continue to improve beach clean-up efforts and create guidelines to direct volunteer efforts.
2. Continue to form partnerships, support volunteer efforts, provide signage, enforce litter laws, invest in equipment, and work on projects that clean-up the beach area, improve water quality, and help provide a safe environment.
3. Improve ADA access to the beach area.
4. Maintain a curfew on Cowell Beach until risk issues for beach goers have been resolved.
5. Consider improving the Junior Lifeguard Headquarters and storage area at Cowell Beach to accommodate growth, improve programming, and store equipment.
6. Consider installing a seasonal tot-lot on Cowell Beach or Main Beach.
7. Renovate the Beach Street restrooms.
8. Consider utilizing the parking area near Cowell Beach for more bike parking and recreational amenities. Seek opportunities for bike valet during the summer to deter theft.
9. Consider improving the layout of the volleyball courts at Main Beach to increase the number of courts and explore seasonally lighting the courts, taking into account light spillover and bird and wildlife concerns in the design recommendations.

## DeLaveaga Park – Audrey Stanley Grove



**Location:** 501 Upper Park Rd.

**Proposed Classification:** Community, Recreational, and Cultural Facility

**Size:** 5 acres

Audrey Stanley Grove is a 496 seat outdoor amphitheater with a sound booth, ticket booth, and parking area that is located in Upper DeLaveaga Park. Santa Cruz Shakespeare developed the amphitheater in 2016 and leases the space from the City, holding summer performances during June, July, and August. During the off-season, the Parks and Recreation Department will use the space for programming or private rentals during September and October. As part of the project approvals, a trail from the lower neighborhood to Upper DeLaveaga Park near the entrance to the Audrey Stanley Grove was improved in 2017.

**Recommendations:**

1. Expand the use of the amphitheater for private and public events during the Santa Cruz Shakespeare off-season. Seek opportunities to coordinate receptions and other public events with the Golf Course restaurant.
2. Renegotiate lease before the 2018 season.
3. Explore future opportunities to enhance the utility and comfort as a performance and community space such as by adding permanent restroom facilities, dressing rooms, and small concession areas.

### DeLaveaga Park - DeLaveaga Archery Range



**Location:** Accessed from the Brookwood Dr. entrance to DeLaveaga Park

**Proposed Classification:** Community, Recreational, and Cultural Facility

**Size:** 5 acres

The Santa Cruz Archery Club maintains the indoor/outdoor archery range at DeLaveaga Park. A membership to the club is necessary to use the facilities. The outdoor range area includes practice and picnic areas with 28 targets. Target areas offer a variety of skill challenges which are not limited to variations of shooting lines, angles, and distance.

**Recommendations:**
None.

## DeLaveaga Park - DeLaveaga Disc Golf Course




**Location:** Access from Upper Park Rd.

**Proposed Classification:** Community, Recreational, and Cultural Facility

**Size:** 40 acres

DeLaveaga Disc Golf Course is a world famous 29-hole disc golf course located in DeLaveaga Park. It is maintained by the Disc Golf Club and tournaments are often held. Erosion control and tree protection need to be improved at this site. Discussions with staff and the club have included the possibility of charging players a fee to play in order to help fund improvements.

**Recommendations:**
Consider a pay-for-play facility to help improve maintenance and care of the facility, including tree protection and replacement, erosion control, poison oak abatement, invasive weed removal, native plant restoration, and other improvements.

## DeLaveaga Park – DeLaveaga Golf Course and Maintenance Yard




**Location:** 401 Upper Park Rd.

**Proposed Classification:** Community, Recreational, and Cultural Facility

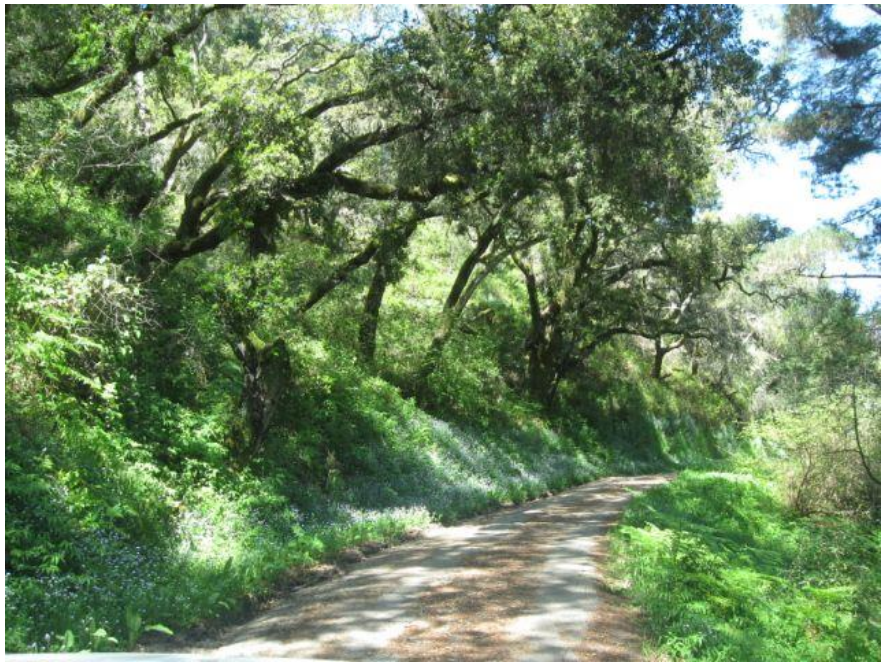
**Size:** 151 acres

**Master Plan:** DeLaveaga Golf Course Master Plan (2002)

DeLaveaga Golf Course is an 18-hole golf course. Golf Course facilities include a double-decked driving range with lighting, a BBQ group picnic area, a clubhouse with a banquet facility, and practice greens for putting and chipping. The operations of the golf course, driving range, and restaurant are leased to a concessionaire. The City maintains the golf course and a maintenance yard is located onsite. The City adopted the DeLaveaga Golf Course Master Plan in 2002 which recommends a variety of improvements, including constructing a new clubhouse to accommodate larger events, installing a new irrigation system to conserve water, adding solar to the upper deck of the golf course to provide shade and conserve energy, performing tree management work to reduce dead and diseased trees, redesigning and updating the sand traps, leveling the tees, grading the fairways, increasing the parking areas, and improving the maintenance yard.

**Recommendations:**
Implement the DeLaveaga Golf Course Master Plan.

## DeLaveaga Park - DeLaveaga Wilderness Area



**Location:** Access from Upper Park Rd., Branciforte Dr., Prospect Hts., and Brookwood Dr.

**Proposed Classification:** Open Space

**Size:** 269 acres

**Master Plan:** DeLaveaga Park Master Plan (1960)

The DeLaveaga Park Wilderness area contains the undeveloped portions of DeLaveaga Park. The area contains multi-use trails that connect the various facilities located within the George Washington Grove, Lower DeLaveaga Park, and the Upper DeLaveaga Park areas. Trail connectivity should be improved throughout the park, and trail linkages will need to avoid crossing the Golf Course which is a large barrier. Improvements could be pursued to link the ad-hoc trails north of Prospect Heights to the Sandpit trail head off of Branciforte Drive to improve connectivity around the park. Easements may need to be granted by the National Guard Armory depending on the trail alignment. A new trail could link to the historic zoo site to the west of Prospect Heights along DeLaveaga Park Drive. A portion of the area is level and is currently fenced. Remnants of the zoo are found in the surrounding hillside. The site could be developed to be a play area with unique features that blend recreation with history, serve the surrounding neighborhood. It could also be a stop along a new multi-use trail. The Wilderness area may also have potential for adding a separate mountain biking trail or skill building area. Arana Creek deposits sediment into the lower portion of the watershed. The City works with the Resource Conservation District to seek grant opportunities for watershed enhancement projects and should continue to pursue these projects.

**Recommendations:**

1. Consider expanding the multi-use trail network and improve connectivity throughout the park, utilizing existing fire roads and ad-hoc trails.
2. Consider a separate downhill mountain biking facility or skill building area.
3. Consider locating a play area or other recreational use and interpretive signage in the historic zoo area. Link the area to a multi-use trail.
4. Continue to work with Resource Conservation District and implement the Arana Gulch Creek Stormwater Watershed improvement projects.

## DeLaveaga Park – Lower DeLaveaga Park and George Washington Grove



**Location:** Entrances are located on Branciforte Dr. north of Mill Rd.

**Proposed Classification:** Community Park

**Size:** 50 acres

**Management Plan:** DeLaveaga Park Master Plan (1960)

George Washington Grove is located across Branciforte Creek to the north of Lower DeLaveaga Park. George Washington Grove contains a seasonally-opened group picnic area, two bocce ball courts, and restrooms. The restrooms at George Washington Grove are in a poor condition. Parking is sometimes limited for the park and an additional parking area could be located to the north of George Washing Grove. A trail could connect the parking area to the picnic area. Seven reservable picnic areas are located at these parks. Lower DeLaveaga Park has restrooms, two softball fields, a large grass field, a sand volleyball court, two horseshoe pits, and a playground. There is currently no access between the parks, therefore a pedestrian bridge across the creek could allow for more recreational opportunities for park users. Trail improvements and access improvements should be sought to link the Upper Eastside Neighborhood to this park.

**Recommendations:**

1. Create spillover parking area and construct a pedestrian bridge across Branciforte Creek to connect George Washington Grove to Lower DeLaveaga Park, possibly a replica of the covered bridge. Add interpretive signage describing the unique history of the property and covered bridge which used to be located onsite.
2. Renovate the restrooms at George Washington Grove.
3. Larger scale renovations to the ballfield should evaluate the potential redesign of the dugout, fencing, bleachers, and field goal posts layout and configuration to potentially accommodate more field space within the park. Considerations could also include the meadow area.
4. Consider artificial turf and energy-efficient lighting improvements to conserve resources.
5. Consider as a potential location for pickleball courts.

| Feature | | Condition | Description |
|---|---|---|---|
| Recreational Facilities | Baseball or softball field | Good | Two softball fields with grass outfields and lighting. Metal bleachers. No scoreboards. Three porta-potties are provided. Small dugouts. |
| | Bocce ball | Good | Two bocce ball courts are located in George Washington Grove area. |
| | Horseshoe pits | Good | Two horseshoe pits with backstops next to picnic areas in Lower DeLaveaga Park. |
| | Large, grass field | Good | Large multi-use field in Lower DeLaveaga Park is relatively level with some gopher holes and bare spots. |
| | Playground | Good | Includes a couple of climbing structures, slides, and a tire swing. Fibar is used for the playground surfacing. |
| | Reservable picnic areas | Good | The seven combined picnic areas include 51 large, wooden picnic tables; ten large BBQ pits with a masonry exterior, 16 serving tables. Two include wet bar areas. Drinking fountains are located in or around most of the picnic areas, and most include electric hook-ups. Plastic garbage bins and recyclable toters are placed for trash pick-up. |
| | Sand volleyball court | Fair | Some of the surrounding edges are taller and limit play for loose balls. |
| Safety and Security | Lighting | Fair | Lighting is provided in the parking lot at Lower George Washington and next to the group picnic areas. A light is provided at Forty Thieves picnic area. |
| | Gate and locked at night | Good | Vehicle access gates are located at both park entrances. |
| Site Access | Pathway | Good | The pathway around the meadow and ball fields is concrete and is in a very good condition. The pathway between the softball fields is decomposed granite and is in a good condition. |
| | Parking | Fair | Off-street. |
| | Entrance sign | Good | One wood sign at each entrance. |
| Site Furnishings | Art | Good | Logger arch historical artifact. |
| | BBQ pits | Good | Twelve located along the meadow area of Lower DeLaveaga Park, one located in George Washington Grove. |
| | Benches/Seating | Very good | Two benches near meadow area. Two wood benches and one recycled plastic in grove area. |
| | Drinking fountain | Fair | Four drinking fountains (not including reservable picnic areas). |
| | Garbage | Fair | Fourteen combined concrete, six metal, and two plastic trash bins (not including reservable picnic areas). |
| | Recycle | N/A | Five recyclable toters (not including reservable picnic areas). |
| | Both | Very good | Twelve BearSaver cans. |
| | Picnic tables | Fair | A combined four wood and 20 concrete (not including reservable picnic areas. |
| | Restroom | Poor | The restrooms (one dual facility) in Lower DeLaveaga are in fair condition. The restrooms (one dual facility) at the George Washington grove are in poor condition. Porta-potties are provided at the softball fields. |

**DeLaveaga Park – Lower DeLaveaga Park Office**



**Location:** Lower DeLaveaga Park

**Proposed Classification:** Other

**Size:** 440 sq. ft.

A park office and maintenance shed is located within Lower DeLaveaga Park to help staff maintain the park facilities.

**Recommendations:**
Additional covered space is needed to protect park tools and equipment.

## Depot Freight Building






**Location:** 119 Center St.

**Proposed Classification:** Community, Recreational, and Cultural Facility

**Size:** 3,000 ft.

The Depot Freight Building is a historic building that is used for City programming and private rentals. The historic freight building used to be a transportation hub. It is now a large, open room with renovated hardwood floors. The restrooms are only accessible from the outside of the building and serve all of Depot Park. The maximum occupancy of the main room is 100 persons. There is room outside at the rear of the building to place a shed or storage unit to help maintain Depot Park and store items that could help programming of the facility. Table Tennis has become a popular programming activity. Technological upgrades could help to facilitate meetings and trainings. Interior access to the restrooms could improve the use of the facility as a rental space.

**Recommendations:**

1. Explore the ability to add exterior storage.
2. Upgrade technological capabilities and interior space to help facilitate meetings and trainings.
3. Explore adding interior access to the restrooms.
4. Explore the addition of a kitchenette to improve programming opportunities.

## Depot Park, Bicycle Trip Bike Park, & Scott Kennedy Fields







**Location:** 115 Center St

**Proposed Classification:** Community Park

**Size:** 9 acres

**Master Plan:** Depot Park Master Plan (2001)

The park has an adult soccer field and practice area which can be used as two practice or youth fields. The soccer field receives a lot of use due to the lack of field space in Santa Cruz and the surrounding region. Lights would extend play. The lights would need to be designed to ensure there is minimal spillover to the surrounding homes. Outreach with the surrounding neighborhood should be conducted to discuss any new proposal. The Depot Freight Building contains restrooms which are open to park visitors. The park also contains the only ramped, wooden bicycle park in the area. Bicycle Trip Bike Park's wooden ramps are deteriorating and will need revamping and replacement in the near future. The Parks and Recreation Department has been working with a consultant on the design and replacement of the wooden ramps with metal which will require less maintenance over time. One metal ramp has been installed as a pilot project to test durability. The park contains a large plaza area, picnic tables, artwork, parking, and a small play features. A pathway connects the southern end to Beach Street towards Cowell Beach. The park includes the Monterey Bay National Marine Sanctuary Exploration Center and adjacent parking area. An approximately half acre site at 101 Washington Street (former location of Lighthouse Liquors) was purchased for incorporation into the park and is currently being leased. The City will explore opportunities for the future use of the site.

**Recommendations:**

1. Continue to revamp the bike park with more durable ramps that require less maintenance.
2. The playground area could be improved to include additional play equipment facilities such as a swing-set.
3. Explore lighting the field to increase usage.
4. Explore new uses for the ½ acre parcel at 101 Washington Street.

| Feature | | Condition | Description |
|---|---|---|---|
| Recreational Facilities | Bike park | Very poor | Large variety of wooden ramps and technical features. |
| | Playground | Very good | Variety of small features including teeter totter and a roundabout. |
| | Soccer field | Very good | One adult artificial turf soccer field w/ small practice area. Field can also be played as two smaller practice or youth fields. |
| Safety and Security | Lighting | Very good | Lights in park and parking area. |
| Site Access | Pathway | Very good | Concrete. |
| | Parking | Very good | Paid parking lots. |
| | Entrance sign | Very good | Large archway sign at entrance to parking lot. |
| Site Furnishings | Art | Very good | Metal sculpture of grass. |
| | Benches/Seating | Very good | Seven recycled plastic benches. |
| | Bike parking | Very good | Twenty-three u-shaped spaces. |
| | Drinking fountain | Very good | Two metal drinking fountains. One has a refillable bottle feature. |
| | Garbage | Very good | Seven garbage cans. |
| | Recycle | N/A | Toters placed next to each garbage can. |
| | Picnic tables | Very good | Four picnic tables. |
| | Plaza | Very good | Concrete plaza with trees, art, benches, and picnic tables incorporated into design. |
| | Restroom | Poor | Restrooms are located in the Depot Freight Building. |

## Downtown Santa Cruz



**Location:** Pacific Ave. and side streets between Mission Ave. and Laurel St.

**Size:** N/A

**Proposed Classification:** Other

Downtown is the business and commercial center in Santa Cruz. The Parks and Recreation Department helps maintain the benches, outdoor patio areas, landscaping treatments, drinking fountains, and trees along Pacific Avenue and side streets. The Downtown Recovery Plan recommends the creation of a park on the existing parking lot at 1100 Cedar Street, near the intersection of Union Street and Cedar Street and adjacent to Plaza Lane. The San Lorenzo Urban River Plan and Downtown Recovery Plan include additional recommendations for improving the connection between Downtown to the Santa Cruz Riverwalk. In 2017, a Downtown Ranger Unit was created and helps monitor and address safety concerns while assisting downtown visitors with directions and interpretive information.

**Recommendations:**

1. Seek opportunities to build parklets, plazas, and mini-parks and improve the connections between Downtown and the Santa Cruz Riverwalk. If opportunities arise, consider the top of parking garages as potential space for locating recreational facilities.
2. Continue to install tree protection fencing.
3. Continue to address public safety concerns.

## East Cliff Accent



**Location:** Southern terminuses of Seabright Ave., 1st Ave., 2nd Ave., 3rd Ave., 4th Ave., and Mariner Park Wy.

**Size:** N/A

**Proposed Classification:** Other

East Cliff Accent overlooks Seabright Beach. A walkway extends from Seabright Avenue to 4th Avenue along the bluff. Small parking areas are provided at the southern terminus of 1st and 3rd Avenues, and stairway access to the beach is provided at 3rd Avenue. A small overlook is also provided at the terminus of Mariner Park Way, but it is not connected to the walkway. Erosion has caused issues with the railings and walkways. In 2017, the Public Works Department completed a cliff stabilization project at Mariner Park Way. The Parks and Recreation Department maintains the site furnishings, picks-up trash, monitors the condition of the stairs, and performs minor landscaping maintenance. The coastline is a recreational, natural, and scenic treasure that embodies the City's unique sense of place and identity. A master plan could be created to guide future improvements; help maintain a more cohesive, consistent identity; and improve the long-term coordination and management.

**Recommendations:**
Partner with other stakeholder departments to develop and implement an integrated design, land-use, recreation, cliff stabilization, and landscape plan for West Cliff and East Cliff Drives to enhance public access, safety, preservation, and recreational enjoyment along the coastline.

| Feature | | Condition | Description |
|---|---|---|---|
| Site Furnishings | Benches | Fair | Two recycled plastic benches in a very good condition. Five wood benches that are in a fair condition with some minor cracking and/or engraving vandalism. |
| | Bike parking | Good | Two t-posts. Paint is fading. |
| | Garbage | Fair | Three BearSaver cans in very good condition. Three concrete in poor condition with warping and rusting metal. |

## El Portal Park



**Location:** Soquel Ave. @ Water St.

**Proposed Classification:** Neighborhood Park

**Size:** 0.21 acres

El Portal Park is located at the intersection of Water Street and Soquel Avenue. It is not suitable for more active recreational uses but offers a brief reprieve from the streets that surround the park. The location is optimal for landscaping treatments, wayfinding signage, and small gateway features such as art, monuments, or interpretive elements.

**Recommendations:**
Consider installing artwork or interpretive elements.

| Feature | | Condition | Description |
|---|---|---|---|
| Site Access | Pathway | Very good | Decomposed granite. |
| | Entrance sign | Very good | Two metal. |
| Site Furnishings | Art | Very good | Concrete monument with library plaque. |

## Frederick Street Park




**Location:** 168 Frederick St.

**Proposed Classification:** Neighborhood Park

**Size:** 3.97 acres

Frederick Street Park is located on a bluff overlooking the Santa Cruz Harbor and Arana Gulch Open Space. It is an extremely popular destination for the Lower Eastside Neighborhood and the overall community. A wooden staircase descends from the park to the harbor. An asphalt pathway connects from Frederick Street to the staircase. The park contains restrooms, a volleyball court, a fenced off-leash dog use area, a playground, a tot-lot, and one of the first skate parks. Picnic tables with BBQ pits are located on the bluff on the eastern side of the park and are popular for small parties and gatherings. The off-leash dog use area was fenced and is one of the largest off-leash dog use areas in the parks system. An obelisk art piece is located near Frederick Street at the southwestern section of the park. Erosion concerns exist along the eastern side of the park and retaining wall improvements will be necessary in the near future. The volleyball court needs some minor improvements.

**Recommendations:**

1. Drinking fountains need repair.
2. Improvements to the off-leash dog use area could include shade structures, benches, drinking fountains, and pathways.
3. The playground could be expanded and new equipment could be added.
4. The volleyball court could be renovated or replaced. A fence may need to be installed around it to prevent animal waste from entering the sand and make game play more enticing. The area could accommodate one pickleball court with low fencing or a half-court basketball court.
5. Improve the stairs to the harbor by exploring different, more durable options and improving the retaining wall.
6. Install drainage and erosion control in the picnic areas to control erosion and grading issues on the hillside.

| Feature | | Condition | Description |
|---|---|---|---|
| Recreational Facilities | Large, grass field | Fair | Uneven surfaces, gophers, and sand patches. |
| | Off-leash dog use | Very good | Large, fenced off-leash dog use area with grass surface. Water spout for dogs. |
| | Playground | Poor | One large playground with swing and tower/slide features. Fibar fill. |
| | Sand volleyball court | Poor | Uneven court, Bermuda grass encroaching on sand. |
| | Skate park | Good | Popular for young kids. Asphalt was recently resurfaced. |
| | Tot-lot | Very good | Small structure with slide, bucket swing, and sand box. |
| Safety and Security | Lighting | Good | Six light poles. |
| Site Access | Pathway | Fair | The new permeable paving and the concrete pathway are very good. The asphalt will need to be resurfaced soon. The d.g. in the front will need to be compacted. |
| | Entrance sign | Good | One wooden and two metal signs. |
| Site Furnishings | Art | Poor | The top of the obelisk sculpture has been vandalized and broken off. |
| | BBQ pits | Fair | One is missing a bottom and needs to be replaced. |
| | Benches/Seating | Good | One recycled plastic, 18 wood. |
| | Bike parking | Good | Two bike parking posts. |
| | Drinking fountain | Poor | Two (one on restroom exterior). |
| | Garbage | Good | Twelve concrete, one plastic, one metal. |
| | Recycle | Fair | One toter, two w/slat screen. |
| | Picnic tables | Poor | Eight wood, one concrete. Wood picnic tables show some damage from rot and bugs. |
| | Restroom | Good | One dual facility. |

## Garfield Park



**Location:** 624 Almar Ave.

**Proposed Classification:** Neighborhood Park

**Size:** 1.78 acres

Garfield Park is a very popular park for the lower Westside Neighborhood. It offers a variety of recreational activities including a grass field, picnic tables and BBQ pits, a playground and tot-lot, two table tennis tables, and a full-size basketball court. It is the only park on the Westside of town with BBQ pits, and the picnic areas often host birthdays and other small gatherings.

**Recommendations:**

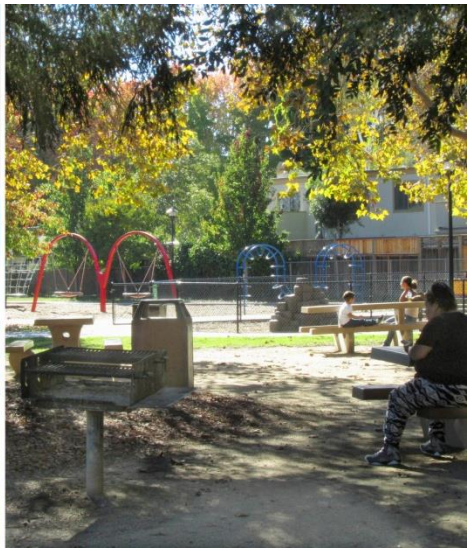
1. Drinking fountains need repair.
2. Playgrounds could be upgraded or expanded.
3. A shed could help to improve maintenance of the park.
4. Several trees are causing damage and root pruning or other treatments may be necessary to limit damage.

| Feature | | Condition | Description |
|---|---|---|---|
| Recreational Facilities | Basketball court | Good | One full-size basketball court. |
| | Large, grass field | Fair | Grass field has some minor dips. |
| | Table tennis | Very good | Two concrete table tennis tables were recently installed. |
| | Playground | Good | One structure with slides. One swing set. One tire swing. Sand fill. |
| | Tot-lot | Good | One structure with slides. One bucket swing set. Sand fill. |
| Safety and Security | Lighting | Fair | Lights poles are rusting and need some touch-up work. |
| Site Access | Pathway | Good | The decomposed granite path needs trim in some areas. Concrete pathway around playground is good. |
| | Entrance sign | Very good | One wooden engraved sign and four metal signs. |
| Site Furnishings | Art | Very good | One decorative, painted concrete bench. |
| | BBQ pits | Good | Three BBQ pits. |
| | Benches/Seating | Good | Twelve wood, one recycled plastic, and one concrete. |
| | Bike parking | Very good | One U bike rack. |
| | Drinking fountain | Poor | One metal. |
| | Garbage | Fair | Six concrete garbage bins. |
| | Recycle | Fair | Two recycle bins with slat screens and three toters. |
| | Picnic tables | Very good | Four concrete tables. |
| | Restroom | Fair | One dual facility. |

## Grant Park







**Location:** 150 Grant St.

**Proposed Classification:** Neighborhood Park

**Size:** 2.36 acres

Grant Park provides a variety of recreational activities onsite and is very popular for the Upper Eastside Neighborhood. The park is fenced and locked at night. A small baseball field is sometimes used for youth league practices. A full-size basketball court is used frequently. A bocce ball court is adjacent to a small fenced off-leash dog use area. The restrooms were renovated in 2017. Picnic tables with BBQ pits are located adjacent to the playground and tot-lot areas and are popular on the weekends. A bucket swing for tots could be added as the park receives a lot of use from this age group.

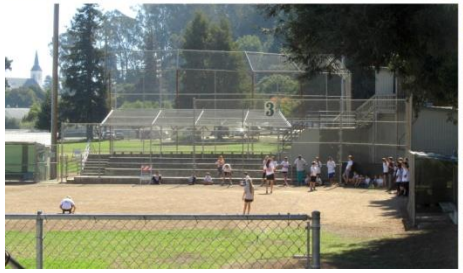
**Recommendations:**

1. Replace the restrooms with modern facilities in 5-10 years.
2. Add a tot-lot swing.

| Feature | | Condition | Description |
|---|---|---|---|
| Recreational Facilities | Baseball or softball field | Good | Small baseball field is used for neighborhood play and occasionally for youth league practice. |
| | Basketball court | Very good | One full-size court. |
| | Bocce ball | Very good | One bocce ball court. |
| | Off-leash dog use | Very good | One small fenced off-leash dog use area with grass surface. |
| | Playground | Very good | One climbing rock, two climbing roundabouts, two swings, one teeter totter. Fibar fill. |
| | Tot-lot | Very good | One structure with slide, two climbing structures, one small spring toy. Fibar fill. |
| Safety and Security | Lighting | Good | Seven light poles. |
| | Gate and locked at night | Very good | Black aluminum wrought iron style fence panels. |
| Site Access | Pathway | Good | D.G. is in good condition. Concrete in very good condition. |
| | Entrance sign | Very good | One wood with rock masonry support structures. Three metal. |
| Site Furnishings | BBQ pits | Good | Three metal. |
| | Benches/Seating | Good | One artistic bench is very good. One wood bench is very poor w/ major cracking. Three recycled plastic benches are in very good condition. |
| | Bike parking | Fair | One six-foot rack locked. Should install a more permanent rack. |
| | Recycle | N/A | Two toters. |
| | Picnic tables | Good | Ten concrete tables. |
| | Restroom | Good | One dual facility. |

## Harvey West Park





**Location:** 324 Harvey West Blvd.

**Proposed Classification:** Community Park

**Size:** 44.77 acres

Harvey West Park is a large community park that is used for a variety of recreational activities, including recreation programming and summer camps, events, sports, and large gatherings. It contains a pump track, athletic fields, reservable picnic areas, a playground and tot-lot, exercise equipment, a sand volleyball court, horseshoe pits, and bocce ball courts. The park hosts large community events. It also contains Community Recreational Facilities which include the Harvey West Pool, Wagner Cottage, Kids Kottage, and Scout and Clubhouse. The Ranger Station and Parks Maintenance Yard are also located on the grounds. Hiking trails connect to the Upper Westside Neighborhood and Pogonip Open Space. A bus stop is located on Harvey West Blvd. Harvey West Park contains six ballfields. The outfield areas are used for soccer and football during the baseball off-season. The overlap between baseball and soccer causes conflicts for practice and overall use. Additionally, wear and tear is a continual issue on the fields as they are extensively used. The ballfield facilities are aging and will require extensive upgrades to bring them up to date.

**Recommendations:**

1. Harvey West Park is the major sports field complex for the City. Future upgrades should include improvements to drainage, installation of artificial turf to improve the playing time and reduce maintenance costs, renovation and installation of additional bleachers, and upgrades to pitching mounds, scoreboards, lighting, and concession stands. Additionally, movable/collapsible soccer goals would improve the efficiency of setup and use for soccer play.
2. The playground at Harvey West Park serves the general public and youth camps and could be expanded to accommodate more features.
3. A small amphitheater could be added to Wagner Grove to host wedding ceremonies and kids camp activities.

| Feature | | Condition | Description |
|---|---|---|---|
| Recreational Facilities | Bocce ball | Very good | Two bocce ball courts. |
| | Exercise equipment | Very good | Four pieces. |
| | Horseshoe pits | Good | Two horseshoe pits. |
| | Playground | Good | One large structure w/ slides, swings, tire swing. Sand and rubber matting fill. |
| | Pump track | Very good | One dirt pump track. |
| | Reservable picnic areas | Good | Eight reservable picnic areas. Some have sinks and power hook-ups. |
| | Sand volleyball court | Fair | One volleyball court. |
| | Tot-lot | Very good | One structure w/ slide and bucket swings. Sand and rubber matting fill. |
| Safety and Security | Lighting | Good | Parking lot lighting and lighting in Friendship gardens. |
| | Gate and locked at night | Very good | Vehicle access gates. |
| Site Access | Pathway | Good | Most of the pathways are in a good condition. Some have some lifting issues. |
| | Parking | Fair | Off-street parking lot will need to be resurfaced soon. |
| | Entrance sign | Good | One large wooden |
| | Trail | Good | Three trails. |
| Site Furnishings | Art | Poor | One train. |
| | BBQ pits | Good | Eleven metal and five w/ rock masonry structure. |
| | Benches/Seating | Good | Six wood and two recycled plastic. |
| | Bike parking | Good | Two t-posts and five u racks. |
| | Drinking fountain | Fair | One metal and two concrete. |
| | Flag pole | Good | One flag pole. |
| | Garbage | Fair | Six metal, twenty-six concrete. |
| | Recycle | N/A | Eight toters. |
| | Both | Very good | Two BearSaver cans. |
| | Picnic tables | Good | Twenty-one concrete, 55 large wood, and 10 recycled plastic. |
| | Restrooms | Very good | One main restroom (one dual facility) for all of park. Located next to Field 1. |

| Ballfield Features | Field(s) | Condition | Description |
|---|---|---|---|
| Backstop | 1 | Poor | Chainlink. |
| | 2 & 3 | Poor and Fair | Chainlink. Field 3 is not tall enough to provide sufficient protection. |
| | 4 | Poor | Chainlink backstop showing warping and rust. |
| | 5 & 6 | Fair | Wood and chainlink. |
| Bleachers/Seating | 1 | Poor | Stepped concrete with wooden planking. Concrete is cracking. |
| | 2 &3 | Fair | Stepped concrete with wooden planking. |
| | 4 | Fair | Stepped concrete with wooden planking. |
| | 5 & 6 | Fair to poor | Metal bleachers. Opportunity to utilize hillside on Field 6 to create amphitheater seating. |
| Concessions stand | 1 | Fair | Concessions stand. |
| | 2 &3 | Fair | Concessions stand. |
| | 4 | Poor | Concessions stand. Rotting of wood and needs interior upgrades. |
| | 5 & 6 | Very poor | Wood concessions stand. Rotting wood. |
| Drinking fountain | 1 | Very poor | Two stand pipe drinking fountains. |
| | 2 &3 | Fair | Two standpipe drinking fountains. |
| | 4 | Very poor | Two stand pipe drinking fountains. |
| | 5 & 6 | Very poor | Two stand pipe drinking fountains. |
| Dugouts | 1 | Very poor | Partially undergrounded dugouts take in water and need to be pumped during rainy season. |
| | 2 &3 | Fair | Caged, chainlink dugouts. |
| | 4 | Fair | Masonry block dugouts with chainlink fencing. |
| | 5 & 6 | Fair | Masonry block dugouts with chainlink fencing. |
| Lights | 1 | Fair | Metal poles with metal halide lights. |
| | 2 &3 | Poor | Combination of wood and metal posts with metal halide lights. The lighting does not provide complete coverage and there are dark spots on the baseball fields. |
| | 4 | Good | Metal poles with metal halide lights. |
| | 5 & 6 | Fair | Wood poles with halide lights. The light does not cover soccer field and there are dark spots on the baseball fields. |
| Restroom/Porta-potty | 1 | N/A | Use main park restroom. |
| | 2 &3 | Very good | Harvey West Park's restrooms (one dual facility) are provided between Fields 2 &3 and Field 1. |
| | 4 | N/A | Use main park restroom. |
| | 5 & 6 | Poor | Two porta-potties. Restrooms at this side of the park are highly desirable. |

| | | | |
|---|---|---|---|
| Scoreboard | 1 | Very good | Recently upgraded scoreboard. |
| | 2 &3 | Poor | Scoreboard is small and outdated. |
| | 4 | Poor | Small and outdated scoreboard. |
| | 5 & 6 | Poor | Small and outdated scoreboards. |
| Scorers Booth | 1 | Fair | Scorers booth. |
| | 2 &3 | Fair | Scorers booth. |
| | 4 | Fair | Scorers booth. |
| | 5 & 6 | Very poor | Poor lighting, portions of siding and framing needs replacement, and shingles are worn-out. |
| Trash and Recycle | 1 | Fair | Two concrete and three metal bins. Two toters. |
| | 2 &3 | Poor | Three concrete and five metal garbage bins. Four recycle toters. |
| | 4 | Fair | Three concrete and two metal garbage cans. Two recycle toters. |
| | 5 & 6 | Poor | Two concrete and two metal bins. One plastic toter. |
| Turf | 1 | Poor | Field is worn from overuse. |
| | 2 &3 | Very poor | Irrigation and overuse issues. |
| | 4 | Fair to poor | Root intrusion. Irrigation system uses different heads than designed for because the heads are no longer manufactured. New heads do not allow for an optimal head-to-head ratio. |
| | 5 & 6 | Fair | Irrigation system uses different heads than designed for because the heads are no longer manufactured. New heads do not allow for an optimal head-to-head ratio. |

## Harvey West Park - Harvey West Pool



**Location:** 275 Harvey West Blvd.

**Proposed Classification:** Community, Recreational, and Cultural Facility

**Size:** 3,500 sq. ft. pool house, lap pool with diving area, wading pool

The small pool is leased to a concessionaire. The large pool is open from June through August for open swim. The concessionaire teaches swim lessons in the small pool from March through October. The large pool is available for lap swim, water fitness, and recreational swimming during the summer, and swimming is one of the many activities provided during youth summer camps. The large pool is most often used by families during the summer weekends. The pool does not open until 11 a.m. which does not accommodate morning lap swimming. Pool maintenance and funding are necessary year-round and should the City seek opportunities to increase use and access to the pool. Future studies to increase usage could consider complementary uses such as a fitness center or larger picnic area. Partnerships and cost-sharing opportunities to fund the project should be explored.

**Recommendations:**
Consider conducting a use and business plan study to improve operations and funding opportunities, identify more comprehensive renovations, and increase community use and continue to seek funding to expand the hours and duration of time the pool remains open for public use during the year.

**Harvey West Park – Kids Kottage and Wagner Cottage**



**Location:** 275 Harvey West Blvd.

**Proposed Classification:** Community, Recreational, and Cultural Facility

**Size:** Kids Kottage (1,500 sq. ft.) Wagner Cottage (1,000 sq. ft.)

The Kids Kottage is leased to the County Office of Education for an alternative education program during the school year. The City operates summer camp programs in the Kids Kottage during the remainder of the year. Wagner Cottage is used for summer camp programs. Both cottages could use improvements to the restroom facilities. Wagner Cottage has some visible foundation issues. The Kids Kottage has termite issues.

**Recommendations:**
Improve the restrooms and address the structural issues.

### Harvey West Park – Ranger Station



**Location:** 275 Harvey West Blvd.

**Proposed Classification:** Other

**Size:** 1,000 sq. ft.

The Ranger Station houses the Parks Ranger unit. The Ranger Station is not located in a very visible location and the unit has outgrown the small building. Consideration should be given to relocating the Ranger Station to a larger, more visible space. The Ranger Station could be an important informational resource for park visitors. If a more suitable location is found, consideration should be given to relocating the summer camps from Wagner Cottage to the building so that program participants are closer to the program activities and other camp uses.

**Recommendations:**
Consider relocating the Rangers to a larger, more visible location.

### Harvey West Park – Scout and Clubhouse



**Location:** 326 Evergreen St.

**Proposed Classification:** Community, Recreational, and Cultural Facility

**Size:** 5,000 sq. ft.

The Harvey West Park Scout and Clubhouse is rented for private use such as weddings, gatherings, and meetings. It is also used for City programming. The clubhouses have seating indoors and outdoors, a deck area, a full kitchen, two barbecue pits, two wet bars, an indoor fireplace, and restrooms. The entryway, kitchen, and patio area could be improved to be more functional and attractive.

**Recommendations:**
Consider minor renovations to approve the function and appearance, such as by enhancing the entry and patio areas.

### Its Beach



**Location:** Accessed from a stairway to the north of Lighthouse Point

**Proposed Classification:** Beach

**Size:** 1.5 acres (City owned)

Its Beach is a popular beach for a variety of beach and ocean oriented recreational purposes. A stairway is provided down to the beach from West Cliff pathway to the north of Lighthouse Point. The City owns approximately 1.5 acres of the beach area and the remainder is owned by the State of California.

**Recommendations:**
Improve coordination with the State to maintain rules and enforcement.

## Jessie Street Marsh



**Location:** Access from E. Cliff Dr., path from Ocean View Park, and the terminus of Lemos Ave.

**Proposed Classification:** Open Space

**Size:** 3.2 acres

**Master Plan:** Jessie Street Marsh Management Plan (1998)

Jessie Street Marsh is adjacent to Ocean View Park and E. Cliff Drive and currently has an ad-hoc trail that extends from E. Cliff Drive to Lemos Ave. In 1998, the City created the Jessie Street Marsh Management Plan. The plan aims to restore the marsh and improve access. A major component of the plan would be creating a tidal exchange between the fresh water marsh and the San Lorenzo Urban River. The tidal exchange aspect of the plan was determined to be "unbuildable" during plan review by the City's Engineers. The marsh area has been vulnerable to criminal activity. City staff hired an engineering consultant to help redesign the plan to address community desires and concerns about the area. Additional outreach and study will need to be conducted through a public process.

**Recommendations:**
Improve the connection from the marsh to the Santa Cruz Riverwalk. Hire an engineering consultant to work through design issues and public concerns with the Jessie Street Marsh Management Plan. Discuss potential modifications to the plan through a public process.

## John D Franks Park



**Location:** Marnell Ave. @ Fairmont Ave.

**Proposed Classification:** Neighborhood Park

**Size:** 0.48 acres

John D Franks Park is a small but important park because it is the only neighborhood park for the surrounding area. The park contains a grass field, picnic tables, an elliptical piece of exercise equipment, and a playground.

**Recommendations:**
Consider adding additional picnic tables, play equipment, and fitness equipment.

| Feature | | Condition | Description |
|---|---|---|---|
| Recreational Facilities | Large, grass field | Fair | Grass field for multi-use. Redwood roots and some minor mounding and dipping. |
| | Playground | Very good | Recently installed play structure with slides and toddler swings. Fibar surface material. |
| Safety and Security | Lighting | Good | Two light poles. |
| Site Access | Pathway | Good | Decomposed granite surface. |
| | Entrance sign | Very good | Engraved wood. Paint is in good shape. |
| Site Furnishings | Benches/Seating | Good | Two wooden benches. |
| | Drinking Fountain | Good | One metal. |
| | Exercise Equipment | Very good | One elliptical. |
| | Garbage | Good | One concrete. |
| | Picnic tables | Good | Two concrete tables. |

## Ken Wormhoudt Skate Park at Mike Fox Park



**Location:** 225 San Lorenzo Blvd.

**Proposed Classification:** Community Park

**Size:** 1.25 acres

Ken Wormhoudt Skate Park at Mike Fox Park is located along the Santa Cruz Riverwalk and is across the street from Riverside Gardens Park. The skate park is very popular and contains bowls and a street course. Bleachers are located outside of the fencing for spectating. The skate bowl's concrete pool coping is preferred by skaters but also requires continual upkeep and repairs. To the east of the skate park, the park has a multi-use, shared area which includes three painted pickleball courts, a roller hockey practice rink, and a basketball hoop. Fruit trees were planted to the east of the shared-use area as part of a community orchard project. The orchard utilizes an area with limited recreational opportunity and increases access to food while providing opportunities to learn about resource conservation and sustainable growing practices in a public setting. A porta-potty is placed onsite. Lighting could be explored to increase use of the skate park.

**Recommendations:**

1. Improve pool coping and perform general repairs to the skate park.
2. Consider adding lighting.
3. Increase programming to teach skateboarding.

| Feature | | Condition | Description |
|---|---|---|---|
| Recreational Facilities | Basketball court | Very good | Half court with asphalt surface. |
| | Pickleball court | Very good | Three painted courts. Nets need to be installed before play. |
| | Roller hockey | Very good | One fenced roller hockey practice area w/ plastic dasher boards. |
| | Skate park | Fair | Concrete pool coping needs repair. |
| Site Access | Pathway | Fair | Minor cracking near entrance to skate park. |
| | Parking | N/A | Off-street parking. |
| | Entrance sign | Very good | Two wood framed with plastic panels. |
| Site Furnishings | Art | Fair | Photographs of skateboarders in a metal frame with plastic encasement. There is some wear and tear from vandalism remediation. There is also a wave mural on the full pipe. |
| | Benches/Seating | Good | Aluminum bleachers. |
| | Bike parking | Very good | Six low profile racks. |
| | Drinking fountain | Good | One metal drinking fountain. |
| | Garbage | Fair | One metal with screen. |
| | Recycle | N/A | One toter. |
| | Both | Good | Two BearSaver cans. |
| | Restroom | N/A | Porta-potty with wood screen. |

## La Barranca Park



**Location:** California St. to Laguna St.

**Proposed Classification:** Neighborhood Park

**Size:** 2.26 acres

La Barranca Park, a linear park with a decomposed granite pathway along Bay Street, offers an opportunity for a casual stroll off of Bay Street. It is primarily landscaped with lawn. Its proximity to the Wastewater Treatment Plant makes it a prime location for a demonstration garden using recycled water.

**Recommendations:**
Convert the turf areas to a demonstration garden using recycled water.

| Feature | | Condition | Description |
|---|---|---|---|
| Site Access | Bus stop | N/A | Yes. |
| | Pathway | Fair | Decomposed granite pathway along Bay St connecting California St to Laguna St. |
| Site Amenities | Art | Good | Two rocks w/ commemorative plaque and one small rowing sculpture. |
| | Benches/Seating | Good | Fourteen recycled plastic benches. Most are in good condition. Some show fading and cracking. |
| | Garbage | Fair | Five concrete cans. |
| | Interpretive signs | Fair | Five interpretive signs. Most are in good condition. |

## Laurel Park






**Location:** 301 Center St.

**Proposed Classification:** Neighborhood Park

**Size:** 1.77 acres

Laurel Park is located adjacent to the Louden Nelson Community Center and offers a variety of recreational activities for general use and for recreational programming and events. The park contains a grass field, a chess table, a table tennis table, a playground, and a full-size basketball court painted to accommodate pickleball. Issues with illegal activities have led to a Ranger being posted at the site, and discussions with the neighborhood about whether or not the park should be fenced. Consensus with the neighborhood is necessary before moving forward with a fencing project. The Louden Nelson Community Center has restrooms which are available during open hours. The park is heavily used by teens, seniors, and other groups using the center. It is also an extension of the Louden Nelson Community Center for events put on by Parks and Recreation.

**Recommendations:**

1. Fencing or decorative gardening displays could provide a barrier between other park uses and the playground area.
2. Parcourse equipment could be installed and incorporated into the senior center or other health-related programming at the Louden Nelson Community Center.
3. Underground electrical connections could be installed to accommodate community events.
4. Volleyball insert sleeves could be installed in the lawn and the community center could check-out nets and balls to allow for volleyball play.
5. Improvements to the garden area could allow for potential senior and teen based gardening programs.

| Feature | | Condition | Description |
|---|---|---|---|
| Recreational Facilities | Basketball court | Very good | Full-size court is painted to allow for pickleball play. |
| | Chess table | Good | One outdoor chess table. |
| | Large, grass field | Good | One grass field for multi-use play and events. |
| | Pickleball court | Good | Striping on basketball court. |
| | Table tennis | Very good | Concrete table tennis table. |
| | Playground | Very good | One bucket seat, one swing set, one structure w/ slide, one large webbed climbing structure. Fibar fill. |
| Safety and Security | Lighting | Good | Four light poles. |
| Site Access | Pathway | Very good | Concrete pathway. |
| Site Furnishings | Art | Very good | The mural on the back of Louden Nelson was recently refurbished. |
| | Benches/Seating | Good | Concrete bench along b-ball court and playground. Seven wood. |
| | Bike parking | Good | Two large metal, cork screwed structures. |
| | Drinking fountain | Good | One metal. |
| | Garbage | Good | Two concrete. |
| | Recycle | N/A | Toters are placed near garbage cans. |

## Lighthouse Avenue Park




**Location:** Lighthouse Ave. near Oregon St.

**Proposed Classification:** Neighborhood Park

**Size:** 0.35 acres

Lighthouse Avenue Park offers a small playground area and eighteen community garden plots. Vandalism and theft has been an issue for the gardeners.

**Recommendations:**
The playground area could be expanded to offer more features.

| Feature | | Condition | Description |
|---|---|---|---|
| Recreational Facilities | Community gardens | Poor | Eighteen garden plots. The raised garden beds will need to be updated soon. The decomposed granite surrounding the beds can be weeded and a new layer can be added. |
| | Playground | Fair | Small structure with slides and rubber matting and a small sand area with digging features. |
| Site Access | Pathway | Very good | Concrete and brick tiles. Decomposed granite around garden area can be resurfaced. |
| | Entrance sign | Very Good | Three metal signs. One arbor near Lighthouse Avenue as entrance feature. |
| Site Furnishings | Benches/Seating | Very good | Three recycled plastic near playground. |
| | Bike parking | Very good | Three metal bike posts. |
| | Garbage | Good | One concrete can near playground. Toters are provided in a screened area for the community garden. |

**Louden Nelson Community Center**






**Location:** 301 Center St.

**Proposed Classification:** Community, Recreational, and Cultural Facility

**Size:** 20,000 sq. ft.

The Louden Nelson Community Center hosts senior and teen programs and services, recreation classes and programming, rentable rooms, and an auditorium with theater seating and a stage. Programs and classes make use of the adjacent Laurel Park. The Louden Nelson Community Center offers a wide selection of spaces available for rent, including a dance studio, meeting rooms, a banquet room, a kitchen, and an auditorium with a stage and retractable seating.
In 2015, the City received more than $500,000 dollars of grant funding to improve the facility. The grant funded general building improvements such as new boilers, roof repairs, refinished hardwood floors, updated technology, carpeting, fans, and paint. New office space and a conference room were configured in the layout. Appliances and storage space were upgraded in the kitchen. The auditorium was renovated with new seating, refinished hardwood floors, and new media technology and stage lighting.

**Recommendations**:
Seek additional funds to continue to renovate and update the Louden Nelson Community Center. Examples include remodeling the restrooms and café/kitchen area; installing sound absorbing panels in the classrooms, replacing the hallway doors, installing new window blinds, and updating the marquis, and redesigning the Teen Center exterior yard area.

## Mimi De Marta Dog Park



**Location:** Broadway near Dakota Ave.

**Proposed Classification:** Neighborhood Park

**Size:** 0.5 acres

Mimi de Marta Park is a fenced off-leash dog use area with a picnic table adjacent to the Santa Cruz Riverwalk.

**Recommendations:**
Dog play features and additional seating could be added to enhance the experience for dogs and/or owners.

| Feature | | Condition | Description |
|---|---|---|---|
| Recreational Facilities | Off-leash dog use | Good | One fenced off-leash dog use area with dirt surface. |
| Site Furnishings | Drinking fountain | Good | One metal drinking fountain with dog bowl feature. |
| | Picnic tables | Good | One concrete, one wooden. |

## Mission Plaza Park



**Location:** 103 Emmet St.

**Proposed Classification:** Neighborhood Park

**Size:** 0.94 acres

Mission Plaza Park is located across the street from the State's Santa Cruz Mission State Historic Park. It contains a plaza with a water fountain, drinking fountain, and benches and the design complements the surrounding setting of the Mission, Holy Cross Catholic Church and School, and Neary-Rodriquez Adobe and State Park. The plaza is used for community events, parties, weddings, and smaller gatherings. Large storm events cause some minor erosion of the decomposed granite pathways. The setting and history do not lend itself to the installation of more active recreational features.

**Recommendations:**
Interpretive signage should be added to describe the history of the site and surrounding area. The decomposed granite could be updated to a less erosive pathway material. Maintain a clean and safe environment.

| Feature | | Condition | Description |
|---|---|---|---|
| Safety and Security | Lighting | Good | Two lights near plaza area. |
| Site Access | Bus stop | N/A | Located on Mission St. |
| | Pathway | Good | Decomposed paved pathways providing access from street to plaza area. Erosion occurs during large storm events. |
| | Entrance sign | Good | Three metal signs and one large wood sign with masonry structures. |
| Site Furnishings | Art | Good | Masonry rock structure with metal plaque to commemorate the Mission. |
| | Benches/Seating | Good | Seven wooden. Some show minor weathering and paint ware. |
| | Drinking fountain | Good | One. |
| | Flag pole | Good | Three flag poles. |
| | Garbage | Good | One. |
| | Recycle | N/A | One plastic toter. |
| | Plaza | Very good | Rose bushes, palm tree, water fountain and benches encircle water fountain. |
| | Event electrical hook-ups | Very good | Located in multiple locations in park. |
| | Water fountain | Very good | Masonry rim w/ concrete fountain head |

**Mitchell's Cove**



**Location:** Beach area accessed from stairwell on West Cliff at the intersection of Sunset Ave. and West Cliff Dr.

**Proposed Classification:** Beach

**Size:** 0.4 acres

A stairway from West Cliff path provides access to the beach. Off-leash dog use is allowed before 10 a.m. and after 4 p.m. The beach is popular for beach and surf activities. This beach is the only legal off-leash dog use opportunity on a beach within the City limits. It is also the only off-leash dog use opportunity for the Lower Westside neighborhood. Consideration could be given to this off-leash dog use area if a future program is developed for moderate intensity and to reduce conflicts with general beach usage. Additional enforcement should be pursued to ensure beach goers on this small beach are not inundated with off-leash dog use during times when dog use is not allowed.

**Recommendations:**
Consider programs and enforcement to ensure that off-leash dog use does not overwhelm the small beach area.

## Moore Creek Overlook



**Location:** Cypress St.

**Proposed Classification:** Neighborhood Park

**Size:** 0.12 acres

Moore Creek Overlook offers a scenic overlook of the Moore Creek Preserve and canyon. A concrete pathway encircles a small grass area and three benches overlook the scenic vista.

**Recommendations:**
None.

## Moore Creek Preserve





**Location:** Accessed from Highway 1 near Shaffer Rd. and the terminus of Meder St. No parking is provided.

**Proposed Classification:** Open Space

**Size:** 263.75 acres

**Master Plan:** Moore Creek Preserve Interim Management Plan

Moore Creek Preserve has nearly three miles of hiking trails (no dogs are allowed) that wind through canyon, forest, and grassland natural settings. Many of the trails overlook the Pacific Ocean. Cattle graze the coastal prairie areas to help restore native plants and the Ohlone Tiger Beetle. Access to the site is limited. Visitors can park on Shaffer Road and cross Highway 1 to enter the southern entrance or park east of Western Drive to walk down Meter Street to enter the northeastern entrance. Highway 1 does not have a crosswalk and a mid-block crossing would likely not be supported by Caltrans at the location. A parking area could be established off of Highway 1 but would likely include retaining walls and other costly improvements. Park signage is worn-out and needs replacement. The signs are not highly visible from the public right-of way at either entrance. Large interpretive signs could help educate visitors on the unique resources and restoration effort. A small metal interpretive sign and four bike posts are located at each entrance.

**Recommendations:**

1. Consider developing a parking area off of Highway 1 to improve access to the property.
2. Provide more prominent entry signs and install new trail and interpretive signage.
3. Improve cattle grazing fencing.
4. Continue efforts to protect rare and endangered species.
5. Explore opportunities to enhance access and connectivity.

### Museum of Natural History




**Location:** 1305 E. Cliff Dr.

**Proposed Classification:** Community, Recreational, and Cultural Facility

**Size:** 3,500 sq. ft.

The Museum of Natural History is located at Tyrrell Park. The museum is leased to the Santa Cruz Museum of Natural History which provides services, events, programs, exhibits, and other educational tools to inspire stewardship and connect people to nature and history.

**Recommendations:**
See Tyrrell Park.

## Neary Lagoon Park



**Location:** 100 California St.

**Proposed Classification:** Neighborhood Park

**Size:** 1.27 acres

Neary Lagoon Park is located adjacent to the Neary Lagoon Wildlife Refuge, La Barranca Park, and the Wastewater Treatment Plant. It has two tennis courts, picnic tables, a playground, off-street parking, and restrooms. It is located at one of the three entrances to the Neary Lagoon Wildlife Refuge. The Monterey Bay Scenic Trail is planned on the railway right-of-way that separates Neary Lagoon Park from La Barranca Park.

**Recommendations:**
Consider lighting the tennis courts.

| Feature | | Condition | Description |
|---|---|---|---|
| Recreational Facilities | Playground | Very good | One large playground with a variety of features and sand play. Combination of rubber matting and sand surfacing |
| | Tennis court | Very good | Two tennis courts |
| Site Access | Pathway | Very good | Concrete |
| | Parking | Fair | Off-street parking. |
| | Entrance sign | Good | One entrance sign. It could be moved closer to street for improved visibility. |
| Site Furnishings | Art | Good | One mural. |
| | Benches/Seating | Very good | Eight benches. |
| | Bike parking | Very good | Three u-shaped. |
| | Drinking fountain | Good | One metal drinking fountain. |
| | Garbage | Good | Three garbage cans. |
| | Recycle | Good | One recycle container. |
| | Combination of garbage and recycling | Very good | One BearSaver saver can. |
| | Interpretive signs | Good | One panel. |
| | Picnic tables | Very good | Two picnic tables. |
| | Restroom | Fair | One restroom (one dual facility). |

## Neary Lagoon Wildlife Refuge





**Location:** Access at Neary Lagoon Park, the terminus of Chestnut St, and the terminus of Blackburn St.

**Proposed Classification:** Open Space

**Size:** 37 acres

**Master Plan:** Neary Lagoon Management Plan (1992)

Neary Lagoon Wildlife Refuge offers a boardwalk loop trail where visitors can bird watch and explore a variety of natural habitats such as riparian forest, freshwater marsh, mixed oak woodland, and open water. The floating walkway offers a truly unique experience within the City and region. Interpretive signs provide information about some of the wildlife that inhabit the refuge. An interpretive kiosk and group education area is located at the Chestnut Street entrance. The walkway is also a good connection between the Lower Westside and Downtown neighborhoods. A portion of the floating walkways was renovated in 2016, but there remains much more walkway in need of renovation. The Santa Cruz Museum of Natural History leads educational tours funded by Public Works. A new biological assessment should be conducted to evaluate the invasive species and provide recommendations for parks maintenance activities which consider timing and approach to limit disturbances to wildlife.

**Recommendations:**

1. Fund the replacement of the floating walkways.
2. Hire a biologist to evaluate parks maintenance activities and timing, and develop recommendations for natural restoration activities.

| Feature | | Condition | Description |
|---|---|---|---|
| Safety and Security | Gated and locked at night | Good | Gated at all entrances. |
| Site Access | Pathway | Fair | The new floating walkways are very good. The remaining wooden walkways will need to be replaced in the near future. The asphalt pathways are in need of resurfacing. |
| | Entrance sign | Good | Three wood signs. Entrance sign on Blackburn Street is small and weathered. |
| Site Furnishings | Benches/Seating | Very good | Twelve benches/seating areas. |
| | Bike parking | Very good | Three u-shaped at Blackburn St. |
| | Garbage | Good | Six garbage cans and one BearSaver can with garbage and recycling. |
| | Interpretive signs | Fair | Twelve interpretive panels. Some show defacing and fading and need panel replacement. |
| | Interpretive kiosk | Good | Six more interpretive panels under a shelter structure and seven benches form a group education area. |

## Ocean View Park




**Location:** 102 Ocean View Ave.

**Proposed Classification:** Neighborhood Park

**Size:** 3.06 acres

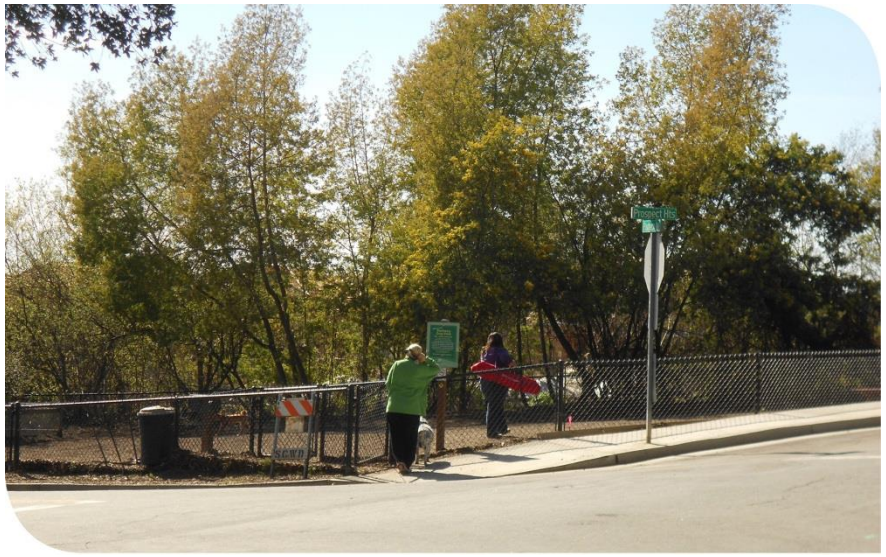
Ocean View Park is a popular family park with picnic tables, playgrounds, long slides and restrooms. Other facilities include a half-court basketball court as well as a grass field which accommodates legal, unfenced off-leash dog use when not being used for other recreational purposes. The proximity of the off-leash dog use area to the picnic, basketball, and playground areas is not optimal and uncontrolled dogs frequently create issues with other park users. Fencing the off-leash dog use area could help improve the situation, but it would also segment the park and limit the amount of activities that can take place. The playground equipment will need to be upgraded soon. Many of the pathways are comprised of decomposed granite. The site has poor drainage and the pathways often become difficult to pass. Replacing the decomposed granite with asphalt or a more decorative material could improve the walkability during the winter months. There is an overlook on the southern side of the park with an impressive view of the Boardwalk and San Lorenzo River. A pathway connects from S. Branciforte Avenue to Ocean View Avenue to E. Cliff Drive and Jessie Street Marsh. The closest crosswalk across E. Cliff Drive to the Santa Cruz Riverwalk is located at Jessie Street.

**Recommendations:**

1. Consider fencing-in the off-leash dog use area or relocating the off-leash dog use area to another location.
2. Upgrade the playground equipment and surfacing.
3. Create a paved surface road from S. Branciforte Avenue.
4. Add native gardens and more ornamental plantings.

| Feature | | Condition | Description |
|---|---|---|---|
| Recreational Facilities | Basketball court | Very good | Half court. |
| | Off-leash dog use | Fair | One off-leash dog use area w/ no fence. Grass field is saturated during winter. |
| | Playground | Good | One swing set, one large climbing structure, seven long slides. Rubber and fibar fill surfacing. Metal slides will need replacement soon. |
| | Tot-lot | Good | One structure with slides, bucket swing, and rubber and fibar fill. |
| Site Access | Pathway | Good | Dirt pathway towards S. Branciforte Ave can be improved. Asphalt is very good. Decomposed granite is in fair condition. Improvements to stairs down to E. Cliff from bluff should be pursued. |
| | Entrance sign | Very good | Three metal and one wood. |
| Site Furnishings | Art | Fair | Rock monument. Vandalism needs to be removed. |
| | Benches/Seating | Good | Thirteen wood benches, three recycled plastic, and five concrete formed benches. |
| | Drinking fountain | Good | One metal and one on restroom. |
| | Garbage | Very poor | Seven concrete. Showing rust and warping. Two plastic. |
| | Recycle | N/A | One toter. |
| | Picnic tables | Fair | Four concrete. |
| | Restroom | Good | One dual facility. |

## Pacheco Dog Park



**Location:** Pacheco Hts. @ Pacheco Ave.

**Proposed Classification:** Neighborhood Park

**Size:** 0.45 acres

Pacheco Dog Park is a popular fenced off-leash dog use area with wood chips as the surface. Wood benches and a picnic table are provided for seating. The park receives a lot of sun exposure and a small oak tree is not mature enough to provide adequate shading. A water spigot is also provided.

**Recommendations:**
Dog play features, shade structures, seating, or tables could be added to enhance the experience for dogs and/or owners.

**Parks and Recreation Administration Building**



**Location:** 323 Church St.

**Size:** 4,546 sq. ft.

**Proposed Classification:** Other

The Parks and Recreation Administrative Building is located within City Hall and currently houses the administrative staff for the Parks and Recreation Department. An ADA assessment was recently completed.

**Recommendations:**
Complete improvements identified within the ADA assessment.

### Parks Maintenance Yard



**Location:** 300 Evergreen St.

**Proposed Classification:** Other

**Size:** 2,100 sq. ft. maintenance garage, 2,700 sq. ft. office, a 2,000 sq. ft. open equipment bay, and approximately 1,800 sq. ft. of sheds

The Parks Maintenance Yard is located at 300 Evergreen Street and includes offices and equipment storage and bays for parks maintenance operations.

**Recommendations:**
None.

## Poets Park and Beach Flats Community Garden




**Location:** 200 Raymond St.

**Proposed Classification:** Neighborhood Park

**Size:** 0.13 acres

Poets Park is a small park which includes picnic tables, a drinking fountain, benches, play equipment, community garden plots, and artwork. It is adjacent to the Beach Flats Community Garden which is located on property which is leased by the City from the Santa Cruz Seaside Company. The City is currently searching for a permanent community garden space in the Beach Area neighborhood. A total of thirty-two combined plots are currently located at Poets Park and Beach Flats Community Garden.

**Recommendations:**
The City will continue to pursue a permanent community garden space for the Beach Area neighborhood.

| Feature | | Condition | Description |
|---|---|---|---|
| Recreational facilities | Community gardens | Good | Thirty-two combined total garden plots. |
| | Playground | Very good | Seesaw and climbing roundabout. |
| Site Access | Pathway | Very good | Concrete. |
| Site Amenities | Art | Very good | Concrete decorative balls and metal tree sculpture. |
| | Benches/Seating | Fair | Concrete formed bench shows minor wear and tear from skateboard grinding. |
| | Garbage | Fair | One concrete. |
| | Picnic tables | Very good | Two recycled plastic tables. |

## Pogonip Clubhouse



**Location:** Accessed from Golf Club Dr.

**Proposed Classification:** Community, Recreational, and Cultural Facility

**Size:** 8,000 sq. ft.

**Master Plan:** Pogonip Clubhouse Rehabilitation Plan (2000) and Pogonip Master Plan (1998)

The Pogonip Clubhouse was built in 1911 and was designed as a two-story Craftsman style clubhouse for the Casa del Rey Golf Course. In 1935, it was converted into a Polo Club. After World War II, the club remained a private social club until the 1980s when it was condemned. In 1988, the City acquired Pogonip and initiated efforts to mothball the building. The clubhouse is currently in a dilapidated state and remains closed to public access. The Pogonip Master Plan plans to restore the clubhouse and use it as a staging area for educational programs, a meeting and retreat center, and a site for special events.

**Recommendations:**

1. Conduct an assessment of the structure's current state and fund short-term mothballing improvements if necessary.
2. Restore and renovate the clubhouse for various uses (events, weddings, community center, winery, etc.).

## Pogonip Open Space



**Location:** Accessed from Harvey West Park, the terminus of Golf Club Dr., Highway 9, Glen Coolidge Dr., and Spring St.

**Proposed Classification:** Open Space

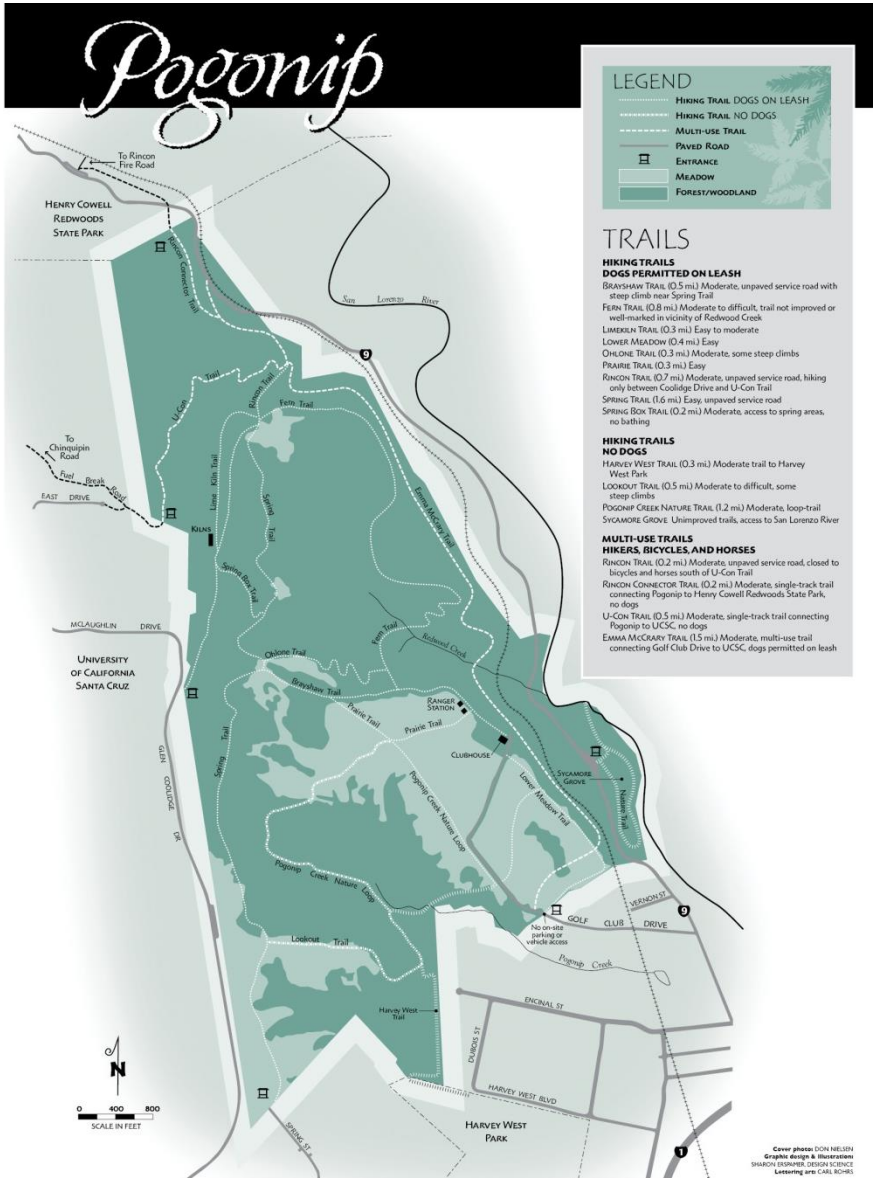
**Size:** 640 acres

**Master Plan:** Pogonip Master Plan (1998)

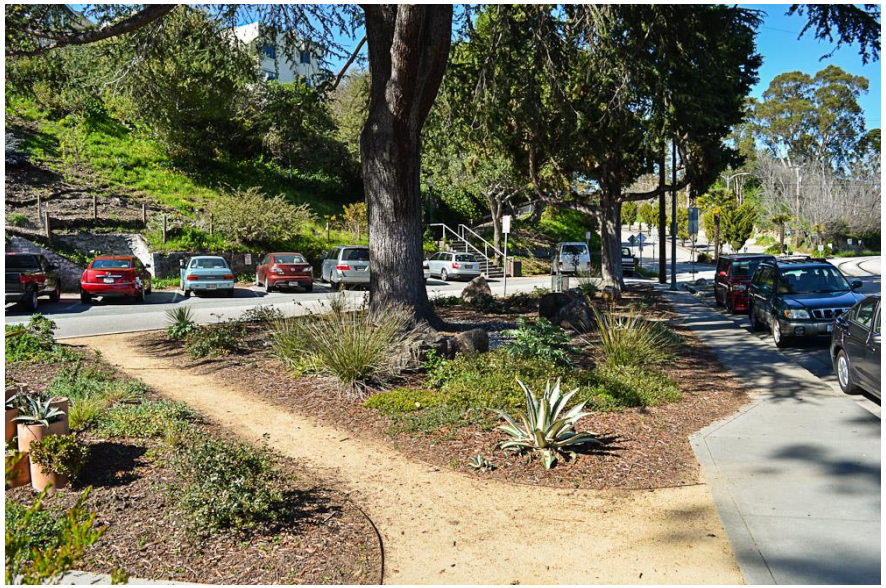
Pogonip Open Space contains approximately eight miles of hiking trails and three miles of multi-use (hiking, biking, and horseback riding) trails that weave through a variety of natural and historic sceneries. The open space is located adjacent to Harvey West Park, UCSC (which includes trails that connect to Wilder Ranch State Park), and Henry Cowell Redwoods State Park. The Emma McCrary Trail was constructed in 2013 with the help of volunteers and has become a very popular tail, especially for mountain biking. The Pogonip Master Plan envisioned a variety of recreational and educational activities for the open space. The Homeless Garden Project will be relocating in Pogonip. The Homeless Garden Project is a non-profit organization that provides programs and training to people who are or have previously been homeless. A 1,500 sq. ft. office/classroom building, parking area and an approximately 9 acre farm will be located in the Lower Main Meadow. The property includes the historic Pogonip Clubhouse which was constructed in 1911 as the Casa del Rey Golf and Country Clubhouse. The clubhouse is currently in a dilapidated condition and is closed-off from public access. The existing Pogonip Master Plan envisioned the restoration of the Pogonip Clubhouse as a staging area for educational programs, a meeting and retreat center, and a site for special events. The former tennis courts are also closed and the swimming pool has been filled-in. The Master Plan recommends replacing the tennis and pool area with event grounds and parking. The Master Plan also planned for an outdoor education camp across Golf Club Drive from the Homeless Garden Project and an interpretive trail through Sycamore Grove. The Sycamore Grove area is located to the east of Highway 9 along the San Lorenzo River and is currently closed as a result of illegal camping issues. No parking is currently provided onsite.

**Recommendations:**

1. Continue to implement the existing master plan.
   - Restore the Pogonip Clubhouse and use for events. Seek partnerships and grant opportunities to fund renovation.
   - Implement the Sycamore Grove interpretive trail.
   - Consider a caretaker residence or park host onsite.
   - Enhance restoration efforts. Renovate cattle grazing infrastructure and begin grazing. Develop and implement a work plan for invasive species removal and native plant restoration.
   - Install interpretive signage.
   - Construct road, parking lot, infrastructure, and other site improvements.
2. Explore modifications to the existing master plan:
   - Conduct a trails assessment to evaluate existing trail conditions and use issues and identify ways to improve access, recreational enjoyment, and connectivity. The assessment will help inform the determination of whether or not future trail modifications or improvements are appropriate and provide for a range of uses (hiking, horseback riding, mountain biking). As part of the process, the City would create clearer maintenance standards, identify use conflicts and solutions, develop a signage and educational program, assess long-term maintenance costs associated with any future improvements, and evaluate potential environmental impacts and mitigations through the CEQA process.
   - Consider adding a parking area near the Emma McCrary trail on Golf Club Dr. in the meadow immediately to the northwest of the vehicle access gate.



## Rincon Park



**Location:** 601 Chestnut St.

**Proposed Classification:** Neighborhood Park

**Size:** 0.06 acres

Rincon Park is a small demonstration garden with pathways.

**Recommendations:**
None.

## Riverside Gardens Park



**Location:** 258 San Lorenzo Blvd.

**Proposed Classification:** Neighborhood Park

**Size:** 0.52 acres

Riverside Gardens Park is the newest park in the system and was opened in 2014. A granitecrete pathway connects from Riverside Avenue to San Lorenzo Boulevard. Along the pathway there are picnic tables, benches, a playground, community garden plots, a small grass field, an arbor, and one piece of exercise equipment. A steel panel fence was specifically designed for the park and each panel was cut with a different floral design pattern. Fruit trees were planted as part of a community orchard project. The orchard is located in an area with limited recreational opportunity and will increase access to food. In addition, it will provide opportunities to learn about resource conservation and sustainable growing practices in a public setting.

**Recommendations:**
None.

| Feature | | Condition | Description |
|---|---|---|---|
| Recreational Facilities | Community gardens | Very good | Eleven plots. |
| | Exercise equipment | Very good | One piece (stairs). |
| | Playground | Very good | One wooden structure with plastic slides, swings, and bucket swings. Fibar fill. |
| Safety and Security | Lighting | Very good | Three light poles. |
| | Gate and locked at night | Very good | Steel panels. |
| | Security cameras | Very good | One security camera. |
| Site Access | Pathway | Good | Granitecrete pathway. |
| | Entrance sign | Very good | Two diecast cut metal signs and two metal park signs. |
| Site Furnishings | Arbor | Very good | Wooden arbor. |
| | Benches/Seating | Very good | Five recycled plastic. |
| | Bike parking | Very good | Two artistic metal bike racks. |
| | Garbage | Very good | Two metal cans. |
| | Both | Very good | Two BearSaver cans. |
| | Picnic tables | Very good | Six concrete tables. |

## Round Tree Park



**Location:** 305 Nobel Dr.

**Proposed Classification:** Neighborhood Park

**Size:** 0.28 acres

Round Tree Park is a small grass field that is infrequently used. The small size, coupled with public streets bordering three sides of the park, limits the type of recreational facilities that can be located there. There is currently no park signage or site furnishings. Smaller, well-designed recreational opportunities could be added such as an outdoor exercise area, swing set, gazebo, tot-lot, or community garden.

**Recommendations:**

1. Add park signage.
2. Consider additional recreational opportunities such as an outdoor exercise area, swing set, gazebo, tot-lot, or community garden.

## San Lorenzo Park




**Location:** 137 Dakota Ave.

**Proposed Classification:** Community Park

**Size:** 11.12 acres

San Lorenzo Park is located along the eastern edge of the San Lorenzo River and is bordered by Water Street to the north; the Santa Cruz County Government Center, a hotel, and an apartment complex to the east; and Branciforte Creek to the south. The park is connected to downtown by a pedestrian bridge over San Lorenzo River. Public Works recently completed the construction of a pedestrian bridge across Branciforte Creek, linking the park to the Santa Cruz Riverwalk to the South. The benchlands area of the park is located within a flood plain for the river and any development is heavily regulated by the Army Corps of Engineers. San Lorenzo Park hosts multiple events throughout the year and parking is often provided at the County Government Center and in the benchlands area for the events. The park has a playground, a tot-lot, a portable pump track, nine disc golf baskets, the San Lorenzo Lawn Bowling facility, and a pond with a small stage. The play area has been completely fenced-in. The pond is a popular destination to bird watch. However, the pond does not recirculate water and needs to be upgraded. The stage is not frequently incorporated into events at the park. The restrooms are periodically closed as a result of illegal activity which is prevalent at the park. Cameras were installed in the park to create a safer environment and a Ranger is generally stationed at the park.

The park is located adjacent to the river and is in need of renovations and enhancements to create more use and deter misconduct. Consideration should be given to creating a larger draw for additional community use of the park when events are not being held. Future renovations of the park could focus on architectural elements, attractions, event infrastructure, and other improvements that separate the park from other destinations. Future renovation of the park should also consider how to increase usage of the Santa Cruz Riverwalk from neighborhoods along the river and Downtown.

**Recommendations:**

1. Consider a comprehensive renovation of the park. Examples include upgrading the playground, renovating or removing the pond, adding more colorful gardening displays, providing art, renovating or relocating the restrooms, expanding the number of recreational facilities, installing hidden infrastructure to support events, and constructing functional architectural elements such as entrances, plazas, art, stages, and arbors.
2. Increase programming of the park.
3. Hold more events and concerts in the park.
4. Consider as a location for a permanent or seasonal food truck court.
5. Partner with the County to provide recreational facilities on the parcel of County-owned land immediately to the north of the lawn bowling facility. Recreational facilities could include pickleball courts, exercise equipment, and/or amenities or features that could be incorporated into weddings or events.

| Feature | | Condition | Description |
|---|---|---|---|
| Recreational Facilities | Disc golf course | Very Good | Nine hole disc golf practice course. |
| | Large, grass field | Poor | Benchlands has no irrigation. |
| | Playground | Good | One structure w/ slides, climbing structure, and tire swing with sand and rubber matting. Concrete serpent. |
| | Pump track | Very good | One fiberglass and wood portable pump track course. |
| | Tot-lot | Good | Fenced-in with a structure with slides and bucket swings and sand and rubber fills. |
| Safety and Security | Lighting | Good | Twelve light poles. |
| | Security cameras | Very Good | Three security cameras on poles. |
| Site Access | Pathway | Fair | Asphalt and decomposed granite are in fair condition. |
| | Entrance sign | Good | Nine metal and one wooden entry sign. |
| Site Furnishings | Benches/Seating | Fair | Five wooden benches in poor condition. Four recycled plastic benches in good condition. One artistically painted concrete bench in a very good condition. |
| | Bike parking | Very good | Two U racks and eight metal bike posts. |
| | Drinking fountain | Good | Three metal. |
| | Flag pole | Very good | One flag pole. |
| | Garbage | Poor | Eight concrete garbage cans. Rusting and warping. |
| | Recycle | Fair | One can with slatted screen. |
| | Both | Very good | Three BearSaver cans. |
| | Pond and Stage | Poor | Pond does not recirculate water and is prone to pipes breaking. Stage is dated. |
| | Restroom | Fair | One dual facility. |

## San Lorenzo Park Lawn Bowling



**Location:** 137 Dakota St.

**Proposed Classification:** Community, Recreational, and Cultural Facility

**Size:** 18,000 sq. ft. outdoor lawn bowling area and 1,500 sq. ft. clubhouse

The San Lorenzo Park Lawn Bowling facility is located in San Lorenzo Park and operated by the Santa Cruz Lawn Bowling Club. The world class green was constructed with a well-drained, compacted substrate layer leveled to within 1/8" level for every ten foot of surface where the ball, when rolled upon the surface, travels at a specific speed to meet world standards for tournament play. Reservations or club memberships are required to use the facility. Used by the Santa Cruz Lawn Bowling Club, the clubhouse contains a kitchen and restrooms in addition to meeting space.

**Recommendations:**
None.

## Santa Cruz Riverwalk





**Location:** Multi-use trail along the San Lorenzo River

**Proposed Classification:** Other

**Size:** N/A

**Master Plan:** San Lorenzo Urban River Plan (2003)

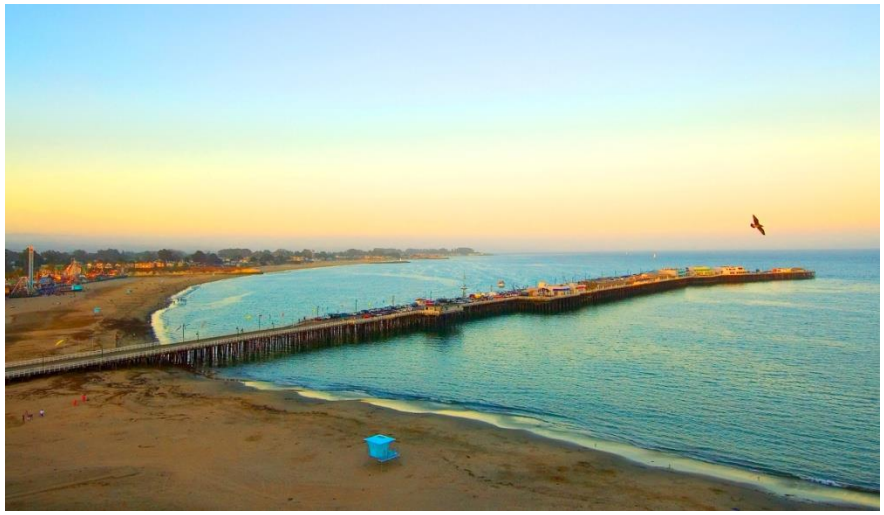
The Santa Cruz Riverwalk is a multi-use trail that encircles the San Lorenzo River south of Highway 1. On the west side of the river, the trail continues under Highway 1 to the Tannery Arts Center. The San Lorenzo Urban River Plan provides a number of recommendations for the locations and designs of plazas, unpaved nature loops, native planting treatments, interpretive signage, bird watching platforms, and art. The plan recognizes that the river is a habitat area for fish and wildlife and a passive recreational area for the enjoyment of the community. The Public Works Department recently added additional lighting along the Riverwalk, as well as exercise equipment on the west side of the river and south of Laurel Street. Exercise equipment is also located on the west side of the river south of Highway 1. Illegal activity, protecting the river and bird habitat, and increasing positive use of the area have been ongoing concerns along the river corridor.

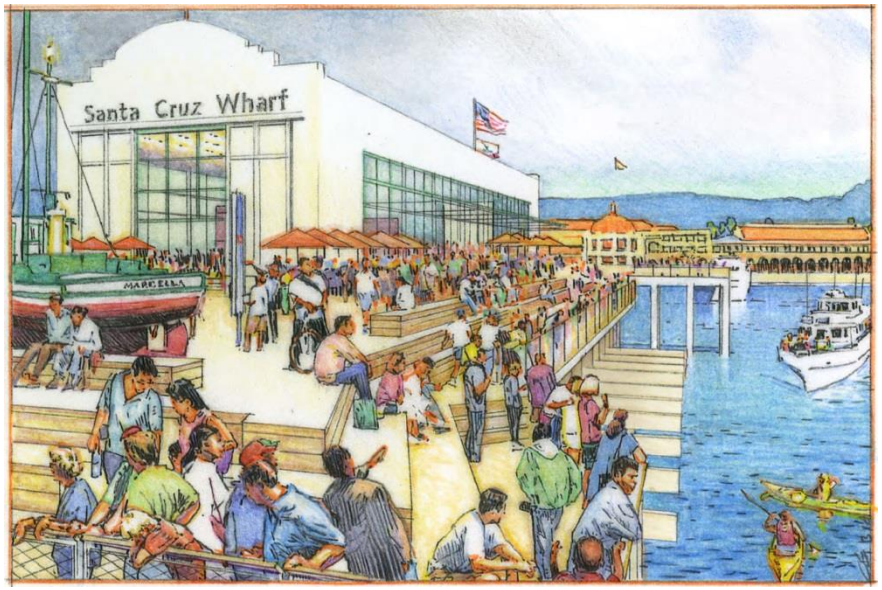
**Recommendations:**

1. Implement the San Lorenzo Urban River Plan as well as stakeholder recommendations developed through the Santa Cruz Riverwalk Summit and subsequent discussions.
2. Integrate multi-departmental and agency partnerships while enhancing the department's programming and safety efforts.
3. Install or coordinate improvements which include but are not limited to the installation of artwork, site furnishings, infrastructure and recreational amenities.

| Feature | | Condition | Description |
|---|---|---|---|
| Recreational Facilities | Exercise equipment | Very good | Two locations, nine pieces total. |
| Safety and Security | Lighting | N/A | Lighting along majority of pathway. |
| Site Access | Pathway | Fair | The majority is asphalt. Some sections concrete and permeable concrete. |
| | Entrance sign | Good | Fourteen metal signs. |
| Site Furnishings | Benches/Seating | Fair | One set of concrete blocks. |
| | Garbage | Good | Five garbage only BearSaver cans. |
| | Both | Fair | Twenty BearSaver cans. The majority are in good condition. A few are in fair condition due to wear and tear and continual remediation of vandalism. |
| | Interpretive Signs | Very good | Three signs. |

## Santa Cruz Wharf






Rendering from the Santa Cruz Wharf Master Plan Report (2014) of potential improvements and activities at the Bayward end of the Wharf.

**Location:** Entrance located at the intersection of Beach St. and Pacific Ave.

**Proposed Classification:** Community, Recreational, and Cultural Facility

**Size:** 8 acres

**Master Plan**: Santa Cruz Wharf Master Plan (2014)

The Santa Cruz Wharf was constructed in 1914 and, at one-half mile in length, is the longest timber pile-supported pier structure in the United States. The Wharf is a major tourist destination and is popular for wildlife viewing, fishing, boat tours, dining, and shopping. The Parks and Recreation Department operates the Wharf. The Economic Development Department is managing the Santa Cruz Wharf Master Plan process which is currently in the CEQA review process. The Santa Cruz Wharf Master Plan will guide the future restoration and expansion of the facility, and includes polices that recognize the importance of the visual and historic landmark and significance as a recreational, commercial, and open space resource. Among the many recommendations, the plan includes a landmark building, an events pavilion, a gateway entrance, a welcome center, a small boat landing area, and pedestrian and bicycle access along the western side. The Wharf Headquarters is located on the Wharf and the Maintenance Yard is leased from the Regional Transportation Commission and is located near Depot Park. In 2014, the Santa Cruz Green Wharf Project, a partnership between the City, UCSC, and other organizations and community members dedicated to reducing the environmental footprint of the wharf, received the Governor's Environmental and Economic Leadership Award.

**Recommendations:**

Work with the Planning and Community Development and Economic Development Departments to implement the Wharf Master Plan. Renew the lease for the Wharf Yard and consider facility improvements such as a workshop and storage structure.

## Scope Park



**Location:** Pacific Ave. @ Mission St.

**Proposed Classification:** Neighborhood Park

**Size:** 0.1 acres

Scope Park is located across the street from the Town Clock and contains a mural. Scope Park and the Town Clock are gateways to downtown.

**Recommendations:**
Coordinate with the Arts Commission to restore or paint a new mural.

**Senior Citizens Opportunity (222 Market Street)**




**Location:** 222 Market St.

**Proposed Classification:** Community, Recreational, and Cultural Facility

**Size:** 5,400 square feet

The community center is leased to Senior Citizens Opportunity to provide senior arts and cultural services. The building has a large multi-use room with a stage at one end along with an adjoining kitchen and another small multi-use room. The City maintains the landscaping and exterior of the building.

**Recommendations:**
None.

## Sgt. Derby Park



**Location:** 509 Woodland Wy.

**Proposed Classification:** Neighborhood Park

**Size:** 3.65 acres

Sgt. Derby Park has a large grass field, one of the first skate parks in California, two tennis courts (six pickleball courts are painted), three disc golf baskets, picnic tables, and a playground. The park does not contain frontage along a public street and is hidden from view behind residences from the public right-of-way on Woodland Avenue to the south. Park access is provided from the street by two narrow unpaved paths located between private residences. A fence was installed by the Santa Cruz City Schools District between Sgt. Derby Park and Natural Bridges School along the eastern property line. Industrial properties are located to the north. Residential properties are located along the west and south. Fence cutting has occurred along the fence-line between the industrial properties and the park for access to the park. There may be an opportunity for a joint-use agreement with the Santa Cruz City Schools District to construct a turf soccer field on their property. The proximity of the park to the recreational facilities is a great opportunity to explore a more detailed joint-use partnership to allow for public use during off-hours. Adjacent to the skate park, the remnants of a volleyball court exist. This court could be converted to another skateboarding area, possibly tailored for less experienced riders or incorporated into the existing skate park. The asphalt pathways are deteriorating and need resurfacing. There is room for expansion next to the adjacent playground to offer more variety for varying age groups. The tennis/pickleball court area could be expanded. A parcourse used to be located at the park and could be reestablished. The park is currently serviced by a porta-potty. Additional use related to more courts or a joint-use partnership for a turf field may necessitate the need for a permanent restroom. The drainage is poor for most of the site. A fenced off-leash dog use area could be located at the site. However, consensus with the surrounding neighbors has not been reached. Many residents do not want the open field segmented with fencing and prefer hours of off-leash dog use to be pursued. Many others have expressed concern that allowing off-leash dog use without a fenced area would create safety and cleanliness issues.

**Recommendations:**

1. The entrances could be improved to be more inviting, such as with the installation of awnings, landscaping, or other entry features.
2. Improved parking and access could occur through mutual parking agreements with adjacent industrial property owners to create access from Delaware Avenue or the Armory property off of Swift Street.
3. A more defined joint-use agreement with the Santa Cruz City Schools District could be pursued for use of the existing school recreational equipment and the development of an artificial turf field.
4. There is opportunity to expand the skate park and tennis/pickleball facilities to accommodate additional skate and court space.
5. A parcourse could be established along the pathway.
6. The pathways should be resurfaced in the near future.
7. The playground could be expanded to offer more variations for skill and age level.
8. The evaluation of adding a restroom facility should be conducted if facilities are expanded and the park receives a higher level of use.

| Feature | | Condition | Description |
|---|---|---|---|
| Recreational Facilities | Disc golf | Very good | Three practice baskets. |
| | Large, grass field | Poor | Large multi-use field. Drainage is poor. |
| | Pickleball court | Very good | Six pickleball courts are painted on the tennis court for shared use. Requires nets to be brought to the site and installed. |
| | Playground | Good | One swing set. One playground structure w/ slides and a bucket seat swing set for smaller children. Fibar fill. |
| | Skate park | Very good | Concrete. Graffiti is prevalent. |
| | Tennis court | Very Good | Two courts. Painted for shared use with pickleball. |
| Site Access | Pathway | Very poor | Asphalt needs to be resurfaced. |
| | Entrance sign | Good | Two wood, four metal signs. |
| Site Furnishings | Art | Very good | One rock w/ metal plaque and one metal sculpture commemorating Sgt. Derby. |
| | Benches/Seating | Fair | One wood, four recycled plastic, and two metal. |
| | Bike parking | Good | One U rack. |
| | Drinking fountain | Fair | One regular, one with dog bowl. |
| | Garbage | Fair | Five concrete. |
| | Recycle | Poor | Two wood slatted shells. |
| | Picnic tables | Fair | One wood and five concrete. |
| | Restroom/Porta-Potty | Fair | Screened porta-potty. |

## Star of the Sea Park



**Location:** 418 Darwin St.

**Proposed Classification:** Neighborhood Park

**Size:** 2.1 acres

Star of the Sea Park is approximately 2.1 acres. The City owns an approximately 1/3 acre parcel along Darwin Street and a joint-use agreement allows use of the adjacent field area which the City maintains. The properties contain very few amenities and the turf area needs enhancement. Additional facilities could be placed at this site. Consideration should be given to provide activities that are not provided at nearby Frederick Street Park. The Parks and Recreation Department could expand the joint use agreement to add signage and a walkway from Frederick Street to encourage more use of the site. Drainage is poor in the field area. The large grass field is large enough to accommodate a youth soccer field. However, this portion of the park is not owned by the City and the joint-use agreement would need to be expanded.

**Recommendations:**
Explore additional amenity opportunities with the surrounding neighborhood and Star of the Sea Church. The location has limited site furnishings and no recreational facilities. Consideration should be given to providing facilities which are not currently located at Frederick Street Park, which is a few blocks away. Some examples of what could be located there include a community garden and/or orchard, pickleball courts, a basketball court, a soccer field, exercise equipment, play equipment, or a small pump track.

| Feature | | Condition | Description |
|---|---|---|---|
| Recreational Facilities | Large, grass field | Very poor | Irrigation system needs work, gopher holes, uneven surfaces, and bare patches. Irrigation clock is located behind school's gate and could be relocated to be more accessible to City staff. |
| Site Access | Pathway | Poor | Decomposed granite, below level of grass and poor appearance. |
| | Entrance sign | Poor | One wooden near Church parking lot is in good condition. No sign on Darwin St. |
| Site Furnishings | Garbage | Very poor | Three concrete bins. |
| | Recycle | Very poor | One wooded w/ slat screening. |
| | Picnic tables | Very poor | Three (wooden). |

### Surfing Museum



**Location:** 701 W. Cliff Dr.

**Proposed Classification:** Community, Recreational, and Cultural Facility

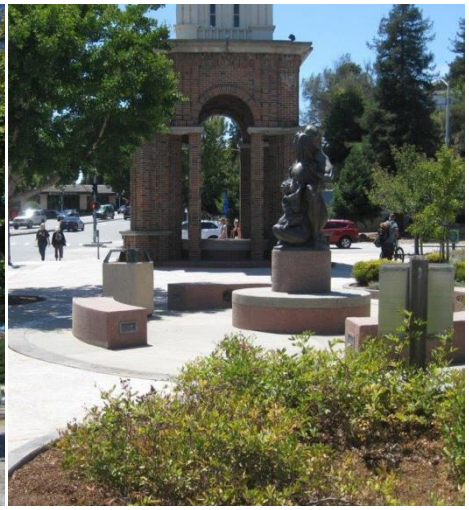
**Size:** 630 sq. ft.

Located inside the iconic Mark Abbott Memorial Lighthouse on Lighthouse Point, the Surfing Museum overlooks the renowned surf break Steamer Lane and has a collection of photographs, surfboards, and other interesting artifacts tracing more than 100 years of surfing history in Santa Cruz. The museum shop specializes in surfing books and surfing related items.

**Recommendations:**
Update the collections. Consider removing the turf and replacing with native plant displays and/or a plaza/gathering area at the rear of the Surfing Museum.

## Town Clock





**Location:** 101 Water St.

**Proposed Classification:** Neighborhood Park

**Size:** 0.19 acres

Town Clock is a plaza with benches, art, a water fountain, and is the site of a memorial plaque for the 1989 Loma Prieta Earthquake. The plaza is used as a gathering place and is home to the annual New Year's Eve countdown event.

**Recommendations:**
None.

## Trescony Park




**Location:** Terminus of Trescony St.

**Proposed Classification:** Neighborhood Park

**Size:** 2 acres

Trescony Park has the largest community garden area in the City with fifty-four plots. The park also has a playground, tot-lot, and picnic tables. A pathway extends to Bay Street. A porta-potty could be provided.

**Recommendations:**

1. Provide a porta-potty.
2. Add signage along Bay Street.
3. Improve concrete pathway.

| Feature | | Condition | Description |
|---|---|---|---|
| Recreational Facilities | Community gardens | Good | Fifty-four plots. |
| | Playground | Good | One tower with slide. Fibar fill. |
| | Tot-lot | Good | One tower with slide. Fibar fill. |
| Safety and Security | Lighting | Fair | Four light poles. |
| Site Access | Pathway | Poor | Concrete pathway is not level. |
| | Entrance sign | Good | One wooden entrance sign, one metal, one wood. No sign on Bay St. |
| Site Furnishings | Benches/Seating | Good | Four recycled plastic benches. |
| | Bike parking | Good | One U bike rack. |
| | Drinking fountain | Good | One metal. |
| | Garbage | Fair | Two concrete toters used for garden area. |
| | Recycle | Fair | One recycle bin with slat screening. |
| | Picnic tables | Fair | Two concrete and one wood. |

## Tyrrell Park





**Location:** 1305 E. Cliff Dr.

**Proposed Classification:** Neighborhood Park

**Size:** 1.2 acres

Tyrrell Park is a small neighborhood park which contains a small group educational area, a grass field, benches, and a life-size gray whale sculpture. The whale is a popular backdrop for photographs taken by visitors of the Museum of Natural History, which is located onsite. The park is located across E. Cliff Drive from Seabright State Beach, and the surrounding streets receive a high amount of traffic from beach goers. Community members help maintain Pilkington Creek which runs along the eastern edge of the site. Monarch butterfly habitat is located onsite. The Santa Cruz Museum of Natural History has requested minor improvements to create a better connection between the park and the museum's programming and educational classes, including a small trail emphasizing native plants from Santa Cruz; replacement of front lawn with native/drought resistant demonstration gardens; natural art and activity zones where art and play make use of natural materials and kids can search for insects; natural play areas making use of stumps, rocks, and tree trunks; bird boxes and other wildlife enhancements; dark sky lighting to allow for star gazing; bicycle parking, and ADA enhancements. The Parks and Recreation Department is generally supportive of these requests but will need to ensure that future programming and activity areas are complementary, neighborhood-serving, and do not deter park use from neighbors or cause other impacts to the neighborhood.

**Recommendations:**
Convert landscaping to demonstrative gardens, add habitat features, bike parking, and dark sky lighting, improve ADA access, and rewire and upgrade plaster whale. Work with the Santa Cruz Museum of Natural History and surrounding neighbors to establish guidelines and locations for the outdoor activity and learning areas to ensure they are scaled appropriately for a neighborhood-serving park. The small amphitheater could be programmed with local events.

| Feature | | Condition | Description |
|---|---|---|---|
| Safety and Security | Lighting | Fair | Two light poles. |
| Site Access | Pathway | Good | Concrete, asphalt, and pervious concrete are good. Decomposed granite pathways are in fair condition. |
| Site Furnishings | Amphitheater | Fair | Small concrete amphitheater. |
| | Art | Fair | One whale. |
| | Benches/Seating | Good | Two wood showing minor cracking, three wood in very good condition, and one recycled plastic in very good condition. |
| | Bike parking | Good | Three bike posts. |
| | Flag pole | Very good | One flag pole. |
| | Trash and Recycling | Very good | Two BearSaver cans. |
| | Interpretive signs | Fair | Three plastic panels and one metal. |

## University Terrace Park





**Location:** Meder St. @ Nobel Dr.

**Proposed Classification:** Neighborhood Park

**Size:** 8.7 acres

University Terrace Park has a playground, large grass field, two tennis courts, picnic tables, and fenced-in off-leash dog use areas (one area is dedicated to dogs less than 25 pounds in size). The park is connected to the Arroyo Seco trail which connects to Grandview Street. The basketball court is popular for pick-up games. Youth soccer leagues occasionally use the field as a practice area. The park is frequently used and currently has a porta-potty. A permanent restroom facility with an attached maintenance shed is a necessary addition. The playground equipment is limited given the size of the park, though the original design planned more play areas. Additional features could be added. A mini soccer field (synthetic) could be added to the large grass area to reduce water use and increase opportunities for pick-up games.

**Recommendations:**

1. Add a permanent restroom with an attached maintenance shed.
2. Upgrade/add playground equipment for more age groups.
3. Consider a mini soccer field (synthetic).

| Feature | | Condition | Description |
|---|---|---|---|
| Recreational Facilities | Basketball court | Very good | One basketball court |
| | Large, grass field | Good | Very large multi-use grass field. |
| | Off-leash dog use | Good | Very large off-leash dog use area. Surface is dirt and becomes muddy during the rainy season. |
| | Playground | Good | One play structure with slides and a bucket swing set. Sand and rubber surfacing. |
| | Tennis court | Very good. | Two tennis courts. |
| Site Access | Pathway | Fair | Sections of asphalt are un-level from tree rooting and show dryness and crumbling and will need sealing and resurfacing. |
| | Entrance sign | Very good | Two wood and two metal. |
| Site Furnishings | Benches/Seating | Good | Seven recycled plastic, six wood, two concrete. |
| | Bike parking | Good | One four foot long bike rack near playground and two bike posts near Nobel Dr entrance. |
| | Drinking fountain | Good | Three drinking fountains. Two include a dog bowl feature. Paint chipping on drinking fountain in off-leash dog use area. |
| | Garbage | Good | Four concrete. |
| | Recycle | Good | One in recycled plastic, slatted shell. |
| | Picnic tables | Good | Three concrete, two recycled plastic, and one wood. |
| | Restroom/Porta-Potty | Fair | Porta-potty with wooden enclosure. |

## West Cliff



**Location:** Swanton Blvd. to Bay St.

**Proposed Classification:** Community Park

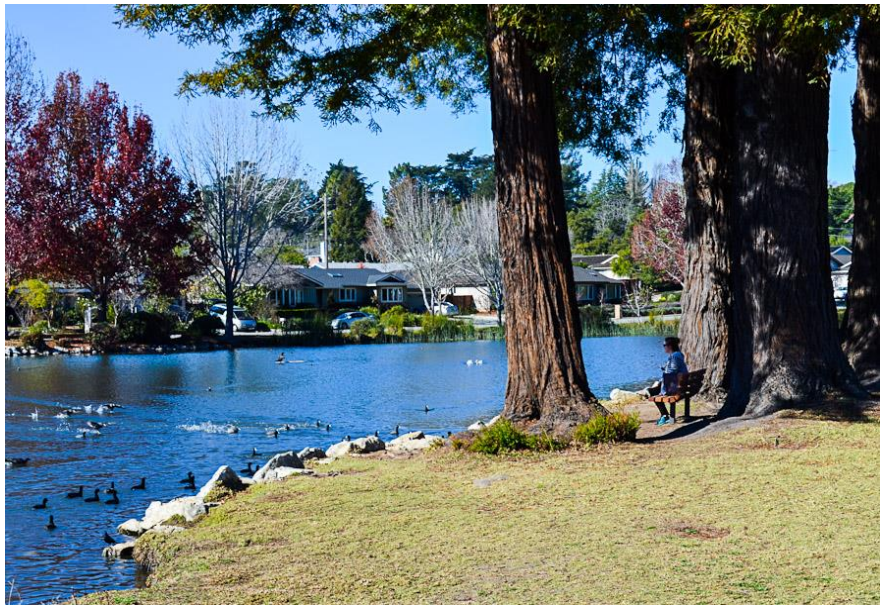
**Size:** 14.64 acres

West Cliff pathway and accents are located on a coastal bluff along West Cliff Drive, a multi-use path that extends from Natural Bridges State Park to Cowell Beach. Stairs provide access to popular surfing breaks and beaches. Coastal recreation on and around the bluff is abundant and includes but is not limited to ocean and wildlife viewing, relaxing, surfing, swimming, rock fishing, wind surfing, biking, walking, and exercising. The park has benches, landscape accents, a statue, artwork, and one turf field. Surf contests are held at Steamer Lane and marathons are held along the pathway. Multiple surf breaks are located along this section of coastline. The Surfing Museum is located at Lighthouse Point. Lighthouse Point offers an un-paralleled viewing opportunity of surfing. It is sometimes booked for special events such as weddings or food truck events. The pathway has overlook areas that provide opportunities to view sea lions, otters, dolphins, migrating whales, and marine birds. Natural Bridges State Park is located at the Western edge of West Cliff and Lighthouse Field State Park is located across the street from Lighthouse Point. The State Parks provide the only restroom facilities on West Cliff. The State also owns the western half of Its Beach. The Parks and Recreation Department maintains the landscaping, railings, and dirt pathways along the pathway. The proximity to the ocean leads to challenges with erosion and deterioration of infrastructure. As improvements take place over time, the appearance of some of the areas lacks continuity. Ice plant is very aggressive. There are varying opinions about the types of facilities that should be included on West Cliff. Exercise equipment was added to Mitchells Cove and receives regular use. The City Council provided direction to staff to hold off on installing additional recreational facilities until a future plan was in place. The City's Local Coastal Program has a planning item to develop a West Cliff Plan. The coastline is a recreational, natural, and scenic treasure that embodies the City's unique sense of place and identity. A master plan could be created to guide future improvements; help maintain a more cohesive, consistent identity; and improve the long-term coordination and management.

**Recommendations:**
Partner with other stakeholder departments to develop and implement an integrated design, land-use, recreation, cliff stabilization, and landscape plan for West Cliff and East Cliff Drives to enhance public access, safety, preservation, and recreational enjoyment along the coastline.

| Feature | | Condition | Description |
|---|---|---|---|
| Recreational Facilities | Exercise equipment | Very good | One dip and one sit-up station. |
| Safety and Security | Lighting | N/A | Street lights are along W. Cliff Dr. |
| | Gate and locked at night | N/A | Lighthouse Point Parking lot is gated. |
| Site Access | Pathway | Very Good to Poor | Asphalt was redone south of David Way. Pavement is eroding and cracking north of David St. |
| | Parking | N/A | Parking lots and spaces along W. Cliff. |
| Site Amenities | Art | Very good | One obelisk sculpture, one surfer statue. |
| | Benches/Seating | Fair | Fifty-nine wooden benches and two recycled plastic benches. Approximately 60 percent of the benches metal supports have deteriorated and will need replacement. |
| | Bike parking | Good | Ten ft. long bike structure and three U bike racks. |
| | Drinking fountain | Good | One metal and one metal with bottle feature. Needs to be painted. |
| | Flag pole | Good | Flag pole is in front of Surfing Museum. |
| | Garbage | Very good | 19 Bearsaver cans for both trash and recycle and five metal cans. |
| | Recycle | Very good | Three recycle cans in addition to 19 Bearsaver cans for both trash and recycle. |
| | Both | Good | Eleven BearSaver cans. Some will need to be repainted due to weathering. |
| | Interpretive signs | Good | Four panels and one brick structure and metal plaque. |

## Westlake Park



**Location:** Bradley Dr. @ Spring St.

**Proposed Classification:** Neighborhood Park

**Size:** 6.03 acres

Westlake Park is picturesque and offers great opportunities to relax and bird watch. It contains a large grass field, tot-lot and playground equipment, benches, and picnic tables adjacent to a drainage basin which visually looks like a small lake. The park is somewhat hidden within a residential neighborhood. Youth soccer league and UCSC students sometimes use the field for practice. Fishing is allowed for youth 16 years and younger and seniors 65 years and older. Tule growth and the aeration and circulation system require continual maintenance. The pathways currently do not accommodate access around the lake.

**Recommendations:**

1. This park is a larger neighborhood park within our parks system and a restroom could accommodate visitors who do not live within walking distance to the park which would encourage longer visits.
2. A small walking loop could be installed to allow for visitors to walk around the lake.

| Feature | | Condition | Description |
|---|---|---|---|
| Recreational Facilities | Fishing | N/A | Allowed for youth sixteen years and younger and seniors 65 years and older. |
| | Large, grass field | Good | Very large multi-use playing field on east side of park. Sometimes used by youth soccer groups as a practice area. |
| | Playground | Good | One tower structure w/slides and a swing set. A combination of sand and rubber fill. |
| Site Access | Pathway | Good | Decomposed granite pathways provide access along the western edge of the lake and to the play structure and picnic tables on the east side of the park. |
| | Entrance sign | Good | Large, engraved wooden sign and one metal. |
| Site Furnishings | Benches/Seating | Good | Seven wooden and six recycled plastic. |
| | Bike parking | Very good | Four metal bike posts. |
| | Drinking fountain | Good | Two. |
| | Garbage | Good | Three concrete garbage cans. No recycle. |
| | Interpretive signs | Good | One wooden and two recycled plastic. |

## Westside Pump Track



**Location:** Western Dr. @ Highway 1

**Proposed Classification:** Neighborhood Park (Leased)

**Size:** N/A

The Westside Pump Track is located on land the City has leased for a short-term basis. The land will be returned to the property owner when the lease is discontinued.

**Recommendations:**
Consider asphalt paving of pump track to reduce long-term maintenance needs.

| Feature | | Condition | Description |
|---|---|---|---|
| Recreational Facilities | Pump track | Very good | The pump track recently underwent a renovation to improve the pumps and berms. |
| Safety and Security | Gate and locked at night | Very good | New fencing. |
| Site Access | Pathway | Very good | Entrance to pump track is concrete. |
| | Entrance sign | Very good | One metal. |
| Site Furnishings | Benches/Seating | Very good | One metal bleacher. |
| | Bike parking | Very good | Two bike parking posts. |
| | Garbage | Very good | One concrete. |
| | Recycle | Fair | One plastic slatted screen. |
| | Restroom/Porta-potty | Poor | Unscreened and located in a visible location. |

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# SECTION 4.3: FUNDING STRATEGIES

A. Introduction
B. City Fiscal Setting
C. Funding Strategies
D. Costs for Future Projects

## A. INTRODUCTION

The *Santa Cruz Parks Master Plan 2030* (Parks Master Plan 2030) identifies numerous goal, policies, actions, and recommendation items for implementation, relating not only to specific parks, facilities, open spaces and recreation areas, but also to citywide programs and administration. Full implementation of the Parks Master Plan 2030 will require significant staff and financial resources over the life of the Plan. Given the inherent limitations of the City's financial resources, many implementation projects will need to be prioritized and phased-in in ways that allow for existing staff and budgetary resources to address the projects over time. Furthermore, many of the recommendations are conceptual in detail, and future planning efforts will need to be pursued to flesh out the project-specific details and figure total costs. Finally, costs related to larger, community assets, such as the Santa Cruz Wharf and Civic Auditorium, will require larger funding sources beyond the Department's operating budget or developer fees that are currently collected. That said, this section provides a broader overview of the City's fiscal setting, existing funding strategies, and potential funding strategies that will or could be explored further to help implement components of the plan.

## B. CITY FISCAL SETTING

For fiscal year 2017-2018 (FY 2018), the City's total budget is $263.2 million, of which $106.1 million is in the General Fund. The Parks and Recreation Department has a total budget of $17.2 million, of which $14.9 million is funded through the General Fund. In FY 2018, the City has appropriated $47.1 million for capital projects, but unlike prior years, none of these projects are supported with new General Fund monies. The City has identified $299.4 million in unfunded capital projects.

The 2018 budget's fiscal projections anticipate budget shortfalls in the General Fund over the next several fiscal years with a modest recovery beginning in 2022. Despite strong revenue growth, pension, health care, and infrastructure maintenance/replacement costs are increasing. In order to avoid reactive cuts during the shortfall years, it is necessary to reserve revenue now to help the City offset the forecasted deficits.

## C. FUNDING STRATEGIES

### EXISTING SOURCES

The City has several existing sources of funds to pay for capital projects.

### Park Land and Open Space Dedication.

The City requires new residential subdivisions to dedicate land, or pay an in-lieu fee, for parks and open space, as authorized by the Quimby Act (California Government Code Sec. 66477). For subdivisions greater than 50 units, the development is required to either dedicate 4.5 acres per 1,000 population or pay an in-lieu fee. For smaller subdivisions, only the fee is required. The 4.5 acre requirement is divided into two acres for neighborhood parks and 2.5 acres for community parks. The in-lieu fee is set at $3.00/sq. ft. of building space or $4,780 per undeveloped parcel. Use of the fee revenue is restricted to the development of new parks or the rehabilitation of existing parks. Santa Cruz allocates its Quimby Act fee revenue into separate funds representing four quadrants of the City. Fees collected from new residential development within each quadrant must be spent on parks within that quadrant. In the City Budget for Fiscal Year 2018, the four park fee funds are projected to have an ending balance of approximately $800,000.

### Park and Recreation Facilities Tax

While the Quimby Act fees are intended primarily to fund acquisition and development of park land, the City has also adopted an excise tax on residential construction to help fund parks and recreation facilities. The

tax, which is paid at the issuance of a building permit, covers development or expansion of all types of residential units, including mobile homes. The tax is charged at the same level as the Quimby Act fees, $3.00 per sq. ft. of new construction. The City has established a separate budgetary fund to account for the excise tax, but as a practical matter the City handles the expenditures of the funds in the same way as it does for the Quimby Act funds. The excise tax revenues are transferred into the four quadrant fee accounts for use on park projects within each of these service areas. Therefore, the fee balance of $800,000 projected for the end of FY 2017-18 indicated above also includes revenues from the excise tax. Future in-lieu fee studies could assess if the quadrant areas could be updated to reflect trends in growth in specific areas of the City and the corresponding impacts on facility needs and demands.

### Growth Impacts on Funding

These types of impact fees and taxes on new construction are intended to mitigate the impact of new population growth on the parks and recreation system, although the revenues can be used to upgrade or renovate existing parks to account for usage of those parks by new residents. It has been about ten years since the City established the fee level for the Quimby fees, based on a nexus study completed at that time. With the adoption of the new Parks Master Plan 2030, it would be appropriate to conduct a new nexus study to incorporate current costs for park land acquisition and development. Similarly, the level of the residential tax should be evaluated to determine if the current tax rate adequately addresses the impacts of new development on park facilities.

The level of future revenues from these sources will also depend on the rate of growth Santa Cruz experiences during the life of the Parks Master Plan 2030. The Association of Monterey Bay Area Governments (AMBAG) is the Metropolitan Planning Organization (MPO) for the Santa Cruz region and has prepared growth projections for each jurisdiction to aid in regional transportation and land use planning. AMBAG's most recent projections were adopted in 2014 and cover the 2010 to 2035 time period. These projections show the City of Santa Cruz gaining 6,039 new residential units between 2010 and 2035, of which 4,231 units would occur by 2020. However, as of December 2016, Santa Cruz had added 437 new units since 2010. It is likely the recovery in the housing market from the recession has been much slower than anticipated.

In order to estimate potential future funding available from these City sources, consultant Applied Development Economics (ADE) has prepared a low and high residential growth projection based on the AMBAG data but calibrated to the actual dwelling unit count in Santa Cruz in 2016 (Table 4.3-1). The low projection assumes that the pace of development in the City between 2010 and 2016 continues until 2020 and then follows the AMBAG projections for each of the subsequent five year periods out to 2035. Under this scenario, Santa Cruz would add 2,684 units between 2016 and 2035 but fall short of the total 29,335 units originally projected by AMBAG for 2035. The high projection assumes development activity accelerates and the City does achieve the original AMBAG projection, adding 5,720 new units between 2016 and 2035.

Table 4.3-1 shows both the Quimby Act fees and the residential tax potentially generated in each future five year period. The residential tax would also be levied on residential remodels if they add square footage to the home, but this is not estimated in Table 4.3-1. The low growth scenario would generate about $25.7 million over the 20 year period, while the higher growth scenario would generate $54.8 million. If the City resets the fee and tax levels to account for new costs identified in the Parks Master Plan 2030, the revenues would likely be higher than shown. As such, it appears that these revenues could fund many of the projects. It is important to note that construction costs will escalate each year, so the further out in time projects are completed, the higher the total cost will be. The City's fee and tax levels are not currently set up to escalate each year automatically, so the revenues could fall short of costs over time.

**Table 4.3-1 Projected Residential Development and Related Quimby Act Fees and Park and Recreation Tax Revenues**

| | 2016 | 2020 | 2025 | 2030 | 2035 |
|---|---|---|---|---|---|
| **Projected Housing** | | | | | |
| Low – Total Units | 23,635 | 23,954 | 24,611 | 25,261 | 26,319 |
| 5- Yr. Growth | | 319 | 657 | 650 | 1,058 |
| High – Total Units | 23,635 | 25,422 | 26,515 | 27,596 | 29,355 |
| 5-Yr Growth | | 1,787 | 1,093 | 1,081 | 1,759 |
| **Low Growth Revenues** | | | | | |
| Quimby Fees | | $1,524,820 | $3,140,460 | $3,107,000 | $5,057,240 |
| Cumulative | | $1,524,820 | $4,665,280 | $7,772,280 | $12,829,520 |
| Residential Tax | | $1,531,200 | $3,153,600 | $3,120,000 | $5,078,400 |
| Cumulative | | $1,531,200 | $4,684,800 | $7,804,800 | $12,883,200 |
| Combined Total | | $3,056,020 | $9,350,080 | $15,577,080 | $25,712,720 |
| **High Growth Revenues** | | | | | |
| Quimby Fees | | $8,541,860 | $5,222,592 | $5,166,948 | $8,410,201 |
| Cumulative | | $8,541,860 | $13,764,452 | $18,931,399 | $27,341,600 |
| Residential Tax | | $8,577,600 | $5,244,443 | $5,188,567 | $8,445,390 |
| Cumulative | | $8,577,600 | $13,822,043 | $19,010,610 | $27,456,000 |
| Combined Total | | $17,119,460 | $27,586,495 | $37,942,009 | $54,797,600 |

## ADDITI0NAL FUNDING STRATEGIES

### Grant Funding

Similar to most cities, Santa Cruz accesses state and federal grant programs when available to help fund parks and recreation facilities. Periodically, voters of the state have approved park, water and natural resources bonds that the State Department of Parks and Recreation has used to grant funds to local agencies through its Office of Grants and Local Assistance (OGALS). Most recently, a statewide park bond was passed in 2006. Additionally, OGALS administers annual Land & Water Conservation Fund (LWCF) funds from the National Park Service, the Habitat Conservation Fund ($2 million/yr) and the Recreational Trails Program (up to $4 million, depending on Congressional action). The City may also access funds and technical assistance directly from the Federal Government. For example, the United States Fish and Wildlife Service offers a Coastal Program that provides direct technical assistance and financial assistance in the form of cooperative agreements to coastal communities and land owners to restore and protect fish and wildlife habitat on public and private lands.

The City receives Community Development Block Grant (CDBG) funds directly from the Federal Government, which may be used for a variety of purposes such as affordable housing, community facilities or economic development. In the past several years, the City has received between $500,000 and $900,000 per year and has used the funds for the operation of the teen center as well as other capital improvement projects. For large projects it is frequently necessary to assemble several grants from sources which may have different purposes but which can contribute to portions of a larger project. In addition to state and federal grant sources, there are a number of private foundations, major corporations and non-profit groups that offer funding for specific purposes appropriate to the types of projects in the Parks Master Plan 2030. Appendix 9 provides a selected list of such grant programs that have offered funds in the past year. In some cases these programs are offered on an annually recurring basis and sometimes they are one time opportunities, or offered on a less frequent basis. If not already, the City may consider subscribing to a service such as Grantstation Insider (www.grantstation.com) in order to monitor upcoming grant opportunities. However, in general grant funds are limited and usually allocated on a competitive basis, which makes it difficult to incorporate them in specific ways into long-term capital improvement programs.

### Potential Additional Funding Sources

The City may consider a variety of other financing mechanisms and funding sources to help close the gap on parks and recreation facilities costs and ongoing operations and maintenance. Some of these programs are most appropriate in relation to major new development projects and others are designed to increase funding from existing

residents and property owners. This latter category usually requires voter approval, but may also include efforts to promote corporate sponsorships and community donations for specific community facilities.

*Community Benefits Program*

In addition to impact fees, another potential approach to developer funding for recreation facilities would be to establish a community benefits program, in which development bonuses are offered in exchange for developer contributions to desired community facilities, which may include recreation related improvements. This approach would need to be coordinated with the City overall land use and development policies. Typically, allowable community benefits are defined broadly and may include a range of improvements from transportation to affordable housing to specific community facilities. A key aspect of the program is that the City would need to be prepared to offer higher development intensities under certain circumstances than are otherwise allowed by zoning in order to create workable incentives that would induce developers to make community benefit contributions. Such programs are gaining wide acceptance in a number of the areas within the San Francisco Bay Area, but their success depends on a vibrant real estate market where development demand is sufficient to support the higher costs associated with the developer exactions.

*Bonds*

The City may also consider financing programs that include existing residents and development in the City. With approval of the voters, the City can levy bonds or impose parcel assessments that would raise money both for parks related capital improvements and also for operations and maintenance costs. In his budget message in the FY 2017-18 City Budget, the City Manager mentioned that considerations are underway to seek approval for a "Quality of Life" bond that could help fund improvements to the City's economic, cultural, recreational, and public facilities.

*New or Expanded Local Taxes*

The City levies a number of local taxes that can be increased with approval of the voters. In the past ten years, voters in the City have approved increases to the sales and use tax, the Transient Occupancy Tax (TOT), and the Utility Users tax. The voters have also approved establishment of water, sewer and refuse franchise taxes and a parcel tax dedicated to protecting public health and wildlife habitat in the San Lorenzo River, the bay and ocean. In addition to these taxes, Santa Cruz also levies an Admission Tax, a Cannabis Tax and a Property Transfer tax. Cities in California have used these types of local taxes to fund parks and recreation services, among other service costs. Taxes used for general purposes are subject to approval by a simple majority of voters while taxes levied for specific purposes require a two-thirds majority vote.

*Land-Based Financing*

In addition to general obligation or revenue bonds, cities also employ more limited land based financing programs such as Community Facilities Districts (Mello Roos), Landscape and Lighting Districts, special assessment districts, and maintenance assessment districts. These types of financing districts can be established citywide, but more typically are employed for major subdivisions where infrastructure or service costs for the new neighborhood cannot otherwise be funded by developer or city sources. While impact fees can be used only to build new public facilities CFDs and maintenance assessment districts can help fund operations and maintenance costs as well.

*Enhanced Infrastructure Financing District (EIFD)*

The State legislature recently approved major modifications to a long standing local financing program called an infrastructure financing district. Under the new program, cities may allocate their own property tax increment within an established district to help finance a wide range of public facilities and improvements, including parks and recreation. This is essentially a limited form of redevelopment tax increment financing, but only public agencies that agree to participate would allocate their tax increment to the EIFD. Multiple agencies can participate, however, so for projects of regional significance, such as the

San Lorenzo Riverwalk, the Santa Cruz Wharf and perhaps the Civic Auditorium, the County or other special districts could agree to participate. Establishing an EIFD, however, would mean that tax increment generated as new development occurs and property values rise would be diverted away from the City General Fund, so this mechanism would also need to be considered within the context of the City's overall long-term budget strategy.

*Charitable Contributions and Donor Campaigns*

The City maintains a budgetary fund for public contributions to the parks system. Citizens and businesses alike often recognize the vital importance of the City's parks and recreation system to the community's quality of life and wish to contribute financially. For major projects, cities often mount donor campaigns, which may include major corporate support, to fund high profile facilities, such as the Civic Auditorium. However, this approach can also be helpful for neighborhood projects as well where the community may be willing to conduct funding raising activities and donate volunteer efforts to provide or maintain a recreation, cultural, or open space amenity in their neighborhood.

## D. COSTS FOR FUTURE IMPROVEMENTS

Decisions on priorities for spending will depend on many factors: need, public desires, new trends, safety, compliance with current regulations and codes, infrastructure required, environmental impact, personnel required and available funding. One major factor will be potential costs and funding available to meet that cost. Table 4.3-2 lists typical costs in 2017 dollars that can aid in decision-making as projects move forward. Variations in size, land constraints, permitting requirements, access or condition of existing infrastructure, design, and the need for consulting or contractor services are some of the factors that affect overall project costs. The costs are intended to give a general sense of scale per type of improvement.

**Table 4.3-2 Typical Project Costs Per Type of Improvement**

| | Facility | Description | **Construction Costs in 2017 per square foot or unit costs** including design fees, necessary prep work, contingencies and soft costs | **Approximate Area** | **Unit** | **Total Construction Costs in 2017** including design fees, necessary prep work, contingencies and soft costs |
|---|---|---|---|---|---|---|
| **1** | **Basic small park Improvements per acre** | Grading, drainage, utilities including connections, paving, planting & irrigation, site furnishings | $650,000 | 1 | acre | $650,000 |
| **2** | **Basic large parks (over 1 acre) Improvements per acre** | Grading, drainage, utilities including connections, paving, planting & irrigation, site furnishings | $600,000 | 1 | acre | $600,000 |
| **3** | **Restrooms** | | | | | |
| a. | *Small* | Prefabricated single restroom with sink and toilet. Water supply and sewer, limited storage. Assumes easy access to water and sewer | $1,450 | 120 | sf | $174,000 |
| b. | *Medium* | Prefabricated single stall women, single stall men with urinal. Water supply and sewer. Assumes easy access to water and sewer | $765 | 600 | sf | $459,000 |
| c. | *Large with concessions* | Prefabricated three stall women, one stall men with two urinal, level 3 concessions. Water supply and sewer. Assumes easy access to water and sewer | $1,100 | 1,070 | sf | $1,177,000 |
| **4** | **Playground** | | | | | |
| | Large | | | | | |
| a. | *Tot Structure* | Some custom structures, platform structure, double tot swing, 3 independent elements, rubberized matting, concrete perimeter curb, fencing, 2 benches | $115 | 4,000 | sf | $460,000 |
| b. | *School age* | Some custom features, large platform structure, 2 swings on single beam, five independent elements, surfacing- half rubberized/half engineered wood fiber, 2 benches, no fencing | $110 | 6,000 | sf | $660,000 |

**Table 4.3-2 Typical Project Costs Per Type of Improvement**

| | Facility | Description | Construction Costs in 2017 per square foot or unit costs including design fees, necessary prep work, contingencies and soft costs | Approximate Area | Unit | Total Construction Costs in 2017 including design fees, necessary prep work, contingencies and soft costs |
|---|---|---|---|---|---|---|
| | Small | | | | | |
| a. | *Tot Structure* | Small platform structure, double tot swing, 2 independent elements, rubberized matting, concrete perimeter curb, fencing, 2 benches | $110 | 1,500 | sf | $165,000 |
| b. | *School age* | Large platform structure, 2 swings on single beam, five independent elements, surfacing- half rubberized/half engineered wood fiber, 2 benches, no fencing | $102 | 2,000 | sf | $204,000 |
| **5** | **Multi- use small turf sports field** | 140' x 200' irrigated turf, soil prep, portable goals | $2.25 | 28,000 | sf | $63,000 |
| **6** | **Artificial turf regulation soccer field** | Artificial turf with Brock sub base, drainage, irrigation to cool fields, goals, buffer areas | $40 | 72,000 | sf | $2,880,000 |
| **7** | **Lighting for soccer field** | Sports field lighting similar to Musco fixtures including transformer, panel, wiring, fixtures | $350,000 | 1 | ea | $350,000 |
| **8** | **Basketball court** | Full size court including paving, striping, hoops, lighting. 2 benches | $56,000 | 1 | ea | $56,000 |
| **9** | **Tennis Court** | Double court, asphalt, fenced, net and posts, paving and striping, 2 benches | $81,000 | 2 | ea | $162,000 |
| **10** | **Bocce Ball** | Wood surround, crushed shell surfacing, 1 bench | $10,000 | | ea | $10,000 |
| **11** | **Bike pump track** | concrete structures, fencing | $47.50 | 8,000 | sf | $380,000 |
| **12** | **Dog Park** | Surfacing- 1/2 decomposed granite paving and 1/2 turf, entry plaza, 6' high fencing, 2 benches, drinking fountain with dog bowl, trash with bag dispenser, shade trees | $303,000 | 25,000 | sf | $303,000 |
| **13** | **Group Picnic Area** | 6 Tables, decomposed granite surfacing, 2 grills, trash, water spigot, (4) trees | $175,000 | 2,000 | sf | $175,000 |
| **14** | **Picnic Shelter** | 20 x 20 prefabricated shelter | $42,000 | 1 | ea | $42,000 |
| **15** | **Demonstration garden** | Shrub and tree planting, irrigation, signage | $11.20 | 4,000 | sf | $44,800 |

**Table 4.3-2 Typical Project Costs Per Type of Improvement**

| | Facility | Description | **Construction Costs in 2017 per square foot or unit costs** including design fees, necessary prep work, contingencies and soft costs | **Approximate Area** | **Unit** | **Total Construction Costs in 2017** including design fees, necessary prep work, contingencies and soft costs |
|---|---|---|---|---|---|---|
| **16** | **Community Garden** | 30,000sf garden with raised beds, soil, irrigation, fencing, decomposed granite paths, 175 sf storage building | $455,000 | 30,000 | sf | $455,000 |
| **17** | **Bicycle Trail Improvements** | 8' wide 2" depth asphalt path with 6" road base with 2' decomposed granite shoulders each side | $10 | 1 | lf | $10 |
| **18** | **Pickleball** | | | | | |
| a. | *Net/court tape* | | | | 1 | $300 |
| b. | *Court resurfacing* | | | | 1 | $3,500 - $5,000 |
| c. | *New court construction* | | | | | |
| d. | *Basic* | | | | 1 | $10,000 - $15,000 |
| e. | *Basic plus lighting/fencing* | | | | 1 | $20,000 - $35,000 |
| f. | *8 court community complex w/ fencing but no lighting* | | | | 8 | $110,000 - $150,000 |
| g. | *8 court community complex w/ fencing, lighting and stadium seating* | | | | 8 | $300,000 + |

# SECTION 4.4: ONGOING PLANNING & UPDATES

A. Implementation
B. Summary & Conclusions

## A. IMPLEMENTATION

The City of Santa Cruz recognizes park, recreational facilities, beaches, and open spaces are essential to the community's quality of life. The *Santa Cruz Parks Master Plan 2030* (Parks Master Plan 2030) is a means to guide future park improvements and to accommodate emerging needs to continue to provide a quality parks system. It is envisioned as a living document that continues to evolve and progress over time. The community profile, existing conditions, emerging trends, and community input received has informed the recommendations in this plan.

As described in the previous chapter, the City is heading into a funding shortfall in the near term. It is necessary to reduce spending now in order to help offset the gap between revenues and expenditures which is projected to begin to close after 2022. The likelihood of funding becoming available for capital projects in the upcoming years is unknown.

It is necessary to set priorities for the implementation of the many action items that evolved out of the community outreach process. Many action items will be ongoing or can be accomplished in a shorter time frame with available resources. Others will require long-term planning. Given the uncertainty of funding streams, it is unnecessary to plot out the step-by-step framework to implement the plan, as the specific steps, costs, and funding allocation will need to change as conditions change.

### ACTION PLAN

The guiding priorities need to remain focused to achieve results, and yet flexible enough to address new challenges and to capitalize on new opportunities. An Action Plan will be maintained to help guide broader priorities and actions and will be based on an assessment of the value of specific actions to the parks system, community, and environment. The Action Plan will remain separate but complementary to the Parks Master Plan 2030. It will be updated and maintained with input from the Parks and Recreation Commission and direction from the City Council. The Action Plan will include actions that are the highest priority for the department to pursue. Staff will use the Action Plan to help guide future departmental decision-making, seeking projects and programs to implement components of the plan on an ongoing and incremental basis. One approach is for staff to meet with the Parks and Recreation Commission to discuss the progress, needs, opportunities, and next steps on an annual basis in preparation for the City's annual budget process.

### ENVIRONMENTAL IMPACT

Many policies and actions are aimed at improving environmental quality within the parks system. Other actions will require additional study of potential environmental impacts before being implemented. Many of the recommendations are conceptual in detail and additional efforts are necessary to determine if the projects should be pursued. During future processes, additional environmental review may be necessary to ensure that final designs do not create a significant impact to the environment. Additionally, some recommendations involve the consideration of additional recreational opportunities within an open space which has an existing master plan in place. The Parks Master Plan 2030 process identified needs which emerged through the process and opportunities to meet those needs at a community level. The Parks Master Plan 2030 neither replaces nor overrides the existing plans. If future projects are pursued to meet those needs that were not already identified within an existing park master plan, then the master plan for the specific park would need to be amended and CEQA review would be necessary.

### MOVING LARGER PROJECTS FORWARD

Funding for actions will require strategic thinking. Many of the recommendations within the Parks Master Plan 2030 have the potential to be funded through grants. However, many grant awards required to be project ready, and efforts will need to be taken to work through project designs and permitting to ensure that the project is competitive. Also, larger projects may require long-term staffing levels and costs which need to be sustainable over time. These projects will likely need to

be postponed until the City's funding levels are more sustainable. Some community assets, such as the Santa Cruz Wharf and Civic Auditorium, will require creative funding strategies which could involve multiple sources and project phasing over time.

### RESPONSIVE TO COMMUNITY NEEDS

As the community continues to evolve and parks system improvements are made, it will be necessary to continually update the plan to remain current. The Parks Master Plan 2030 will need to be updated periodically in five-year intervals. These updates will be less comprehensive but should provide a meaningful opportunity to receive feedback from the community and reassess the condition of the parks. A larger, more comprehensive update should occur concurrently or shortly after the next General Plan update.

The long-term funding strategy will need to be updated to reflect changes in the conditions to ensure that priorities can be realigned and could include:

- Review of existing City financing and facility development
- Future demand and capital improvement costs
- Maintenance and operations costs
- Changes or adaptations to the City's approach to cost mitigation
- Funding alternatives
- Financing strategies
- Maintenance contracts and agreements
- Update Park-in – lieu Fee Schedule

## B. SUMMARY & CONCLUSIONS

This document should serve as a planning tool for decision-making regarding recreation in the City of Santa Cruz. Timely updates to the document and the process are necessary to reflect the community's changing needs and desires.

ABOUT US

# Current Projects

County Parks is constantly working to improve our parks, coastal access points, trails and facilities to maximize community benefit, recreational opportunity, and stewardship of natural resources! Parks projects include grant applications, master plans, environmental review and design and construction of capital projects including new playgrounds, restrooms, trails and other park amenities!

Due to COVID-19, information on this page is subject to change.
Please check for updates.

**COVID-19 UPDATES**

## Projects Underway at County Parks





## Moran Lake County Park ↗

County Parks is working with a consultant team to prepare a restoration and public access plan for Moran Lake County Park. The project will evaluate and continue with previous draft park improvement plans prepared by the Redevelopment Agency in 2010 and include community outreach and development and assessment of restoration goals as well as public access improvements at the park. The planning project is funded in part by the State Coastal Conservancy, including funding from Prop 1, and is expected to be completed by the end of 2023!

Community Meetings were completed at the park in summer 2021:
Thursday, August 19, 2021 3PM – 6PM
Sunday, August 22, 2021 11AM – 2PM

Comments received at community meetings and through the online survey were summarized and shared with the Parks and Recreation Commission on October 4, 2021. To attend this meeting via video conference, or to see the agenda packet containing the written summary before or after the meeting, use this link.

Join the project email list for updates. Previous Park Plans & Studies:

- 2010 Draft Moran Lake County Park Site Plan for Moran PDF
- 2010 Moran Lake Monarch Butterfly Habitat Management Plan PDF
- 2005 Moran Lake Water Quality Study & Conceptual Restoration Plan PDF

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## Chanticleer Avenue County Park ↗

Chanticleer Avenue County Park is a 4.5-acre neighborhood park in the Live Oak community. Construction of phase 1 is complete. The park opened on January 18th, 2020. During fall 2020 Parks staff held a series of community meetings to get input on phase 2 park improvements at Chanticleer Park to include in the Prop 68 Statewide Park Program application. Based on the input received at these meetings, the Draft Phase 2 Site Plan has been developed.

- Chanticleer County Park Draft Phase 2 Site Plan PDF



## Hidden Beach County Park ↗

Hidden Beach County Park has two upcoming improvements: playground replacement and the installation of a permanent restroom. The County Parks Department is working with consulting firm SSA Landscape Architects to design a permanent restroom facility at the park. The restroom will be accessible to people with mobility impairments and provide flush toilets and running water for handwashing. Preliminary planning has the facility sited between the existing playground and the service road.



## Live Oak Library Annex at Simpkins Swim Center

The Live Oak Library Annex vision is to provide multi-use learning spaces accessible to all. Specific goals include creating a learning environment which serves all ages and provides gathering spaces which encourage intergenerational activities, provide learning facilities not available at the Existing Live Oak Library branch that are free to the public, locate the facility in a central location accessible to the Live Oak Community, design the facility to function in partnership with other community organizations maximizing the opportunities for collaborative and engaging programming as well as providing the most efficient use of resources and personnel.

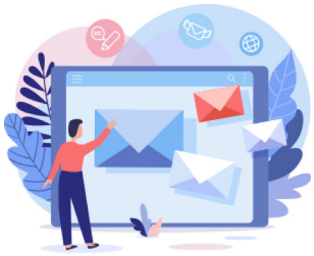
- Community Meeting Presentation (English) PDF
- Community Meeting Presentation (Spanish) PDF






## Completed Projects ↗

View some of our recently completed projects!



## Contact Us

**Phone:** (831) 454-7901

*Monday – Friday 9:00 AM to 4:00 PM, except holidays*

**Email:** parksinfo@scparks.com

Our physical office is open, but staff availability is limited as most staff members are working remotely.

979 17th Avenue, Santa Cruz, CA 95062

*Monday-Friday, 9:00 a.m. - 4:00 p.m.*

(831) 454-7901

parksinfo@scparks.com

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# Pogonip



**ADDRESS:**
501 and 410 Golf Club Drive

**HOURS OF OPERATION:**
Summer (April through October) Sunrise to 7pm
Winter (November through March) Sunrise to 4pm

**TRAILS:** The Pogonip trail system totals approximately 11.5 miles; 3 of those mile are multi-use open to hikers, bicyclists and equestrians. In the northernmost portion of Pogonip, a multi-use trail (approximately one mile in length) is open hikers, bicyclists and equestrians. This multi-use trail provides a connection between Henry Cowell Redwoods State Park, Pogonip, and the upper UCSC campus. Along the eastern boundary of Pogonip is the Emma McCrary Trail open to hikers, bicyclists, dogs on leash and equestrians. This trail can be accesses from Golf Club Dr or at the southern terminus of the UCon Trail. Bicycles and horses are prohibited on all other trails. Bicyclists must ride responsibly and at a safe speed. Please obey all trail signs. Spring trail is not open to mountain biking.

Here is your **Trail Map!**

**IMPORTANT UPDATE:**

**Homeless Garden Relocation:**

The Parks and Recreation Department is at the initiation stage of a Pogonip Master Plan Amendment process to allow for the Homeless Garden Project's 9.5 acre Pogonip Farm and Garden to be relocated to the Upper Main Meadow, Pogonip Open Space (near the historic Pogonip Clubhouse). There will be numerous opportunities for community members to provide input during the process, including community meetings, environmental review, and public hearings. Stay up-to-date on the project here.

**DOG REGULATIONS:** On trails where dogs are permitted, dogs must be on a leash at all times. Please be courteous and clean up after your pet. Dogs are prohibited on trails in sensitive habitat areas. Refer to the Pogonip trail map for more information.

**PROHIBITED ACTIVITIES:** Smoking, fires, camping, alcohol, littering, wood gathering, collection of plants or animals, archery/hunting.

**PARKING/ENTRANCES:** No on-site parking

- **Golf Club Drive On**- street parking on Golf Club Drive between the trestle & HWY 9
  (Hiking only/Dogs on leash)
- **Harvey West Park** - Trailhead near Friendship Garden
  (Hiking only/No dogs)
- **Spring Street** - Limited parking on residential street
  (Hiking on/Dogs on leash)
- **UCSC Upper Campus** - Fuel Break Road - Multi-Use Trail Entrance
  (Hiking, Bicycles and Horses permitted/No Dogs)
- **Henry Cowell State Park** - Rincon Connector Trail - Multi-Use Trail Entrance (Hiking, Bicycles and Horses permitted/No Dogs)



**Highlights**

A scenic 640-acre expanse of open meadows, woodlands and creeks., A multi-use trail (approximately 1 mile) is open to bicyclists and equestrians in the northernmost portion of Pogonip. This multi-use trail provides a connection between Henry Cowell Redwoods State Park, Pogonip, and UC Santa Cruz campus lands. Bicycles and horses are prohibited on all other trails in Pogonip.

Pogonip has several walk-in entrances. There is no on-site parking. Visitors may park on Golf Club Drive just to the west of Highway 9 and walk to the main entrance gate. There is also parking in the vicinity of the Harvey West Park entrance to Pogonip. Parking is limited in the residential neighborhood adjacent to the Spring Street entrance.

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**Cycles of Change**

Pogonip is an inspiring retreat of natural beauty. Its habitat is of special value given its proximity to the urban center of Santa Cruz. Over the past 150 years much of the landscape has been altered by human influence; it is far from being a pristine remnant of untouched wilderness. But as a testament to the resilience of nature perhaps, Pogonip survives as an enchanting refuge. Today, the park is protected as one of the City's Greenbelt properties; purchased in 1988 with funding from the CALPAW State Bond Act.

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**A Habitat for Wildlife**

The predominant woodlands at Pogonip are mixed evergreen forest (oak, madrone, bay and conifers) and upland redwood forest (redwood and Douglas fir). Stands of coast live oak also occur in smaller areas within the meadows. California's northernmost stand of Central Coast Cottonwood/Sycamore riparian woodland occurs along the San Lorenzo River in the area known as Sycamore Grove.

A prominent feature within Pogonip, the Main Meadow is dominated by non-native grassland species though remnants of coastal terrace prairie still exist. Prairie habitat also occurs in smaller expanses in the northern reaches of Pogonip. Most of the rare and unique plant and wildlife species found at Pogonip are associated with coastal terrace prairie, including Santa Cruz clover (Trifolium buckwestorium), San Francisco popcorn flower (Plagiobothrys diffusus), and the rare, brilliant green-colored Ohlone tiger beetle.

Though the days of bear and antelope are gone, wildlife still exists in abundance at Pogonip. In the grasslands and prairies, there are black-tailed jack rabbits, California ground squirrels, Botta's pocket gophers, California voles and black-tailed deer. The smaller mammals provide prey for raptors, coyote, fox and bobcat. Both forested areas and grasslands are used by many bat species. Mountains lions have also been reported in Pogonip, particularly in the northern areas and upper ridges.

Numerous birds, both resident and migrating species, are found at Pogonip. A few of those observed include owls, western bluebird, American robin, western meadowlark, chestnut-backed chickadee, acorn woodpeckers, sparrows and the raptors; white-tailed kite and red-tail hawk.

Amphibians and reptiles are also numerous. The alligator lizard, western fence lizard and garter snake are commonly found in the grasslands while the redwood forests provide habitat for the Pacific giant salamander, California newt and the popular UCSC mascot, the banana slug.

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**A Glimpse into the Past**

In addition to natural history, Pogonip has a human history. Our Bay and Coast region was home to Ohlone triblets for 5,000 years before the arrival of Europeans. Few survived beyond the era of the founding of the Santa Cruz Mission in 1791 and its control by Mexico in the early 1800s. Their dramatic decline is believed to have been hastened by several epidemics and persecution from immigrants. It is likely Native Americans relied upon the resources found within Pogonip but no prehistoric sites have been identified.

Although the park is sometimes perceived by visitors as undisturbed, logging production in the mid-1800s resulted in the massive loss of old growth redwoods. Only three virgin redwoods remain in Pogonip today.

In addition to lumber, redwood logs were used to fuel kilns in the conversion of limestone to lime, an ingredient in mortar and plaster. Segments of Rincon Trail and Spring Trail are believed to have been originally constructed as part of the road connecting the timber areas, limestone quarries, and limekilns. The limestone kilns are still intact and the roadbed is visible at several locations.

Pogonip was once part of the extensive Cowell Ranch, originally purchased for its lime and timber resources. Portions of the ranch were converted to livestock operations as the lumber was depleted and demand for lime declined by the turn of the century. In 1961, the western portion of the ranch was sold to the University of California and the remaining acreage eventually became known as Pogonip.

Time brought change to Pogonip. After the construction of the landmark clubhouse and the greens, the Casa del Rey Club and Golf Links was opened in 1912. When competition from other courses led to the closure of the course by the 1930s, the area was then transformed into popular polo fields. The Pogonip Social and Polo Club soon became internationally known, visited by movie stars and world caliber polo players. The Polo Club was especially noteworthy due to Dorothy Deming Wheeler and the winning women's polo team. Dorothy Wheeler ensured the polo club was not restricted to men, and Santa Cruz became one of the few areas where coed games were accepted.

World War II brought an end to polo at Pogonip and for a short time the facilities served as a rehabilitation site for service men. The Pogonip Club reopened in 1948 as a private social organization. Today, the clubhouse is structurally unsafe and closed to the public.
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**Additional Info**

http://hilltromper.com/article/pogonip

# List of All County Parks

-click to get directions-

**Abbott Square - 110 Cooper St, Santa Cruz**

**Aldridge Lane Park - 20 Aldridge Lane, Corralitos**

**Anna Jean Cummings Park - 461 Old San Jose Rd, Soquel**

**Aptos Village Park - 100 Aptos Creek Road, Aptos**

**Ben Lomond Park - 9525 Mill Street, Ben Lomond**

**Bert Scott Estate - 301 Eagle Ridge, Watsonville**

**Brommer Street Park - 1451 30th Avenue, Live Oak**

**Chanticleer Park - 1975 Chanticleer Ave, Live Oak**

**Coffee Lane Park - End of Coffee Lane, Live Oak**

**Davenport Landing - Highway 1, Davenport**

**Dolphin/Sumner Beach - Dolphin/Sumner Intersection, Aptos**

**The Farm Park - Northwest corner of Soquel Drive and Cunnison Lane**

**Felt Street Park- 1904 Felt Street, Live Oak**

**Felton Covered Bridge - Graham Hill Rd at Mount Hermon Rd, Felton**

**Floral Park - 656 38th Avenue, Live Oak**

**Freedom Lake - located along Freedom Blvd in Freedom, CA**

**Greyhound Rock - Highway 1, Davenport**

**Heart of Soquel - 4740 Soquel Drive behind Soquel Village Post Office**

**Hestwood Park - 1230 Harper Street, Santa Cruz**

**Hidden Beach Park - End of Cliff Drive, Aptos**

**Highlands Park - 8500 Highway 9 Ben Lomond, CA**

**Jose Avenue Park - 1435 Jose Ave, Live Oak**

**Mesa Village Park - 790 Green Valley Road, Watsonville**

**Michael Gray Memorial Field - 3650 Graham Hill Road, Felton**

**Miller Property - located along Kings Creek Road in Boulder Creek**

**Moran Lake Park - East Cliff Drive by 26th Avenue, Live Oak**

**Old Jail/Octagon - 118 Cooper St, Santa Cruz**

**Pace Family Wilderness - located along Newell Creek Road in Boulder Creek**

**Pajaro Dunes - Shell Road, Watsonville**

**Pinto Lake Park - 757 Green Valley Road, Watsonville**

**Place Del Mer - East of Hillview Way in Watsonville**

**Pleasure Point Park - Pleasure Point Dr. and East Cliff Dr, Capitola**

**Polo Grounds - 2255 Huntington Avenue, Aptos**

**Quail Hollow Ranch - 800 Quail Hollow Road, Felton**

**Richard Vessey - Victory Ln./Maplethorpe, Soquel**

**Santa Cruz Gardens - Katherine Lane, Santa Cruz**

**Scott Creek Beach - Highway 1, Davenport**

**Scott Park - 3101 Freedom Blvd, Watsonville**

**Seacliff Village Park (McGregor) - 120 Canterbury Dr., Aptos**

**Seascape Park - End of Sumner Ave, Aptos**

**Simpkins Family Swim Center - 979 17th Avenue, Santa Cruz**

**Soquel Lions - Main/E. Walnut, Soquel**

**Sunny Cove Beach - End of Johans Beach Drive and Sunny Cove Drive Veteran's Building**

**Twin Lakes Park - 520 7th Avenue, Live Oak**

**Valencia Hall - 2555 Valencia Road, Aptos**

**Wilder Hall - 9527 Mill St, Ben Lomond**

**Willowbrook Park - 2950 Willowbrook Lane, Soquel**

**Winkle Farm - 3201 Winkle Ave.**

**Veteran's Memorial Building - 846 Front Street, Santa Cruz**

**Santa Cruz County Department of Parks, Open Space and Cultural Services**
979 17th Avenue, Santa Cruz, CA 95062
General Information (Monday-Friday, 9:00 a.m. - 4:00 p.m.)
Phone: (831) 454-7901 • PRCweb@santacruzcounty.us

SHARE

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# Santa Cruz County Parks

| | Ballfields | Basketball | Beach Access | Comm. Room | Dog Park | Hiking | Horseshoe Pit | Parking | Picnicking | Play Element | Restrooms | Skate Park | Soccer | Swimming | Tennis | Volleyball | Public Art |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Aldridge Lane | | * | | | | | * | * | * | * | * | | | | * | | |
| A.J. Cummings | * | | | | | * | | * | * | * | * | | * | | | | * |
| Aptos | | | | * | | | | * | * | | * | | | | | | * |
| Ben Lomond | | * | | | | | | | * | * | * | | | | | | |
| Brommer Street | * | * | | | | | | * | * | * | * | | | | * | | * |
| Coffee Lane | | * | | | | | | * | * | * | | | | | | | |
| Felton Covered Bridge | | | | | | | | * | * | * | * | | | | | * | * |
| Floral | | | | | | | | | * | * | | | | | | | * |
| Freedom Lake | | | | | | | | | | | | | | | | | |
| Hestwood | | | | | | | | | * | * | * | | | | | | * |
| Hidden Beach | | | * | | | | | * | * | * | * | | | | | | |
| Highlands | * | | | * | | * | | * | * | * | * | * | * | | * | * | |
| Jose Ave. | | * | | | | | * | * | * | * | * | * | | | | * | * |
| Mesa Village | | * | | | | | | | * | * | * | | | | | | |
| Michael Grey | * | | | | | | | * | * | | * | | | | | | |
| Moran Lake | | | * | | | * | | * | * | | * | | | | | | |
| Pinto Lake | * | | | | * | * | | * | * | * | * | | * | | | | |
| Polo Grounds | * | | | | * | | | * | * | | * | | * | | | | * |
| Quail Hollow Ranch | | | | * | | * | | * | * | | * | | | | | | |
| Richard Vessey | | | | | | | | | * | * | * | | | | | | |
| Santa Cruz Gardens | | | | | | | | | | * | | | | | | | |
| Scott | | | | | | | | * | * | * | * | | | | | * | |
| Seascape | | | * | | | | | * | * | * | * | | | | | | * |
| Simpkins Swim Center | | | | * | | | | * | | | * | | | * | | | * |
| Soquel Lions | | | | | | | | | * | * | * | | | | | | |
| Twin Lakes | | * | | | | | | | * | * | * | | | | * | | * |
| Valencia Hall | | | | * | | | | | | | | | | | | | |
| Willowbrook | | * | | | | | | | * | * | * | | | | * | | * |
| Winkle Farm | | | | | | | | | * | * | | | | | | | |

Revised October 2010

## SANTA CRUZ COUNTY DOG PARKS

***Polo Grounds County Park,***
***2255 Huntington Dr., Aptos***

***Pinto Lake County Park,***
***757 Green Valley Rd., Watsonville***




***Dog parks can be a great place for you and your dog to enjoy, but there are rules to follow and etiquette to respect.***

Use the poop bag dispensers and pick up after your pet.

Obey the **Leash Law** until you have brought your dog inside the enclosed dog park area.

Dogs must be at least 4 months old.

Dogs must be vaccinated, and you should carry your dog's rabies certificate with you.

Please exercise caution when bringing small children inside the dog park.

Don't pick up another dog without the owner's consent.

Don't bring an aggressive or unsocialized dog into the dog park area.

Please, no dogs in heat.

COUNTY OF SANTA CRUZ
Parks, Open Space & Cultural Services
979 17th Avenue
Santa Cruz, CA 95062

COUNTY OF SANTA CRUZ DEPARTMENT OF
PARKS, OPEN SPACE AND CULTURAL SERVICES

# A DOG OWNER'S GUIDE



## *to enjoying the parks of Santa Cruz County*

**Santa Cruz County**
**Department of Parks, Open Space and Cultural Services**

979 17th Avenue
Santa Cruz, CA 95062
831-454-7901
www.scparks.com

## WHY SHOULD YOU BOTHER TO LEASH YOUR DOG?

### IT'S THE LAW!

The fines for an unleashed dog can be over $240, depending on the charges that may be included for violation of one or more of the following:

- Dog is not on a leash;
- Dog harasses, kills or maims deer, birds, or other wildlife protected by law;
- Requirements for licensing, vaccination, and display of tags not followed;
- Dog is not spayed or neutered;
- Dog waste not properly disposed of.

### LEASHING YOUR DOG CAN HELP PREVENT A VARIETY OF ISSUES!

- An unleashed dog may dart into traffic causing an accident.



Fact: Unleashed dogs cause over 1,500 car accidents and fatalities per year. Drivers trying to avoid hitting an unleashed dog end up paying the price simply because the dog was not responsibly handled.

- Dogs trespass from the park onto private property.
- Protects you from costly medical bills, should your dog harm a child or jump up on a frail or elderly person, causing injury.
- Fighting with other dogs; a loose dog can be difficult to restrain.
- Court bills: lawsuits can arise from a dog biting someone and it may be required that the dog be euthanized.




- Protects the environment from dogs harassing, killing or maiming wildlife.
- A dog may be lost or stolen.
- It's the right thing to do! While an owner likes their dog, others may not.

Leashed dogs are allowed in all county parks and beaches, ***except*** *for Quail Hollow Ranch and Scott Creek Beach.* These areas have sensitive habitats and dogs are prohibited.

To prevent children from coming into contact with feces and urine, ***dogs are not allowed in playground areas or athletic fields.***

For information about the many animal services provided in Santa Cruz County please call the Santa Cruz County Animal Services Authority at (831) 454-7303.

## THE 3 SIMPLE RULES = IT'S THE LAW!

**1 - License Your Dog**

License your dog for your dog's protection. If an Animal Control Officer finds a licensed dog, they have a commitment to reunite the owner with the dog. A license tells an officer that a dog has a home and is not a stray.

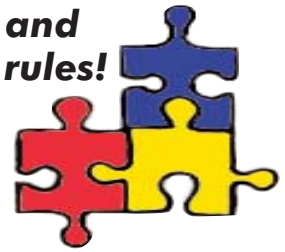
**2 - Leash Your Dog**

Leashing your dog protects everyone, and can help prevent many problems and costly bills. Dogs must be leashed in all County-owned parks and beaches, unless the dog is in a specified, fenced dog area.

**3 - Leave No Unpleasant Waste**

Always carry a dog bag; dog waste is your responsibility. When you fail to clean up after your dog, it affects the experience of other park visitors and their pets. The waste left may have parasites that can spread disease to other dogs and to people. We all know what an unpleasant experience it is to step in dog waste! Left on the ground, dog waste can be transported by rain and washed into storm drains. Remember, storm drains are not connected to any type of treatment plant and flow directly into our streams, lakes, and bays.

***Put the pieces together and follow the rules!***





# SANTA CRUZ COUNTY PARKS STRATEGIC PLAN

**FINAL**
**AUGUST 6TH, 2018**

# FORWARD


# County of Santa Cruz

**DEPARTMENT OF PARKS, OPEN SPACE & CULTURAL SERVICES**

**979 17TH AVENUE, SANTA CRUZ, CA 95062**

**(831) 454-7901 FAX: (831) 454-7940 TDD: (831) 454-7978**

**JEFF GAFFNEY**
**DIRECTOR**


Dear Friends and Partners,

The Santa Cruz County Parks Department is pleased to present to you our first Strategic Plan. This document represents a year-long process of assessment, inquiry, and outreach to our community, partner organizations, public officials, staff, and supporters. We are proud of the comprehensive and collaborative nature of the document as well as the process which created it.

Our goal was twofold: first, provide a ten-year roadmap for the department that will assist us in adapting and growing our support for a healthy, connected, and culturally vibrant Santa Cruz County. Second, to create a resource for understanding of what we do and how we serve the community, as well as guidance for partnering and collaboration.

The premise of this document is that our system of parks, open spaces, beaches, and recreation and cultural services represent one of our county's most valuable investments. The department's primary role is to ensure that this investment is well-managed, relevant and accessible to all, regardless of age, cultural background, physical ability, or income. We also must see that it is preserved and enhanced for generations to come.

Thank you for your contribution and dedication to our amazing park system and the public value we provide. We hope you will find this plan useful; it is the beginning of a relationship and an open conversation about community priorities.

Sincerely,

Jeff Gaffney
Parks Director

*The Mission of the Santa Cruz County Parks, Open Space and Cultural Services is to provide safe, well designed and maintained parks and a wide variety of recreational and cultural opportunities for our diverse community*

# ACKNOWLEDGEMENTS

This plan would not have been possible without the assistance and participation of a great number of individuals. We would like to thank all the members of the public who participated in the public process that created this Strategic Plan, and to all the staff and volunteers who contributed.

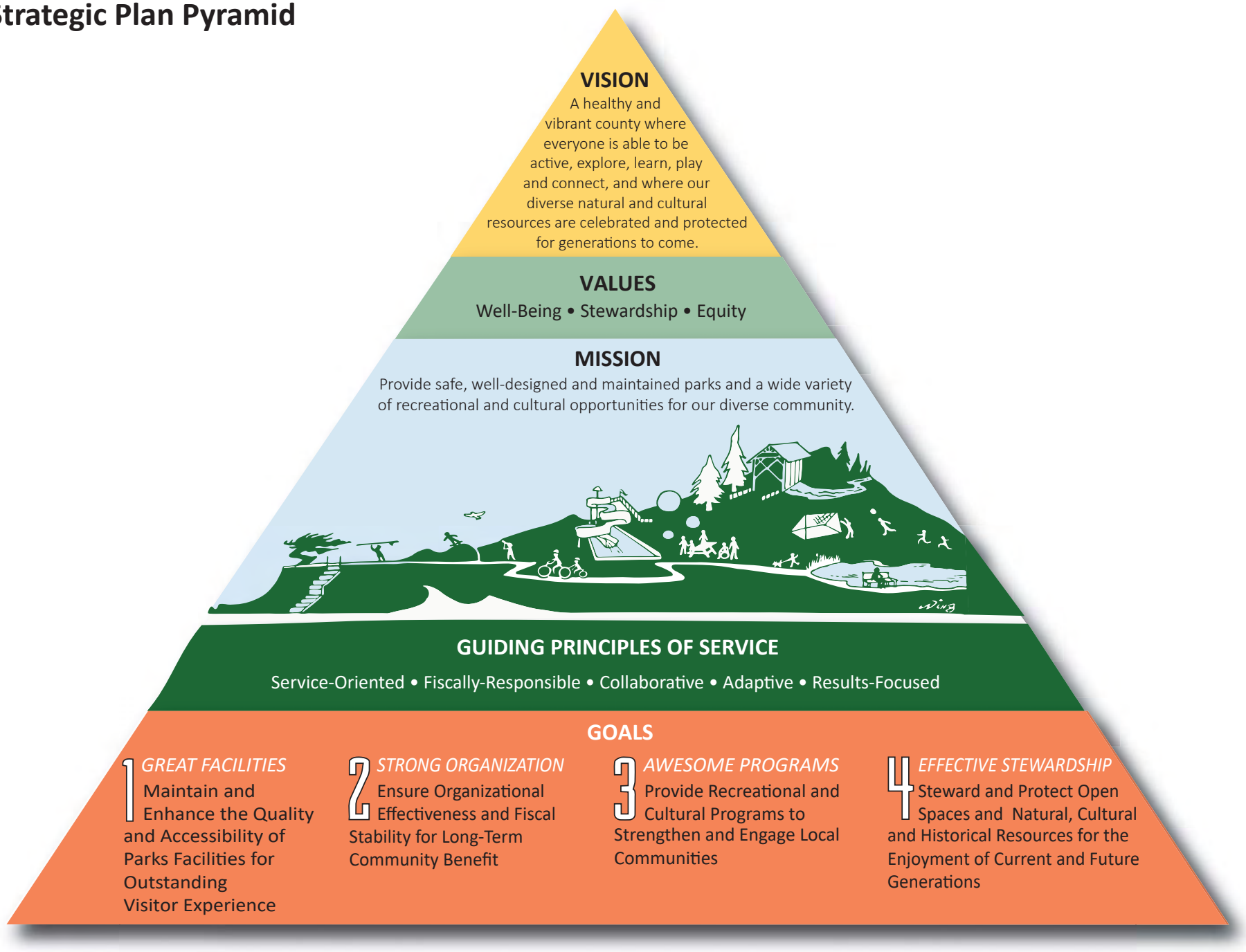
Working Group Members:
- Dena Loijos
- Mariah Roberts
- Jim Rapoza
- Tess Fitzgerald
- Judy Stabile
- Terry Corwin
- Melodye Sereno
- Brad Blachly
- Isabelle Kornberg
- Micaela Lopez

Parks and Recreation Commission Members:
- Mariah Roberts
- Kate Minott
- Alexandra Sibille
- Steven Bennett
- Jim Rapoza

Strategic Plan Project Team:
- Jeff Gaffney, Parks Director
- Kim Namba, Administrative Services Manager
- Will Fourt, Park Planner
- Jessica Wolf, Program Coordinator

With Consultant:
- Meetings that Matter

# Strategic Plan Pyramid



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# PART I:
# THE COUNTY PARKS STRATEGIC PLAN

## CHAPTER 1: INTRODUCTION

This Strategic Plan represents the first comprehensive and collaborative planning effort between the County Parks Department and the local community in Santa Cruz County. The Strategic Plan seeks to articulate the vision and strategic priorities for the future of the County Parks system in a ten-year timeframe. The vision and priorities established through this process reflect the strong value that Santa Cruz County places on parks, coastal access, open space, programs and the events and activities that bring us together as a community.

The Strategic Plan addresses the County's existing park system, including its strengths and challenges, and identifies the necessary areas of improvement to remain responsive to the changing needs of our community. Ultimately, the plan will serve as the basis for future department work plans (operational plans) and as a roadmap for the department.

OUR VISION FOR THE FUTURE:

*A healthy and vibrant county where everyone is able to be active, explore, learn, play and connect, and where our diverse natural and cultural resources are celebrated and protected for generations to come.*

### WHY A STRATEGIC PLAN?

The Santa Cruz County Department of Parks, Open Space and Cultural Services (County Parks Department or County Parks) has grown in both the size of its holdings and its importance in the lives of county residents since its inception in 1979. Over the course of the last 38 years, the department has undergone many changes, while the County Parks system has grown into a large network of parks, open spaces, facilities, trails and coastal access points throughout the unincorporated portions of the county.

Some highlights of the department's history:

- **1979 - 2002**: Established in 1979, the County Parks system grew for two decades in the number of parks, programs and employees. By 2002 there were 55 County Parks facilities, parks and coastal access points.
- **2002 - 2011**: The number of full time permanent budgeted department staff positions declined from 68 funded full time or equivalent staff positions in 2002/03 to only 35 in 2011/12, along with a decline in program offerings. At the same time, the number of park facilities steadily increased.
- **2011 - 2014**: In the wake of the economic downturn, the Parks Department was temporarily dissolved into the County Department of Public Works from 2011 to 2014.

- **2014 - 2018**: Some limited additional funding for County Parks was established through the passing of Measure F in 2014. The County Parks Department was re-established as an independent department in 2014 and a new director was hired in 2015.

The Parks Department provides both local and regional parks and programs. Santa Cruz County is unique in having such a large portion of the population living outside of incorporated cities (about 130,000 people, or 49 percent according to the 2010 Census). The County Parks Department provides typical county regional parks and open spaces serving the entire county population. The Department also has a role similar to a city parks department in providing local neighborhood and community parks and event facilities in these unincorporated areas, despite having a smaller relative tax apportionment and ability to leverage funding than other counties and cities (see Chapter 7 for more explanation).

Working within the current framework of the County's General Plan, the County Parks Strategic Plan represents the current vision of the community, and identifies opportunities for leveraging funding and resources to move the department towards this vision. The Strategic Plan does not create or change any County policy, but provides a framework to assist us in working more effectively within existing policies.

## HOW THE STRATEGIC PLAN WILL BE USED

This document consolidates background information, community feedback, key findings and other information that was used to develop the vision, values, goals, objectives and strategies contained in this Strategic Plan. County Parks has gained a wealth of information about the community and the environment through this process, and this summary will be used by staff, community stakeholders, the County Administrative Office, and the Board of Supervisors as the County moves forward to carry out the vision outlined in this Strategic Plan. Much of this information will be referenced or serve as a jumping-off point for strategic decision-making. Additionally, this Strategic Plan will serve as the basis for future operational plans for the department, which will contain performance measures, more time-specific priorities, and detailed actions to implement the Strategic Plan and achieve our goals.

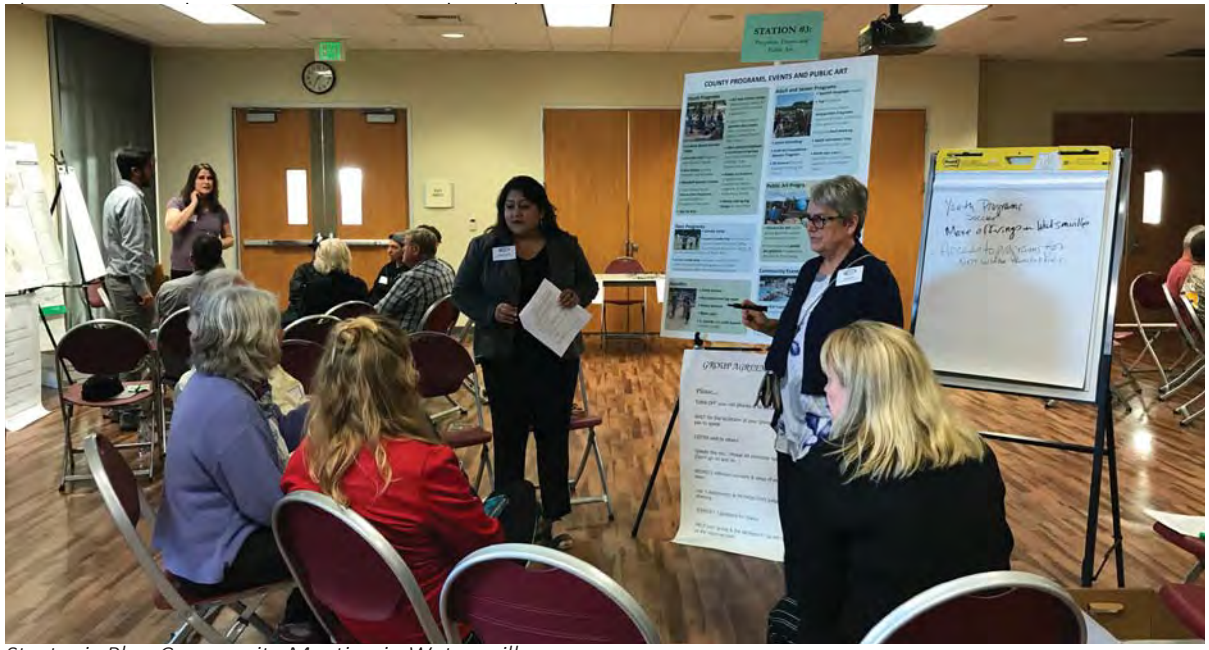


*Simpkins Family Swim Center in Live Oak*

## RELATIONSHIP TO THE COUNTYWIDE STRATEGIC PLAN 2018-2024

The County Administrative Office developed its first-ever countywide strategic plan in 2018. This plan establishes a common vision and set of goals that will be implemented by all the County departments and will contain broad, inter-departmental goals. The goals and objectives in the County Parks Strategic Plan will work together and align with the countywide goals, while being more specific to the provision of parks and recreation in the county.

The Parks Department is not the only County department to undergo its own strategic planning process. Under the direction of our County's new Chief Administrative Officer, all County departments will be asked to develop plans and to align those plans with the overarching County plan.




*Strategic Plan Community Meeting in Watsonville*

## STRATEGIC PLAN VOCABULARY

Throughout the Strategic Plan, the following terms will be used frequently and have a specific meaning within the context of this Strategic Plan.

**Vision**: A brief statement articulating the desired future state, describing ***why*** the department does the work that it does.

**Values**: Core ***motivators*** reflecting community ideals that drive the work of the Parks Department and relate directly to the vision.

**Mission**: A brief statement describing ***what*** the department does.

**Goals**: Broad statements of ***how*** we pursue our vision.

**Objectives**: Specific ***ways*** we plan to achieve our goals and impact our community.

**Strategies**: The ***approach*** we plan to take to achieve our objectives.

# CHAPTER 2: VISION, MISSION AND VALUES

## VISION

The vision for the future of Santa Cruz County Parks describes the desired end state of the work that we do and articulates the biggest 'why' for the County Parks Department's existence. Our vision statement was created with extensive input from the staff, the community, and partners during the Strategic Plan process.

## MISSION

The County Parks mission states what the department does to serve the community. The mission statement was adopted for the department prior to this Strategic Plan process, and represents the department's most essential purpose.

### OUR VISION:

*A healthy and vibrant county where everyone is able to be active, explore, learn, play and connect, and where our diverse natural and cultural resources are celebrated and protected for generations to come.*

### OUR MISSION:

*The Mission of the Santa Cruz County Parks, Open Space and Cultural Services is to provide safe, well designed and maintained parks and a wide variety of recreational and cultural opportunities for our diverse community.*

## VALUES

The values listed in this section represent the core motivators that drive the work of the Parks Department to serve the community, as identified through the strategic planning process. The values directly support the new Parks Department vision and have been used to identify and define department priorities and our goals and objectives in the Strategic Plan.

The three core values are ***Well-Being, Stewardship and Equity.***

***WELL-BEING***

*Creating a happier and healthier Santa Cruz County and improving quality of life by promoting physical activity, safe and welcoming public spaces, positive community interactions, and relief from everyday stress.*

***STEWARDSHIP***

*Sustaining natural systems and conserving resources throughout the parks system for future generations, including education and learning opportunities, and chances for people to appreciate and connect with the natural world.*

***EQUITY***

*Serving communities throughout the county with a focus on those most in need, to ensure that parks and programming are inclusive, welcoming and accessible to all.*



*Aptos Village County Park*




*Parks Department Core Values*

## GUIDING PRINCIPLES OF SERVICE

The following principles describe the strong value the parks department places on ***service.*** These principles were identified by staff and the community during the strategic planning process, and reflect how the department operates to increase the values of well-being, stewardship, and equity.

**Service-Oriented**: We work as a team to provide a consistent high level of service to our community.

**Fiscally-Responsible**: We allocate and use resources responsibly and pursue sustainable funding that meets the needs of the system of parks and parks services.

**Collaborative**: The department works together with other agencies, organizations, businesses, volunteers, community members and staff to provide the highest possible level of service and to create new opportunities.

**Adaptive**: The department remains nimble and creative as it responds and adapts its parks and programs to the changing needs of the community.

**Results-focused**: We establish community driven goals, measure our performance, and communicate with the public our progress in meeting long-range goals in support of community well-being, stewardship and equity.

# CHAPTER 3: GOALS, OBJECTIVES AND STRATEGIES

For the purposes of articulating the vision of the Parks Department, specific means for implementing the plan are described through Strategic Plan goals, objectives and strategies. These means are intended to describe the direction and priorities for the department for the next 10 years. These statements respond to the key issues and themes that emerged during the strategic planning outreach process.

Definitions for goals, objectives and strategies are described in the text box to the right. A summary table of goals and objectives is shown in Table 1. Strategic goals are not ranked and are numbered only for reference. Note that these strategies do not include specific measurable actions. Actions to implement the Strategic Plan will be developed in future operational plans for the department (see Chapter 4).

Objectives and strategies are organized into categories of "core" and "stretch." These categories illustrate what the department can pursue with existing staffing and resources, and what will require additional resources, according to definitions on the right.

All the goals, objectives, and strategies were developed with extensive input from the community and staff as part of the strategic planning process.

**Goals**:
Broad statements of how we pursue our vision

**Objectives**:
Specific ways we plan to achieve our goals and impact our community

**Core Objectives**:
Objectives that: 1) are essential to the Department's existence and function, 2) may be pursued with existing staffing and resources, and 3) have been core areas of focus for the department in the past.

**Stretch Objectives**:
Objectives that: 1) have been identified as important by the community, 2) will require us to leverage new resources and to increase department capacity, and 3) expand the services provided by the Department

**Strategies**:
The approach we plan to take to achieve our objectives



*Miller Property County Park in Boulder Creek*

# COUNTY PARKS STRATEGIC GOALS AND OBJECTIVES

## *Goal 1: Great Facilities*

MAINTAIN AND ENHANCE THE QUALITY AND ACCESSIBILITY OF PARKS FACILITIES FOR OUTSTANDING VISITOR EXPERIENCE

***CORE OBJECTIVES:***

*1.1* Maintain and update parks facilities, and the accessibility of parks facilities, to a consistent standard

*1.2* Ensure safety and cleanliness of parks facilities

***STRETCH OBJECTIVES:***

*1.3* Increase accessibility of parks facilities to people of all abilities, ages, backgrounds and financial resources

1.4 Create and implement a plan to address deferred maintenance throughout the parks system

1.5 Upgrade parks in alignment with parks master plans and add additional parks facilities in underserved areas

## *Goal 2: Strong Organization*

ENSURE ORGANIZATIONAL EFFECTIVENESS AND FISCAL STABILITY FOR LONG-TERM COMMUNITY BENEFIT

***CORE OBJECTIVES:***

*2.1* Ensure department efficiency and effectiveness

*2.2* Invest in staff development and promote innovation and excellence in service

*2.3* Develop sources of sustained funding for operations and enhanced services

***STRETCH OBJECTIVES:***

*2.4* Institute improved systems for departmental management and operations planning

*2.5* Lead and partner with other departments, agencies and organizations to better serve the community

## *Goal 3: Awesome Programs*

PROVIDE RECREATIONAL AND CULTURAL PROGRAMS TO STRENGTHEN AND ENGAGE LOCAL COMMUNITIES

***CORE OBJECTIVES:***

*3.1* Provide recreational programs and events to meet community needs

*3.2* Cultivate the arts and strengthen the culture of the county through public art programs and events

*3.3* Conduct community outreach and offer regular opportunities for diverse groups to engage with and learn about their county parks department

***STRETCH OBJECTIVES:***

*3.4* Provide additional recreational programs and events to address areas of unmet need

*3.5* Enhance our support of local families and youth by expanding after school and summer offerings

3.6: Increase the department's understanding of parks customers through increased outreach, data collection and research

## *Goal 4: Effective Stewardship*

STEWARD AND PROTECT OPEN SPACES AND NATURAL, CULTURAL AND HISTORICAL RESOURCES FOR THE ENJOYMENT OF CURRENT AND FUTURE GENERATIONS

***CORE OBJECTIVES:***

*4.1* Partner with other agencies, organizations, and land owners in an integrated regional approach to resource management

*4.2* Protect cultural and historical resources throughout the parks system

*4.3* Provide interpretive programs and opportunities to increase awareness and appreciation of natural, cultural and historical resources

*4.4* Provide opportunities for volunteers in parks, facilities and programs

***STRETCH OBJECTIVES:***

*4.5* Establish a natural resources and open space management program in the parks department to maximize environmental benefits throughout the parks system

*4.6* Increase interpretive programs and opportunities to increase awareness and appreciation of all natural, cultural and historical resources

*4.7* Increase volunteer opportunities in parks, facilities and programs

*Table 1: Summary of Goals and Objectives*

## *GOAL 1: GREAT FACILITIES*

## MAINTAIN AND ENHANCE THE QUALITY AND ACCESSIBILITY OF PARKS FACILITIES FOR OUTSTANDING VISITOR EXPERIENCE

### CORE OBJECTIVES

#### *OBJECTIVE 1.1: MAINTAIN AND UPDATE PARKS FACILITIES, AND THE ACCESSIBILITY OF PARKS FACILITIES, TO A CONSISTENT STANDARD*

STRATEGIES:

a. Continue to establish consistent park maintenance standards and staff levels throughout the parks system

b. Determine and communicate staffing needs based on department goals and the number of properties, facilities and programs, and pursue appropriate staff levels

c. Assess the anticipated operational costs for potential new parks projects and budget for projected staffing levels and maintenance costs

d. Regularly inventory and prioritize system-wide needs for deferred maintenance projects

e. Continue to increase accessibility of parks to all people as parks are upgraded

#### *OBJECTIVE 1.2: ENSURE SAFETY AND CLEANLINESS OF PARKS FACILITIES*

STRATEGIES:

a. Pursue resources to increase professional staff presence in parks

b. Increase volunteer presence in parks under direction of staff

c. Engage community and volunteers in supporting safe and clean parks

d. Partner with law enforcement to enhance security in parks and facilities

e. Improve and expand system for tracking and responding to citizen reports of maintenance and safety issues

f. Increase staff input in identifying and prioritizing maintenance needs

### STRETCH OBJECTIVES

#### *OBJECTIVE 1.3: INCREASE THE ACCESSIBILITY OF PARKS FACILITIES TO PEOPLE OF ALL ABILITIES, AGES, BACKGROUNDS AND FINANCIAL RESOURCES*

STRATEGIES:

a. Conduct physical accessibility assessments of existing parks facilities, identifying and prioritizing needed improvements

b. Increase relevance of parks to youth and aging populations and to families with young children, and ensure that all demographics are served by parks

#### *OBJECTIVE 1.4: CREATE AND IMPLEMENT A PLAN TO ADDRESS DEFERRED MAINTENANCE THROUGHOUT THE PARKS SYSTEM*

STRATEGIES:

a. Identify needs and determine priority projects

b. Develop budget and timeframes for deferred maintenance projects, and identify potential funding sources

c. Secure funding for deferred maintenance

d. Implement the deferred maintenance plan in stages to maintain investments in parks

e. Anticipate and schedule upgrades as projects are completed

#### *OBJECTIVE 1.5: UPGRADE PARKS IN ALIGNMENT WITH PARKS MASTER PLANS AND ADD ADDITIONAL PARKS FACILITIES IN UNDERSERVED AREAS*

STRATEGIES:

a. Inventory and develop a system to prioritize planned park projects

a. With input from the community, identify new park uses for existing parklands, including both active and passive recreation opportunities

b. Pursue park acquisitions in areas that lack access to parks

c. Pursue resources to develop additional amenities to serve the community

## *GOAL 2: STRONG ORGANIZATION*

## ENSURE ORGANIZATIONAL EFFECTIVENESS AND FISCAL STABILITY FOR LONG-TERM COMMUNITY BENEFIT

### CORE OBJECTIVES

#### *OBJECTIVE 2.1: ENSURE DEPARTMENT EFFICIENCY AND EFFECTIVENESS*

STRATEGIES:

a. Provide exceptional customer service to park users and the wider community
b. Provide resources and systems to ensure effective staff communication throughout the department
c. Engage and deploy volunteers effectively to augment departmental capacity
d. Upgrade technology where it makes the most difference to staff effectiveness
e. Regularly survey staff regarding department priorities and effectiveness, and solicit ideas for improving department functionality

#### *OBJECTIVE 2.2: INVEST IN STAFF DEVELOPMENT AND PROMOTE INNOVATION AND EXCELLENCE IN SERVICE*

STRATEGIES:

a. Create and maintain a variety of opportunities for staff training and leadership development
b. Encourage collaboration across the department and promote ways for staff to learn from each other and share expertise
c. Increase regular communication between staff and supervisors
d. Track and recognize staff performance
e. Pursue opportunities for networking and staff development with other agencies

#### *OBJECTIVE 2.3: DEVELOP SOURCES OF SUSTAINED FUNDING FOR OPERATIONS AND ENHANCED SERVICES*

STRATEGIES:

a. Pursue new opportunities for revenue generation
b. Collaborate for the creation of a parks funding measure or other sustainable source of park funding
c. Evaluate park dedication fees and update as needed
d. Work with the County Administrative Office and Board of Supervisors to assess department operations and capital projects budgets and secure adequate funds

### STRETCH OBJECTIVES

#### *OBJECTIVE 2.4: INSTITUTE IMPROVED SYSTEMS FOR DEPARTMENTAL MANAGEMENT AND OPERATIONS PLANNING*

STRATEGIES:

a. Develop metrics and performance measures for Strategic Plan Objectives and share compelling data with stakeholders and potential funders
b. Develop and annually update an Operational Plan, integrated with the Capital Improvement Program and department budget
c. Regularly track and report progress on Strategic Plan Objectives and Strategies through implementation of the department's strategic management cycle
d. Work to align the Parks Department's Strategic Plan with the County's Strategic Plan

#### *OBJECTIVE 2.5: LEAD AND PARTNER WITH OTHER DEPARTMENTS, AGENCIES AND ORGANIZATIONS TO BETTER SERVE THE COMMUNITY*

STRATEGIES:

a. Partner with other public land owners to provide increased recreational access to existing public open spaces
b. Partner with school districts, land trusts, non-profit groups, community organizations, and public agencies to provide additional public access to existing facilities
c. Collaborate to develop an interagency vision for the countywide network of trails

## *GOAL 3: AWESOME PROGRAMS*

## PROVIDE RECREATIONAL AND CULTURAL PROGRAMS TO STRENGTHEN AND ENGAGE LOCAL COMMUNITIES

### CORE OBJECTIVES

#### *OBJECTIVE 3.1: PROVIDE RECREATIONAL PROGRAMS AND EVENTS TO MEET COMMUNITY NEEDS*

STRATEGIES:

a. Continue to offer free and low-cost programs and events to the community

b. Sponsor and co-sponsor a variety of events for families & diverse audiences

c. Promote program scholarships offered by non-profit partner organizations based on individuals' financial need

#### *OBJECTIVE 3.2: CULTIVATE THE ARTS AND STRENGTHEN THE CULTURE OF THE COUNTY THROUGH PUBLIC ART PROGRAMS AND EVENTS*

STRATEGIES:

a. Continue to work with the County Arts Commission and partners to: a) fund arts programs, b) include public art components in public projects, c) provide art in public spaces, d) develop new public art programs and e) conserve existing public art

b. Continue to offer opportunities to engage in rich, hands-on arts curriculum through arts-based summer camps and class offerings

#### *OBJECTIVE 3.3: CONDUCT COMMUNITY OUTREACH AND OFFER REGULAR OPPORTUNITIES FOR DIVERSE GROUPS TO ENGAGE WITH AND LEARN ABOUT THEIR COUNTY PARKS DEPARTMENT*

STRATEGIES:

a. Conduct meaningful outreach to the county's diverse communities to increase access to and knowledge of parks facilities and programming

b. Regularly engage community members and other agencies and organizations in assessing community needs

### STRETCH OBJECTIVES

#### *OBJECTIVE 3.4: PROVIDE NEW AND INNOVATIVE RECREATIONAL PROGRAMS AND EVENTS THAT ADDRESS AREAS OF UNMET NEED*

STRATEGIES:

a. Regularly assess needs and inventory priorities for classes, programs, and events, especially in underserved areas

b. Pursue partnerships and develop programs where most needed

c. Add additional programming targeted to and relevant for high-need and underserved groups

d. Increase relevance of programs to youth, elders, and families with young children, and ensure that all demographics are served by programs

#### *OBJECTIVE 3.5: ENHANCE OUR SUPPORT OF LOCAL FAMILIES AND YOUTH BY EXPANDING AFTER SCHOOL AND SUMMER OFFERINGS*

STRATEGIES:

a. Pursue resources for expanding programs and classes for youth, especially in underserved areas

b. Regularly survey youth, parents, teachers and school administrators to identify current gaps in services and areas of unmet need

c. Partner with other agencies and non-profits to expand the cultural, recreational, educational and interpretive program options available to families and youth countywide

d. Expand the Junior Volunteer Program and Junior Lifeguard programs to support job and life skills development and opportunities for mentoring

#### *OBJECTIVE 3.6: INCREASE THE DEPARTMENT'S UNDERSTANDING OF PARKS CUSTOMERS THROUGH INCREASED OUTREACH, DATA COLLECTION AND RESEARCH*

STRATEGIES:

e. Conduct an equity analysis including a survey to help the department focus on key areas of need

f. Regularly conduct surveys of park and program users to determine how parks facilities and programs are used and how they can be improved

## *GOAL 4: EFFECTIVE STEWARDSHIP*

## STEWARD AND PROTECT OPEN SPACES AND NATURAL, CULTURAL AND HISTORICAL RESOURCES FOR THE ENJOYMENT OF CURRENT AND FUTURE GENERATIONS

### CORE OBJECTIVES

#### *OBJECTIVE 4.1: PARTNER WITH OTHER AGENCIES, ORGANIZATIONS, AND LAND OWNERS IN AN INTEGRATED REGIONAL APPROACH TO RESOURCE MANAGEMENT*

STRATEGIES:

a. Regularly meet with local conservation partners to assess opportunities to lead and/or provide support for stewardship projects

b. Provide ongoing educational and interpretive opportunities related to natural resources

#### *OBJECTIVE 4.2: PROTECT CULTURAL AND HISTORICAL RESOURCES THROUGHOUT THE PARKS SYSTEM*

STRATEGIES:

a. Inventory and assess priority projects to enhance preservation of cultural and historical resources in the parks system

#### *OBJECTIVE 4.3: PROVIDE INTERPRETIVE PROGRAMS AND OPPORTUNITIES TO INCREASE AWARENESS AND APPRECIATION OF NATURAL, CULTURAL AND HISTORICAL RESOURCES*

STRATEGIES:

a. Continue to provide interpretive programs led by staff and volunteers in the parks system

b. Continue to provide interpretive signage and information with all appropriate new parks projects

#### *OBJECTIVE 4.4: PROVIDE OPPORTUNITIES FOR VOLUNTEERS IN PARKS, FACILITIES AND PROGRAMS*

STRATEGIES:

a. Provide a variety of types of opportunities for volunteering in the parks system

b. Establish regional and neighborhood-based Adopt-A-Park programs to encourage community engagement in parks

### STRETCH OBJECTIVES

#### *OBJECTIVE 4.5: ESTABLISH A NATURAL RESOURCES AND OPEN SPACE MANAGEMENT PROGRAM IN THE PARKS DEPARTMENT TO MAXIMIZE ENVIRONMENTAL BENEFITS THROUGHOUT THE PARKS SYSTEM*

STRATEGIES:

a. Pursue additional resources to increase department's available expertise, staff capacity, and leadership in natural resource management projects on park properties

b. Create a natural resources program with staff and volunteers dedicated to developing and implementing resource management goals

c. Create a parks natural resources management plan to improve ecological outcomes and pursue multiple long-term environmental benefits

#### *OBJECTIVE 4.6: INCREASE INTERPRETIVE PROGRAMS AND OPPORTUNITIES TO ENHANCE AWARENESS AND APPRECIATION OF ALL NATURAL, CULTURAL AND HISTORICAL RESOURCES*

STRATEGIES:

a. Develop an interpretive plan for the parks system

b. Pursue resources to increase interpretive staff presence at appropriate parks throughout the county to run programs, manage volunteers, and engage with park users

c. Develop additional interpretive facilities and amenities throughout the parks system

#### *OBJECTIVE 4.7: INCREASE VOLUNTEER OPPORTUNITIES IN PARKS, FACILITIES AND PROGRAMS*

STRATEGIES:

a. Grow the volunteer and intern programs to provide experiential learning opportunities and promote land stewardship throughout the parks system

b. Increase involvement, collaboration, communication and coordination with "friends of" groups to pursue the department mission

# CHAPTER 4: PLAN IMPLEMENTATION

## DEPARTMENT STRATEGIC MANAGEMENT SYSTEM & OPERATIONAL PLANNING

*THE STRATEGIC MANAGEMENT SYSTEM*

Implementing the Strategic Plan will require future cooperation and planning. The strategic management cycle illustrates how the plan will be implemented (Figures 1 and 2) including the phases of planning, implementing and monitoring, evaluating, and adjusting. These phases will help keep the department on track with the Strategic Plan goals, will set regular times to engage the community, and will help continually improve efficiency and effectiveness.

The Strategic Plan lays the groundwork and sets the framework for future operational plans which will serve to implement the Strategic Plan and help manage department staff work plans and budgets. Together, the Strategic Plan and these future operational plans make up this strategic management system. This is the framework for managing the department and steering us towards our vision and the realization of our Strategic Plan goals.

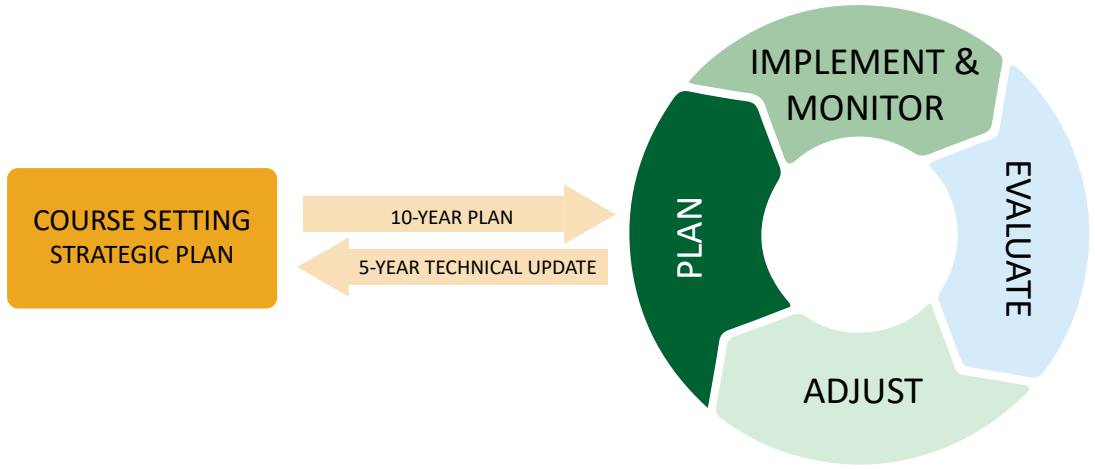
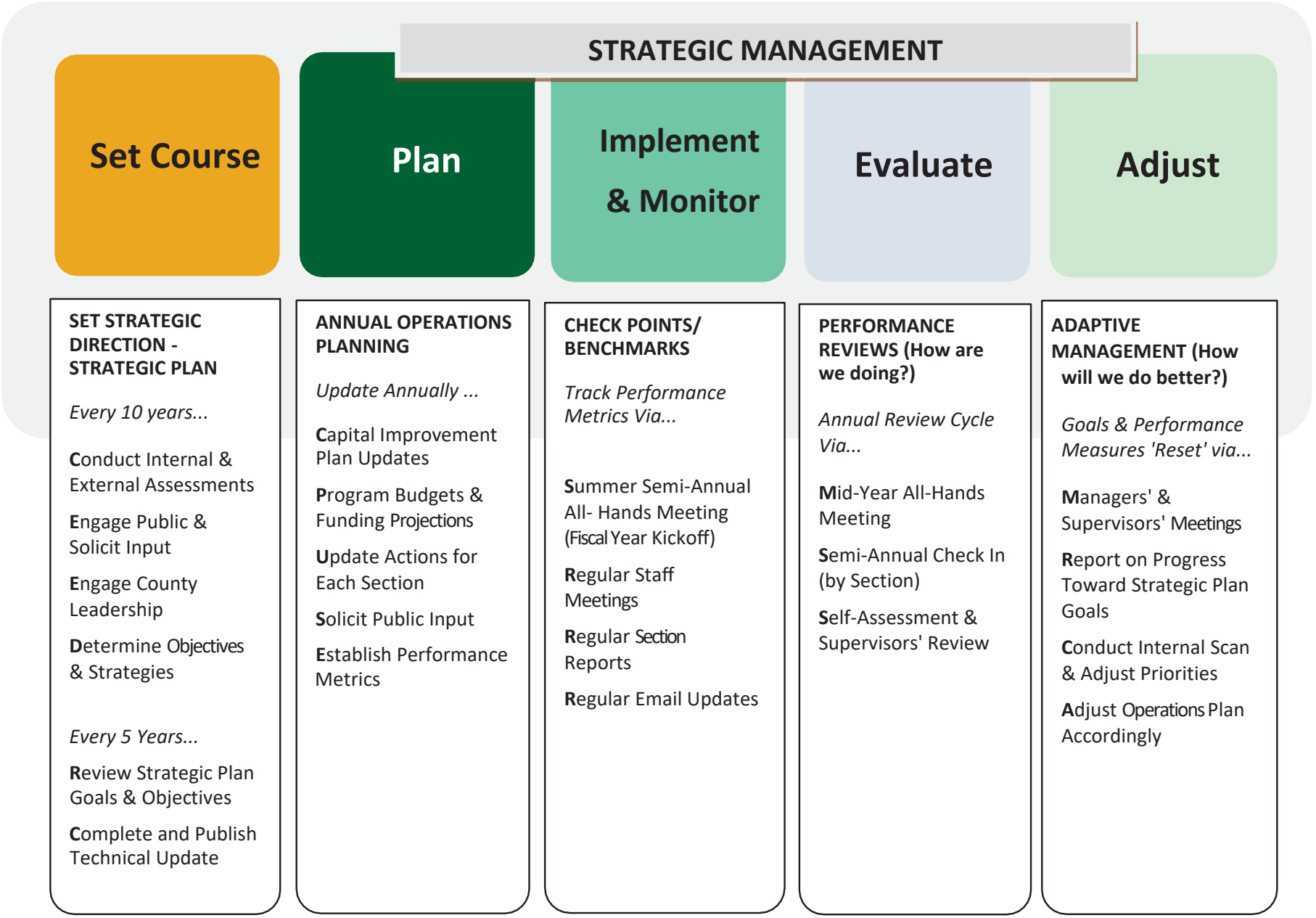



*Figure 1: Strategic Improvement Cycle*

*Figure 2: Strategic Management System*






### *THE OPERATIONAL PLAN*

The Operational Plan is a tool we will use to implement this Strategic Plan. The Operational Plan will be updated regularly and will identify shorter-term (1-2 year) actions that will flow from Strategic Plan goals and objectives and support department priorities. Each operational plan will identify the concrete steps that the County Parks Department will take to assign resources and staff toward achieving the strategic priorities and goals laid out in the Strategic Plan.

The heart of these operational plans will be the formulation and tracking of actions and performance measures. Operational plan actions are specific, measurable, achievable steps to be taken to implement Strategic Plan objectives. In each operational plan, priority will be given to specific actions that further multiple goals and objectives identified in the Strategic Plan. Performance measures will be established and tracked on an annual basis.

### *CRITERIA FOR PRIORITIZING ACTIONS*

With finite staffing levels and budget, the Parks Department must prioritize. In order to determine which actions take priority, the following set of criteria will be used to maximize the potential to achieve the goals, objectives and strategies in this Strategic Plan. Since each goal and objective will require additional resources and needs to build on additional progress, the emphasis is on actions that set the stage and overcome initial barriers, enabling the department to work towards multiple Strategic Plan goals.

Actions should address the following criteria:

1. Lay the groundwork for implementing the long-term goals
2. Work towards fulfilling multiple goals and objectives as identified in the Strategic Plan
3. Create additional resources and enable pursuit of additional goals and objectives identified in the Strategic Plan
4. Be readily achievable in the short-term, with existing funding and staff levels.
5. Capitalize on previous momentum and continue previous progress

### *THE STRATEGIC PLAN WILL EVOLVE*

Over the 10-year horizon for the County Parks Strategic Plan, the priorities and context will evolve in response to changing circumstances. To succeed, we must revisit our Strategic Plan goals regularly and refine our course by adjusting the actions in the Operational Plan. Every five years, the Strategic Plan should undergo a technical update to ensure that the priorities articulated reflect the changing environment, economy, and department and community needs.

## KEYS TO MAKING PROGRESS



*Mesa Village County Park*

### *FOCUSING*

Priority Actions for the first Operational Plan have been selected based on the criteria stated above, as applied to the goals, objectives and strategies included in this Strategic Plan. Based on this approach, the first and highest priorities identified for the Parks Department include the following:

1. Clearly articulate the funding needs of the department through creation of a deferred maintenance plan (Objective 1.4), a system to prioritize capital projects (Objective 1.5), and an assessment of appropriate staff levels needed to operate and maintain the existing parks system (Objective 1.1).

2. Pursue additional funding for the department through potential collaboration on a funding measure, working with the Board of Supervisors and County Administrative Office on department budget allocations, pursuing additional revenue sources, and evaluating park dedication fees (Objective 2.3).

3. Develop metrics and performance measures with the first operational plan (Objective 2.4) for Strategic Plan goals and objectives, and begin to share compelling data with stakeholders and potential funders.

We hope that the focus objectives named here will help the Parks Department achieve the goals, objectives and strategies identified in this Strategic Plan by increasing the capacity and organization of the department.

### *FUTURE FUNDING*

The improvement and growth of the County Parks Department will require investment. This investment is expected to yield a wide range of recreational, environment and socio-economic returns to the community. To realize the goals articulated in this plan, additional department resources and revenue must be pursued.

Before other goals and objectives can be realized, we will need to first develop sources of sustained funding for operational and enhanced services (Objective 2.3). Strategies to meet that objective are detailed below.



*Scotts Creek County Beach*



*Willowbrook Park in Soquel*

### PURSUE NEW OPPORTUNITIES FOR REVENUE GENERATION

The County Parks Department currently generates revenue through user fees and reservations of facilities. There may be future opportunities to generate new revenue sources through increased services such as providing additional facilities available for reservation.

### COLLABORATE FOR THE CREATION OF A PARKS FUNDING MEASURE OR OTHER SUSTAINABLE SOURCE OF PARK FUNDING

The County Parks Department is not the only agency providing parks and recreation services in the county, and is not the only agency that requires additional funding to meet community needs for parks and recreation. Working together, the various parks agencies and the community may pursue a ballot measure to fund parks in the county. This could be in the form of a dedicated parcel tax or a sales tax, which could be used to fund projects identified by the community as important, and could help us implement the goals and objectives of this Strategic Plan. The Parks Department could also individually pursue a ballot measure to secure a sustainable funding source for County Parks.

### EVALUATE PARK DEDICATION FEES AND UPDATE AS NEEDED

The Park Dedication Fees are required for residential development in the unincorporated county, and are used locally to provide additional park facilities proportionally to serve increased demand resulting from new development. Fees are based on the standard provision of acres of parkland for every 1,000 new residents, and fees are adopted by the Board through resolution. These fees were last evaluated and updated based on market conditions in 1998, and should be assessed for appropriate levels for current economic conditions.

### WORK WITH COUNTY ADMINISTRATIVE OFFICE AND BOARD OF SUPERVISORS TO ASSESS DEPARTMENT OPERATIONS AND CAPITAL PROJECTS BUDGETS AND SECURE ADEQUATE FUNDS

The largest source of funding for the County Parks Department is the County General Fund. The General Fund contribution to the department budget has decreased from its pre-recession level, while operational costs and the size and demands on the County Parks system have increased. The Parks Department should work cooperatively with the Board of Supervisors and the County Administrative Office to develop a sustainable source of revenue that is commensurate with the long term needs identified in this plan.

### *THE NEED FOR COMMUNITY PARTNERSHIPS*

This Strategic Plan represents a collaborative vision developed with the Parks Department and the community at large. The County Parks Department cannot implement the goals of this plan alone. Realizing this vision will require the leadership of other organizations and agencies as well as increased participation and support from the community. New partnerships will be needed to pursue strategies identified in this plan that will improve the County Parks system, and that the community sees as important, but which are currently outside the scope of the department to implement (such as improving neighborhood bike and pedestrian infrastructure and connections to parks). Community support will be especially important to help us generate new resources and additional funding, as many goals of this plan simply will not be realized without it.

By focusing on collaboration and partnership, this department intends to foster and to amplify the leadership and innovation in this community, to implement this plan, and to support community values. Working together, County Parks will strive to create a healthier and more vibrant Santa Cruz County for all.



*Volunteers at Quail Hollow Ranch County Park*

# PART II:
# THE COUNTY PARKS DEPARTMENT

## CHAPTER 5: THE PARKS NETWORK AND SERVICES

### SANTA CRUZ COUNTY'S PARKS & OPEN SPACE NETWORK

The County Parks Department is one of several entities that provide parks, open space, cultural services and recreation facilities and programs in the county, along with several other public agencies, organizations, and private landholders. Together, these various entities provide a network of parks and open space that serves the entire county. Generally, local urban-type neighborhood and community parks are provided by the cities, County Parks, and the four park and recreation districts. Larger regional-serving parks are provided by State Parks, County Parks, and other entities. Local park-provider jurisdictional lines are shown in Figure 3. Parklands and protected lands are shown in Figure 4.

*COUNTY PARKS*

Generally, the County Parks Department provides two broad categories of services: local neighborhood and community parks and programs in the unincorporated portions of the county (areas outside one of the four city limits), and larger regional-serving parks and facilities that serve the entire county. In Santa Cruz County, there are many urban neighborhoods that are not within a city limit, including the communities of Live Oak, Soquel, and Aptos, and the County provides neighborhood parks in these areas.

*CITY PARKS*

There are four incorporated cities in the county, including Capitola, Santa Cruz, Scotts Valley and Watsonville. Each of these four cities has their own city parks department providing local neighborhood-serving parks and recreation services within that city's limits.

*INDEPENDENT RECREATION AND PARK DISTRICTS*

The four independent park and recreation districts of Alba, Boulder Creek, La Selva Beach and Opal Cliffs are responsible for providing local neighborhood and community parks to urban and rural neighborhoods within their independent jurisdiction boundaries.

*OTHER PARKS AND OPEN SPACE AGENCIES & LANDHOLDERS*

In addition to the local parks provided by the County Parks Department, the four city parks departments, and the four recreation and park districts, California State Parks also provides several large parks and beaches in the county. State Parks provide important recreational opportunities for local county residents as well.

There are also recreational facilities and open space provided by other agencies in the county including local school districts, the Bureau of Land Management, the California Department of Fish and Wildlife, the City of Santa Cruz Water Department, the San Lorenzo Valley Water District, the Land Trust of Santa Cruz County, and the Midpeninsula Regional Open Space District.

*Figure 3: Neighborhood-Park-Providing Jurisdictions*

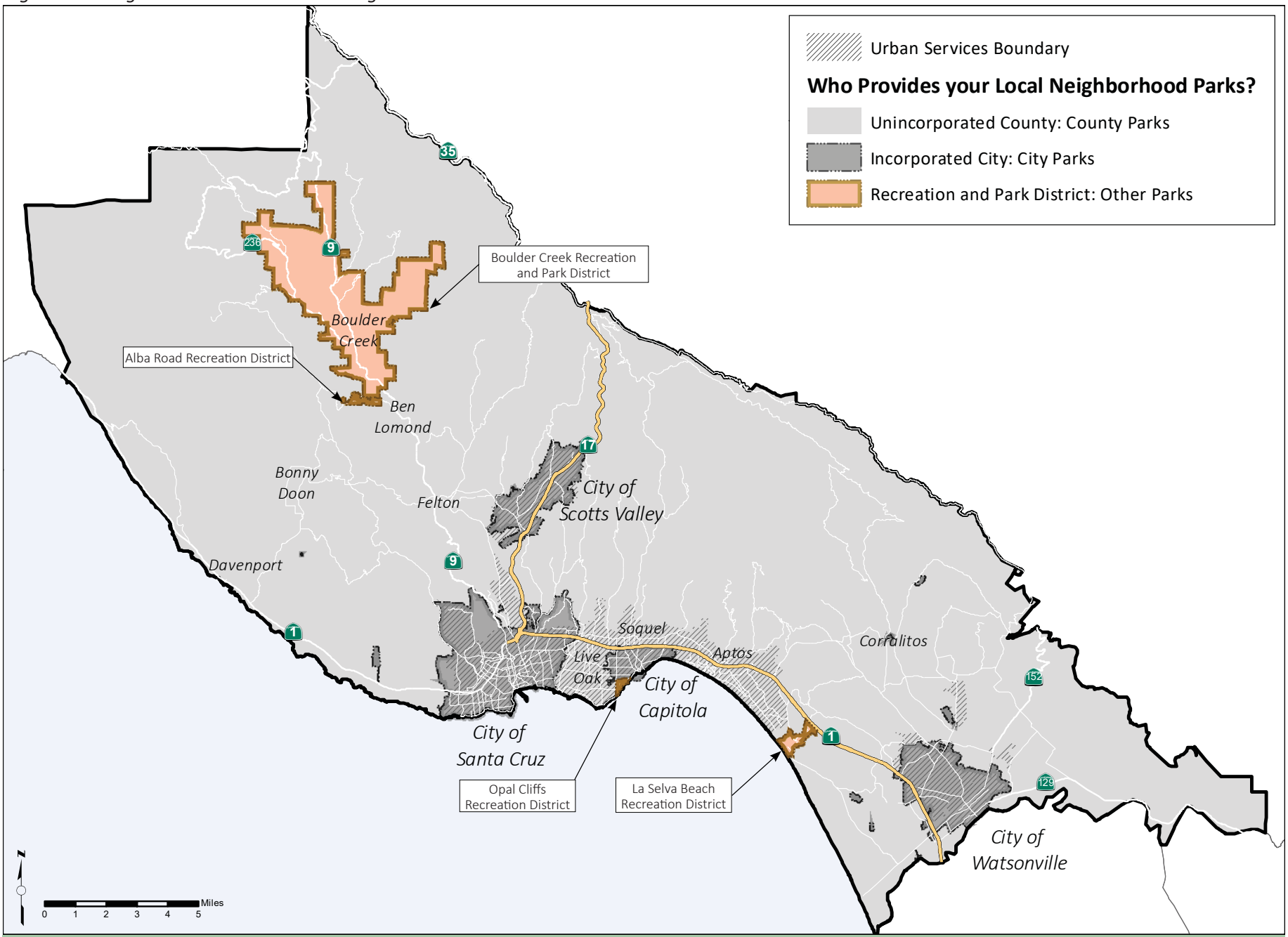
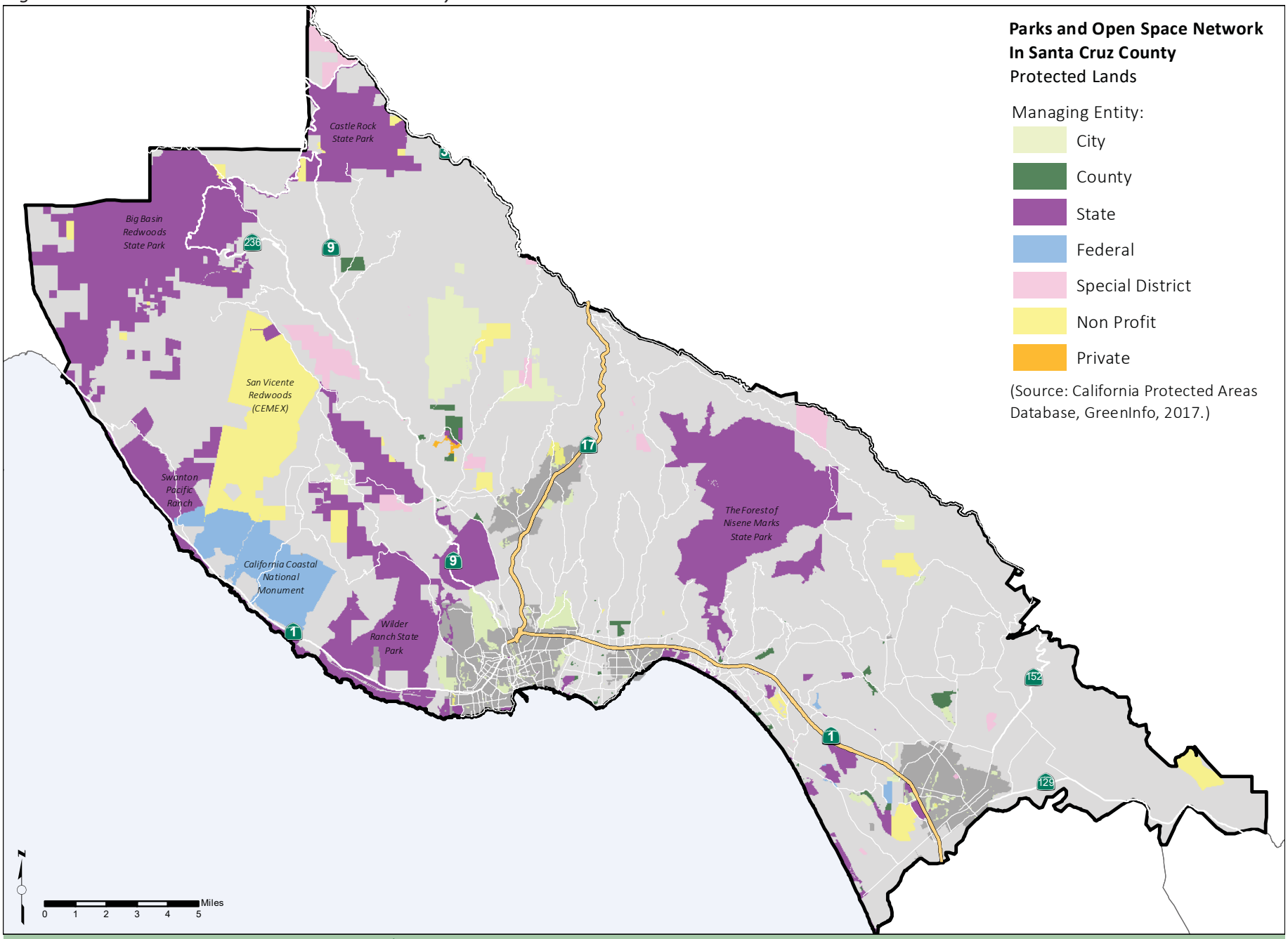


*Figure 4: Protected Lands in Santa Cruz County*



Today the County Parks Department manages:

- 1,593 acres of parkland including 883 acres of parks and 710 acres of open space
- 38 neighborhood, community, regional or rural parks
- 27 coastal access points
- 23 playgrounds
- 6 parks with sports fields
- 8 parks with basketball courts
- 5 parks with tennis courts
- 5 parks with community rooms
- 1 regional swim center with aquatics and fitness programs and special events throughout the year. Swim Center visits exceed 180,000 per year
- Recreational, cultural and youth programs throughout the unincorporated county
- 4 parks with wedding event facilities

## COUNTY PARKS SERVICES

Since 1979, the County Parks Department has managed a diverse parks system including neighborhood, community, regional, and rural parks, coastal access points, trails, and cultural and recreational programs and activities for all ages throughout the unincorporated county. County Parks facilities' locations and amenities are shown in Figure 5.

The County Parks Department also provides financial support to community arts and recreational programs provided by other organizations such as the Museum of Art and History, the Davenport Teen Center and local school district facilities and programs in various locations around the county.

The Parks Department provides the following services.

*Seascape County Park in Aptos*



*Photo by Mary Chavez*

### *REGIONAL PARKS*



Regional parks, located throughout the county, include Quail Hollow Ranch in the San Lorenzo Valley, Polo Grounds in Aptos, and Pinto Lake in Watsonville. These parks and their facilities have unique geographic features, draw people from a wide area, and provide a wide variety of public amenities such as trails, sports fields, dog parks, and rental facilities.

### *NEIGHBORHOOD AND COMMUNITY PARKS*



Among the County's 29 neighborhood and community parks are Highlands Park in Ben Lomond, Brommer Park in Live Oak, Seascape Park in Aptos, and Aldridge Lane in Corralitos. These parks serve the surrounding communities and provide amenities such as places to picnic and hold gatherings, play structures for children to explore, benches to rest on, community art for visitors to enjoy, community gardens, skate parks and bike pump tracks, and facilities for community events and weddings.

### *SIMPKINS FAMILY SWIM CENTER*



The Swim Center, also a regional park, is located in Live Oak. Among the aquatic programs offered are swim lessons, recreation and lap swim, water exercise, and water polo, as well as the popular Pool Jr. Guards and Little Guards summer camps. It is the primary public pool in the area and provides services for every age group 363 days a year.

### *COMMUNITY EVENTS*



The County Parks Department puts on events such as the Parks & Rex pool party, where dogs can take a dip in the pool, the Holiday Art & Craft Faire and the Floating Pumpkin Patch.

### *TEEN PROGRAMS*



Zombie Camp (pictured), for ages 11-14, is held at Aptos Park. Teens can gain valuable job skills while having fun by volunteering as a Junior Leader at County Parks youth summer camps, as well as assisting with after-school programs.

### *COASTAL ACCESS POINTS*



Coastal access points include Scott Creek Beach near Davenport, Sunny Cove Beach in Live Oak, and Hidden Beach in Aptos. County Parks, together with State Parks and other entities, provides and maintains coastal access points in the unincorporated portions of the county. These coastal access points sometimes include restroom facilities, trash receptacles, natural plantings, and infrastructure such as stairs and fencing to protect sensitive areas and species.

### *YOUTH PROGRAMS*



School-age youth can enjoy a variety of camps and programs, including Nature Adventure and Science Sleuths at Quail Hollow Ranch, Kreative Kids at Wilder Hall, and art and science camps at Aptos Park. Afterschool programs are held at Mar Vista Elementary and La Selva Beach clubhouse.

### *ADULT AND SENIOR PROGRAMS*



Programs for adults and seniors include local day trips (pictured, trip to Harley Farms), water and dry-land exercise classes at the Swim Center, Spanish language and tap classes, interpretive hikes and workshops at Quail Hollow Ranch, and a popular Mall Walk Program.

### *ARTS*



The Percent for the Arts Program, art exhibitions at the Government Center, Artist of the Year, and Outside the Box are just a few of County Parks art-related programs. Arts programming for youth is provided through summer camps and is integrated into parks after school programs. County Parks-sponsored public art can be enjoyed at locations throughout Santa Cruz County. The department also supports the Arts Council and the Museum of Art and History.



*Jose Avenue County Park in Live Oak*



*Recreational Trip to Suisun Marsh Natural History Cruise*



*Mar Vista Kinder Enrichment Program*

## DEPARTMENT STRUCTURE & STAFFING

The County Parks Department is made up of five sections with distinct functions.

### *ADMINISTRATION AND RESERVATIONS*

Administration staff provides support and customer service to all Parks staff and customers, and oversees the department budget, finances, human resources, and office operations. Reservations staff administers the use and rental of all park buildings, beaches and park sites; manages concessionaires and the rentals of private houses in county park sites; provides oversight of community gardens and horse-boarding facilities; and works closely with maintenance staff to maximize the use and enjoyment of public facilities.

### *AQUATICS*

Aquatics staff manages the Simpkins Family Swim Center and the extensive aquatics programs offered there. Swim Center visits exceed 180,000 a year. Staff continues to develop new program opportunities to meet the needs of the community and increase participation at the Swim Center.

### *MAINTENANCE AND OPERATIONS*

Maintenance staff provides maintenance to all park locations, beaches and facilities. In addition, staff maintains the landscaping around all County government facilities. A partial list of responsibilities include mowing, minor construction projects, trash pick-up, restoration of natural resources, building maintenance, and pool maintenance at the Simpkins Family Swim Center. Maintenance staff also assists Reservations staff in preparation, set up and clean up for events.

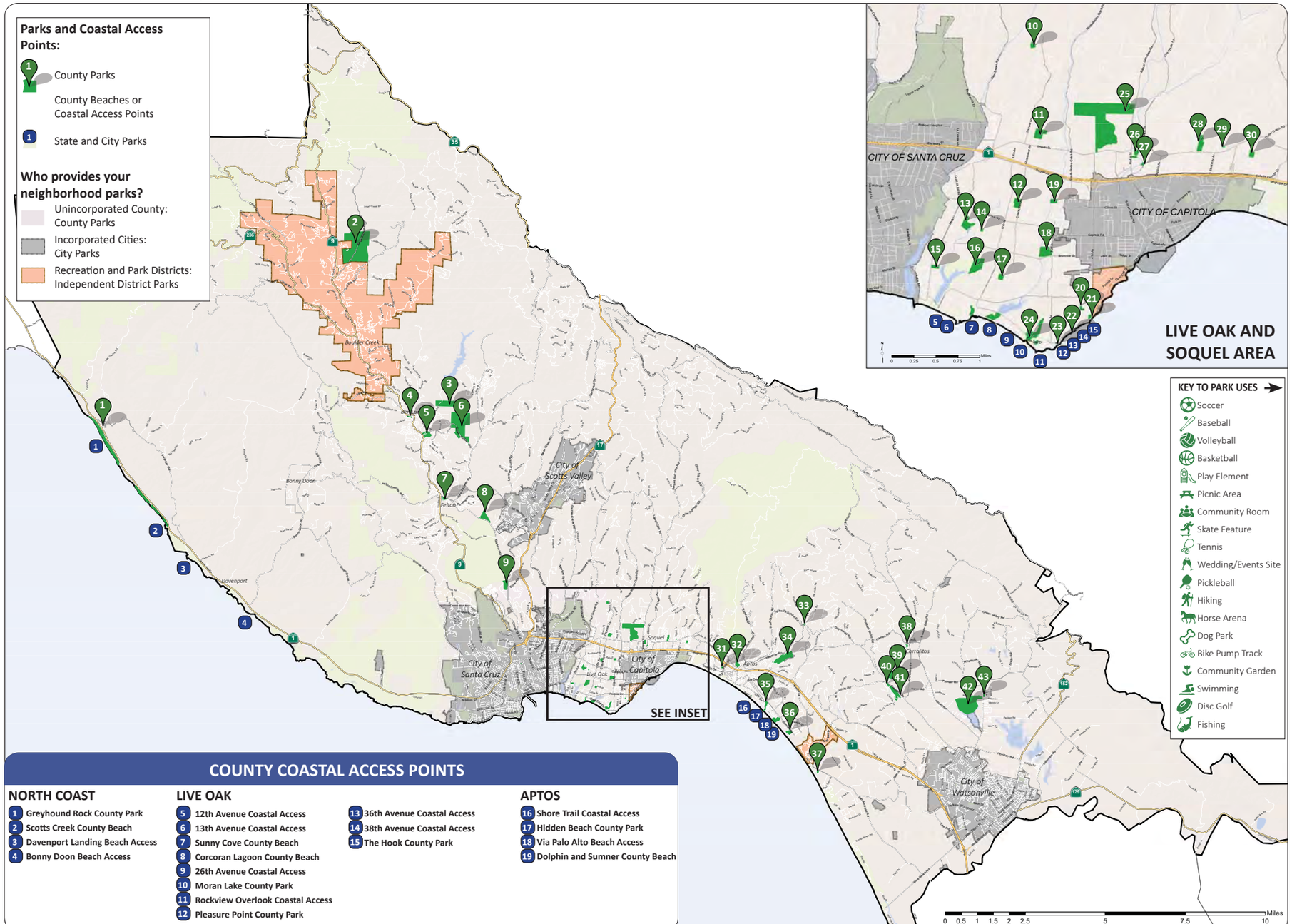
### *PLANNING AND DEVELOPMENT*

Planning staff oversees the implementation of the Parks Capital Improvement Program (CIP) projects, develops plans and studies for components of the County Parks system, and oversees park construction projects. The Planning and Development section works with specialists from a variety of disciplines and members of the public to develop short, medium and long term plans such as feasibility studies, acquisition studies, park master plans, environmental review documents, design and construction documents, and permits for park projects. Staff leads the submission and administration of grant applications for County Parks projects. The planning section also reviews plans for projects led by other agencies for potential impacts on the County Parks system.

### *RECREATION & CULTURAL SERVICES*

Recreational Program staff administers an extensive list of programs including youth programs, interpretive nature programs centered at Quail Hollow Ranch, adult and senior programs, cultural services and arts programs. Recreation and Cultural Services staff also conducts annual special events, such as the Holiday Art and Craft Fair.

*Figure 5: County Parks, Facilities, and Coastal Access Points*




## COUNTY COASTAL ACCESS POINTS

### NORTH COAST

1. Greyhound Rock County Park
2. Scotts Creek County Beach
3. Davenport Landing Beach Access
4. Bonny Doon Beach Access

### LIVE OAK

5. 12th Avenue Coastal Access
6. 13th Avenue Coastal Access
7. Sunny Cove County Beach
8. Corcoran Lagoon County Beach
9. 26th Avenue Coastal Access
10. Moran Lake County Park
11. Rockview Overlook Coastal Access
12. Pleasure Point County Park
13. 36th Avenue Coastal Access
14. 38th Avenue Coastal Access
15. The Hook County Park

### APTOS

16. Shore Trail Coastal Access
17. Hidden Beach County Park
18. Via Palo Alto Beach Access
19. Dolphin and Sumner County Beach

## COUNTY PARKS AND USES

### NORTH COAST

1. Greyhound Rock

### SAN LORENZO VALLEY

2. Miller Property
3. Pace Property (Currently no public access)
4. Ben Lomond Park
5. Highlands Park
6. Quail Hollow Ranch
7. Felton Covered Bridge
8. Michael Gray Field
9. Graham Hill Showgrounds

### LIVE OAK/UNINCORPORATED SANTA CRUZ

10. Santa Cruz Gardens
11. Winkle Farm
12. Chanticleer
13. Jose Avenue
14. Hestwood
15. Twin Lakes
16. Simpkins Family Swim Center
17. Felt Street
18. Brommer
19. Coffee Lane
20. Floral
21. The Hook
22. East Cliff Parkway
23. Pleasure Point
24. Moran Lake

### SOQUEL

25. Anna Jean Cummings
26. Heart of Soquel
27. Soquel Lions
28. The Farm
29. Richard Vessey
30. Willowbrook

### APTOS

31. Seacliff Village
32. Aptos Village
33. Valencia Hall
34. Polo Grounds
35. Hidden Beach
36. Seascape
37. Place De Mer

### WATSONVILLE AND CORRALITOS

38. Aldridge Lane
39. Bert Scott Estate (currently no public access)
40. Scott Park
41. Freedom Lake
42. Pinto Lake
43. Mesa Village

# CHAPTER 6: OVERSIGHT AND FUNDING

## PUBLIC OVERSIGHT

As with all County departments, the Parks Department is overseen by the Board of Supervisors. In addition, it is supported by two Commissions: the Arts Commission and the Parks and Recreation Commission. These commissions are appointed by the Board of Supervisors, make recommendations to the Board of Supervisors for park-related actions, and assist in coordinating between the public, the department, and the Board.

### *THE PARKS AND RECREATION COMMISSION*

The mission of the Santa Cruz County Parks and Recreation Commission is to advise and support the Board of Supervisors in its work to provide excellent and accessible parks, open spaces, recreational programs and facilities that promote health and enhance the quality of life for all.

### *THE ARTS COMMISSION*

The mission of the Santa Cruz County Arts Commission is to promote, expand and plan for the cultural life of Santa Cruz County and to bring artists and arts organizations together with government for the benefit of all residents of the county.

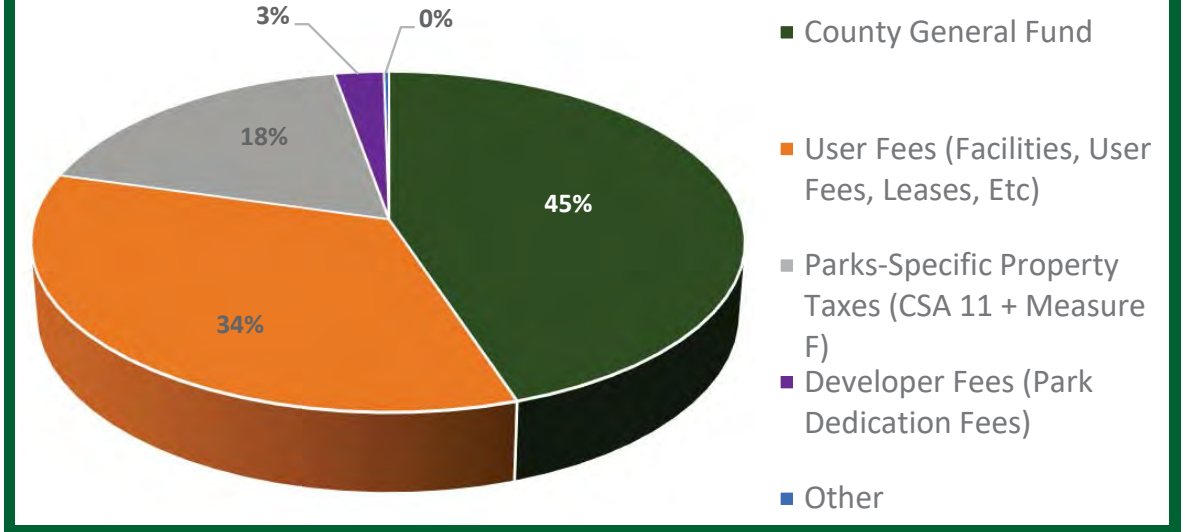



*Figure 6: Parks Revenue Sources in Fiscal Year 2016/17*

## DEPARTMENT FUNDING

County Parks funding comes from a variety of sources including the County General Fund, property taxes, recreation and park facility user fees, grants, and developer fees (for capital projects only) as shown in Figure 6. The amount of each of these sources varies by year depending on specific grants and several other factors. Property tax money includes funds associated with County Service Area (CSA) 11, which exists to provide funding specifically for County Parks.

Generally, the budget can be divided into two categories. First, the operating budget includes the costs associated with operations and maintenance of the existing parks facilities and programs. Second, the capital projects budget includes costs associated with the acquisition of new park properties, development of new or additional park facilities on park properties, and deferred maintenance.

The Parks Department budget, including both the operating budget and the capital projects budget, has not remained proportional to the growing size, demands and costs of operating the parks system (see Figure 7).

### *OPERATING BUDGET*

The sources of funds used for department operations generally include the County General Fund, park user fees, CSA 11, and Measure F.

The overall department operating budget decreased with the recession in 2008, and has only recently (in 2015/16) returned to the pre-2008 level. Additionally, costs associated with staff, supplies and services have increased over the same time period. To illustrate both of these points, Figure 7 shows that there were 68 funded full time or equivalent staff positions in 2002/03, and only 46 in 2016/17. While staff numbers have decreased, the number of parks and facilities for which the department is responsible has increased from 55 in 2002/03 to 64 in 2016/17.

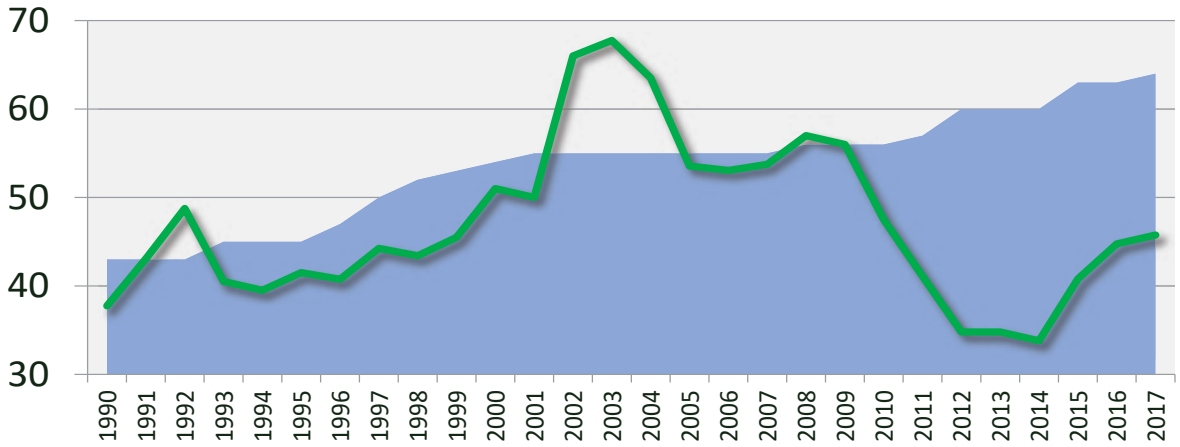
### COUNTY GENERAL FUND CONTRIBUTION

Each fiscal year, the County Board of Supervisors approves the department budget which includes a contribution from the County General Fund. This General Fund contribution generally has increased slightly each year proportionate to rising costs of operating the department. However, in the economic downturn of 2008, with the fiscal crisis and the dissolving of the County Parks Department into the Department of Public Works, the General Fund contribution to the Parks Department was reduced significantly, from $4.3 million in 2007/08 to $2.1 million in 2012/13. Although the total operating budget has partially recovered – due to increasing program participation, user fees and Measure F – in 2016/17 the General Fund contribution was $3.7 million, and has still not returned to pre-recession levels.

### COUNTY SERVICE AREA 11

County Service Area (CSA) 11 is a special district that covers the entire unincorporated county (outside the four cities) except areas that are within one of the four distinct recreation and park districts. This service area was created in 1971 to provide additional property tax funds in an effort to address the gap between needed parks services and available funding. This relatively small fund has been essential to the department in maintaining the most important

*Figure 7: Number of Parks and Number of Parks Department Staff*





*Valencia Hall*

department services. Because the Santa Cruz County Parks Department provides an urban level of service in some areas while collecting proportionally fewer taxes than a city, this was a necessary step.

### MEASURE F

Measure F was approved by the voters of CSA 11 in 2014, to include a specific per-parcel property tax within CSA 11 that provides a small additional amount of funding to the County Parks Department. Measure F provides less than 4 percent of the annual department budget.

### *CAPITAL PROJECTS BUDGET*

There is no consistent source of funding allocated to capital projects in the County Parks system for upgrades to park infrastructure, deferred maintenance, planning and construction of new park uses and facilities, and acquisition of new park properties. These types of projects must be funded through unique combinations of funding sources such as grants, park dedication (developer) fees, one-time individual funding sources such as property sales, and public-private funding partnerships.




*The Hook County Park at Pleasure Point*

### REDEVELOPMENT AGENCY

Throughout the past 30 years, the Redevelopment Agency provided the largest amount of capital funding for parks projects. Since the agency was dissolved in 2011, this source of funding is no longer available for development of the County Parks system. Redevelopment Agency funding was only available for parks within the Redevelopment Project Area, which included Live Oak and Soquel. The parks throughout the rest of the County Parks system were not eligible to receive these significant contributions of capital project funds.

### PARK DEDICATION FEES

New residential development in the unincorporated portions of the county requires either dedication of new public park land or paying an in-lieu fee to offset additional demand for parks created by the residential development. In-lieu fees go to the County Parks Department and are used to fund capital projects or acquisition of new parkland. The intent of these funds is to allow the parks system to grow proportionally with the increased demand created by new residential development. These fees have not been adjusted to reflect inflation or the increase in property values since 1998.

# CHAPTER 7: KEY CHALLENGES

A number of key challenges face this county and this department. Understanding these challenges is critical to creating a way forward that is strategic, holistic, and proactive, rather than reactive. Understanding these challenges will also help the department focus on the big picture rather than responding individually to specific circumstances in a way that is at best piecemeal or partial. The following issues have been identified by staff during the strategic planning process.

### *LARGE URBANIZED UNINCORPORATED AREAS*

The passage of Proposition 13 in 1978 locked in the apportionment rate for each county in California in addition to establishing a maximum property tax rate of one percent statewide. The apportionment rate determines the percentage of property taxes that go to the County as opposed to other local agencies such as cities and special districts. Since that time, Santa Cruz County has been locked into a lower property tax apportionment, on average 13 cents of each tax dollar, than many other counties and cities in California, some of which may receive about twice that for each tax dollar. At the same time, about half (49%) of Santa Cruz County's population lives in the unincorporated area (e.g. outside the cities of Capitola, Scotts Valley, Santa Cruz or Watsonville) compared to the median of 19% living in unincorporated areas in all California counties with populations over 200,000. This means that our parks facilities experience high use and many urban-type challenges, and that the County Parks Department is responsible for providing more urban-type parks than would typically be provided by a county. At the same time, the County has fewer financial resources to meet those challenges.

### *DECLINE IN AVAILABLE FUNDING*

In the wake of the economic downturn of 2008, available funding for parks and services was reduced dramatically in favor of directing funds toward other essential services such as fire and policing. The General Fund contribution to the department has still not returned to pre-recession levels, while costs have risen. Despite passage of Measure F in 2014, staffing has still not returned to pre-2008 levels despite significant new demands on the department such as new properties and facilities. The number of funded full time or equivalent staff positions has dropped from 68 in 2002/03, to 41 in 2015, and is up only to 46 in 2016/17 (see Figure 7). In addition, in response to our state's budget crisis,



*The Shore Trail in Aptos*

in 2011 California's Redevelopment Agencies were shuttered. Redevelopment was previously the primary funding source for almost all parks development and capital projects in the Redevelopment Area of Live Oak and Soquel. The only other source of funding currently available to help us meet community demand for new or improved parks and facilities is Park Dedication Fees, and these haven't been adjusted for inflation since 1998 and are limited due to the small amount of new development in the county.

### *DEFERRED MAINTENANCE*

The Parks Department estimates that there are approximately $100 million in deferred maintenance projects needed to address critical or primary maintenance needs within the County Parks system. These deferred maintenance projects include critical upkeep and routine maintenance such as roof replacements, repairs to the Simpkins Family Swim Center, and replacement of facilities such as playground equipment that has reached the end of its usable lifespan. There is a strong potential for 'cascading' effects and permanent negative impacts if we don't address these issues in the near term.

### *COUNTY LAND AND HOUSING COSTS*

Santa Cruz County is now one of the least affordable places to live in the world based on median house price and median household income.[1] Considering the cost of living there's a great need for low and no-cost programs and facility access. Many residents are housing insecure, and a growing number are currently experiencing homelessness. Impacts of increased homelessness on parks include use of parks property to meet basic human needs (for sleeping, bathing, storage, etc.), which puts additional environmental and maintenance demands on parks-owned facilities and open spaces. Additionally, the high cost of land means it is much more expensive to purchase and develop new parks facilities.

### *CHANGING DEMOGRAPHICS*

The demographics and needs of the community in our county continually evolve, causing changes in the demands on the parks system. The parks system must continually adjust its services as needed to meet these changing demographics. Most significantly, over the past two decades, the county's median age has increased and the percentage of the population identifying as Latino has increased.[2] These two demographic groups, as well as other groups, may be disproportionally underserved by the parks system. Each community has unique needs, and the department strives to understand and address these needs as they continue to evolve.

### *PARK ACCESS CHALLENGES*

Transportation difficulties exacerbate County Parks' challenges in providing accessible park facilities and programs throughout the county. The county's population is spread out, with many residents commuting long distances to jobs. There are few functional alternatives to private automobile use for residents and visitors to access many of the county parks. The one primary transportation corridor is narrow and heavily impacted. This increases the cost of doing business in a number of important ways such as increased construction and shipping costs, and increased travel time for parks field staff who travel between facilities. Transportation challenges also increase the need to provide local parks within close proximity to all neighborhoods, to make parks more accessible to more people.



*Felton Covered Bridge County Park*

1. 13th Annual Demographia International Housing Affordability Survey, 2017.

2 "Profile of General Population and Housing Characteristics: 2010," for Santa Cruz County, US Census, 2017.

# PART III:
# CREATING THE PLAN

## CHAPTER 8:
## PROJECT APPROACH

The Strategic Plan was developed through a collaborative process that sought to be both geographically and culturally inclusive. Input was solicited through meetings with staff, community members and the Strategic Plan Working Group. Generally, the process is illustrated in Figure 8, and includes outreach, visioning and goal-setting.

### GUIDANCE & OVERSIGHT

The Strategic Plan was instigated and the process was led by a Strategic Planning Team which consisted of two lead project designers from the department along with parks leadership. In addition, a Strategic Plan Working group was formed in December of 2016 for the distinct purpose of helping with the County Parks Strategic Plan process. It was composed of ten outside members of varying backgrounds with diverse interests, expertise, experience and partnerships. A list of Working Group members is included in the Acknowledgements section at the beginning of this document.

The Working Group met periodically, for a total of six times over the course of developing the Strategic Plan, to review and give input into all Strategic Plan materials and project phases. This review included project outreach and public engagement, creation of the parks vision and values, and the framing of the goals and objectives for the department. The Working Group also helped implement the public meetings.

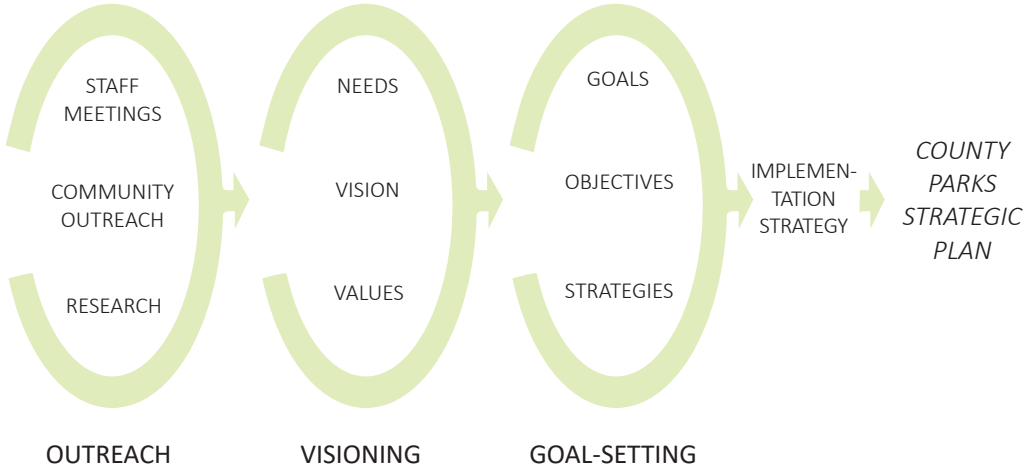



*Figure 8: Strategic Plan Flow Chart*

## STAFF INVOLVEMENT

In Spring 2017 the Parks Department hosted a series of three meetings for staff across the department to solicit their input and engage them in the strategic planning process. Each meeting drew a mix of attendees from various sections, and a total 48 staff members provided input. Ultimately, all sections of the department were represented: maintenance and operations, recreation and cultural services, administration and reservations, aquatics, and planning and development.

These initial meetings included a series of visioning and brainstorming exercises aimed at gathering ideas on how the department can improve and evolve to meet the needs of the community and continue to be a great place to work. Through this process we sought also to identify what changes were needed to both enhance the department's ability to serve the public and to improve job satisfaction for Parks employees.

These meetings generated a wide range of specific ideas and feedback – all of which have been valuable to this process and will be important to the department in future planning. Staff input was synthesized and used to populate a large graphic (see Figure 10 in Chapter 9).

Just as staff input was vital to developing the Parks Vision and Values, it contributed foundationally to establishing the department's priorities. An additional 'All-Hands' meeting took place later in the process to generate specific goals and objectives for the Strategic Plan.

Internal feedback about what is missing, and what can improve the department will continue to be gathered on a regular basis from staff as part of the new Strategic Improvement Cycle.

## COMMUNITY INVOLVEMENT

Community input was an integral part of the Strategic Plan process. The people that live in Santa Cruz County care deeply about their parks system; in total over 1,000 people participated in the Strategic Plan process through completing online surveys, attending one or more of the community meetings about the project, or providing comments or feedback in other ways. Strategic Plan outreach included engagement of County communications staff, Board of Supervisors' staff, department staff and members of the Strategic Plan Working Group for assistance in personally contacting various groups of stakeholders, key community organizations and interested community members to solicit their input via the survey and to publicize the community meetings.

Our personal outreach included over 5,000 people at over 200 local organizations with a wide geographic and demographic reach with materials in English and Spanish. Feedback from the community members was the most important consideration in developing each component of the Strategic Plan.



*Strategic Plan Staff Meeting*

### *STAKEHOLDER OUTREACH/ONLINE SURVEY*

As part of the outreach process, the Parks Department created an open online survey and distributed it widely through the official County website, on Nextdoor in neighborhoods throughout the county, and personal contacts via our distribution lists. The survey was available in both English and Spanish for anyone interested in giving input from April 8 through June 2, 2017. In that time, 802 people responded to the survey. The survey was not intended to statistically represent the county; rather, it was made available to anyone who wanted to participate. Survey responses were completed from all parts of the county.

*Figure 9: Words used in the responses to the survey about favorite aspects of Santa Cruz County Parks*




Survey objectives included:

- Gauge general knowledge of the County Parks system and inform survey respondents about County Parks' services
- Assess satisfaction with existing County Parks system
- Determine people's priorities for types of improvements to the County Parks system
- Learn generally how survey respondents use, and would like to use, parks facilities, coastal access points, and programs
- Hear people's perceptions of gaps in services/facilities
- Involve the community and help people feel invested in the Strategic Plan process, and in the future of the Parks Department

### *COMMUNITY MEETINGS*

The heart of the engagement process was a series of five community meetings throughout the county on the topic of vision and priorities for the department's Strategic Plan. Over 190 people participated in these meetings, and participants shared a variety of perspectives on their vision and values and their goals for the department. Meetings were held in Ben Lomond, Watsonville, Davenport, Aptos and Live Oak.

The meetings were publicized through individual letters and emails to over 200 stakeholder groups and their membership, publishing in each of the Board of Supervisors' newsletters, posting on both the County's and the Parks Department's website and social media, posting on Nextdoor, posting in the Parks Activity Guide and at parks and community bulletins, distributing flyers to school districts where feasible, and a press release which generated several articles in local media. Outreach materials were provided in English and Spanish.

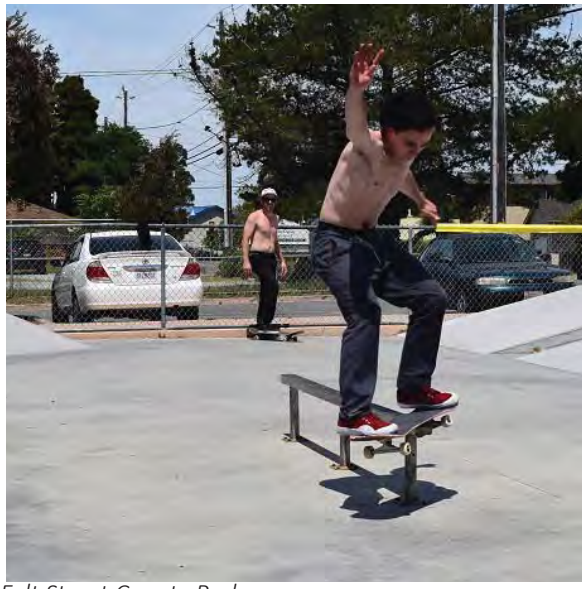
Community meetings included about an hour and fifteen minutes for public comments. Participants were split into four groups for the comment period, and each group rotated through a series of four stations. Each station was facilitated by staff and/or volunteers and focused on one of four topics, including vision and values, parks and facilities, programs and events, and priorities. Facilitators asked a series of prompts and led a series of exercises with each small group, and all comments were recorded. Spanish translation services were available at each meeting.



*Strategic Plan Community Meeting in Live Oak*



*Polo Grounds County Park in Aptos*



*Felt Street County Park*

# CHAPTER 9: KEY FINDINGS

## KEY DEPARTMENT NEEDS

Community members and parks staff have provided significant contributions during the Strategic Plan process, describing the needs of the parks system and the needs of the department. Funding constraints are a key limiting factor in the ability to meet these needs. For a discussion on needed funding, see Chapters 6 and 7. This chapter summarizes key findings from staff and the community that identifies the needs for the County Parks Department. These needs form the basis for the development of the goals, objectives and strategies in Chapter 3.

All staff members in the County Parks Department were given the opportunity to give input into the strategic planning process through an initial series of three staff meetings, additional written comments and interviews, and as part of a follow-up mid-year 'All-Hands' meeting, where they were able to prioritize their ideas on ways to improve the department's functioning.

In the course of the initial internal strategic planning meetings, staff was asked to consider both the internal needs of the department and what the community most wants and needs—from the perspective of those who are on-the-ground directly serving the public.

### *DEPARTMENT NEEDS*

Parks staff identified the following most important staff needs:

- **More financial resources to maintain the growing number of parks and facilities:** It has been increasingly challenging for the small number of staff—particularly maintenance staff—to do their jobs while being given increasingly more responsibilities with less time.

- **More training and support:** Staff sees great value in participating in training to develop new skills as well as cross-train and share knowledge within the department. These opportunities could increase staff capacity and efficiency, allow for personal growth and career advancement, and allow the department to retain skilled employees with experience and knowledge.

- **Improved internal communication:** Increasing and improving communications between parks management and staff, and between individual parks staff members, has been a consistent key need raised by staff as part of this process. Ideas for improving communication include technological upgrades for staff such as email and network access, as well as improved communications planning and disseminating information throughout the department.

### *COMMUNITY NEEDS*

Parks staff considered the most important community needs as follows:

- Safe, clean and well-maintained parks facilities
- More programs for youth, especially in underserved communities
- Expanded volunteer opportunities and community involvement
- Better awareness of what the Parks Department offers

The input collected in the course of these meeting was used to fill in a large graphic summarizing the key themes and ideas received from staff (see Figure 10).

Many of the specific actions identified as priorities at the internal staff meetings will be incorporated into our first operational plan and will continue to be referenced as the department moves forward.

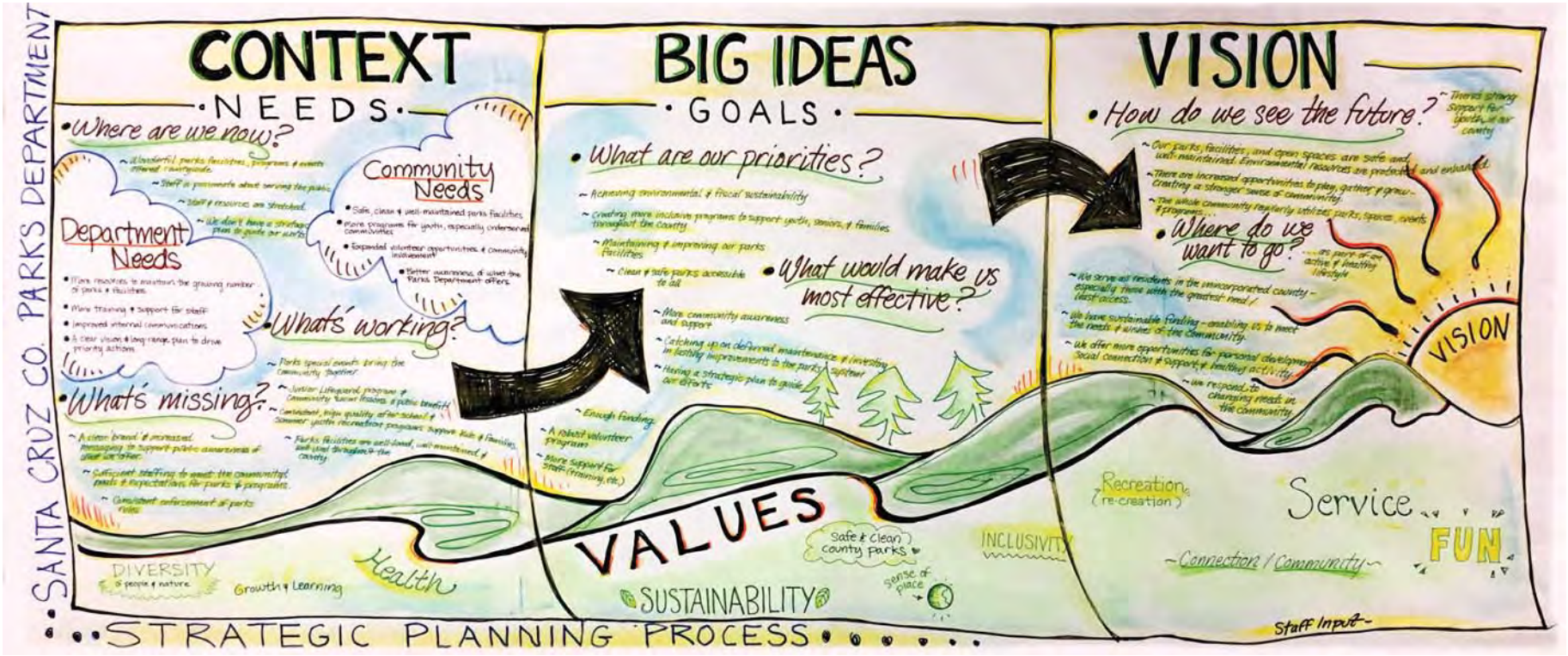



*Figure 10: Key Themes and Ideas Received from Staff*

*Highlights from Graphic Text (Figure 10)*

**CONTEXT**
**Needs**

Where are we now?

- Wonderful parks facilities, programs & events offered countywide
- Staff is passionate about serving the public
- Staff & resources are stretched

What's working?

- Parks special events bring the community together
- Junior Lifeguard program and community swim lessons a real public benefit
- Consistent, high quality after school & summer youth recreation programs support kids & families
- Parks facilities are well-loved, well-maintained (for the most part) & well-used throughout the county

What's missing?

- Sufficient staffing to meet the community's needs & expectations for parks & programs
- Consistent enforcement of parks rules

**BIG IDEAS**
**Goals**

What are our priorities?

- Achieving environmental & fiscal sustainability
- Creating more inclusive programs to support youth, seniors & families throughout the county
- Maintaining & improving our parks facilities
- Clean & safe parks accessible to all

What would make us most effective?

- More community awareness & support
- Catching up on deferred maintenance & investing in lasting improvements to the parks system
- Having a strategic plan to guide our efforts
- Having a robust volunteer program
- More support for staff development

**VISION**

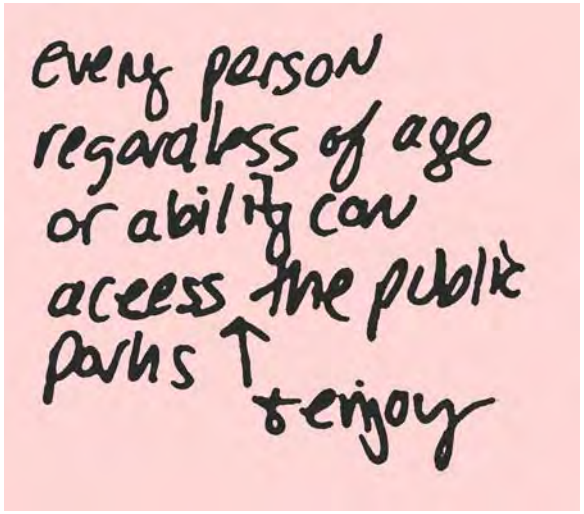
How do we see the future?

- Our parks, facilities & open spaces are safe & well-maintained. Environmental resources are protected & enhanced
- There are increased opportunities to play, gather & grow – creating a stronger sense of community
- The whole community regularly accesses/utilizes our parks, outdoor spaces, events & programs… as part of an active & healthy lifestyle
- There's strong support for all youth in our County of Santa Cruz

Where do we want to go?

- We serve all residents in the unincorporated county—especially those with the greatest need/least access
- We have sustainable funding—enabling us to meet the needs & wishes of the community… while maintaining what we have
- County residents have more opportunities for personal development, social connection & support & healthy activity
- We respond to changing needs in the community




*Vision Statement from Public Meeting*

## COMMUNITY RESPONSE

The outreach process provided valuable insight into community needs that could be addressed by the County Parks Department. It also clarified priorities and hopes for the future of parks in the county.

In the community conversations, five general themes emerged as being important to community members. These themes include 1) the quality of park experience; 2) opportunities for outdoor recreation; 3) stewardship and protection of open space and natural, cultural and historical resources; 4) accessibility of parks and programs; and 5) engagement of the local community. Generally, these themes are well represented by the number of comments, as shown in Figure 11. However, the most common theme overall was engagement of the local community, which included interest from the community in topics such as programs, outreach, volunteers, events and educational opportunities. Themes are explained below, and the most prominent themes, topics, and comments are summarized in Table 2.

### *QUALITY OF PARK EXPERIENCE*

The community consistently emphasized the need for maintaining and improving the quality of the existing park experience for park visitors. Essential to a positive park experience, things like improving ***safety*** for park users, improving the ***cleanliness*** and availability of restrooms, and ***maintaining aging parks infrastructure*** are of upmost importance. Community members also expressed a need for allocating additional and consistent levels of resources to the parks system to allow improvements and consistent levels of service in times of economic downturn.

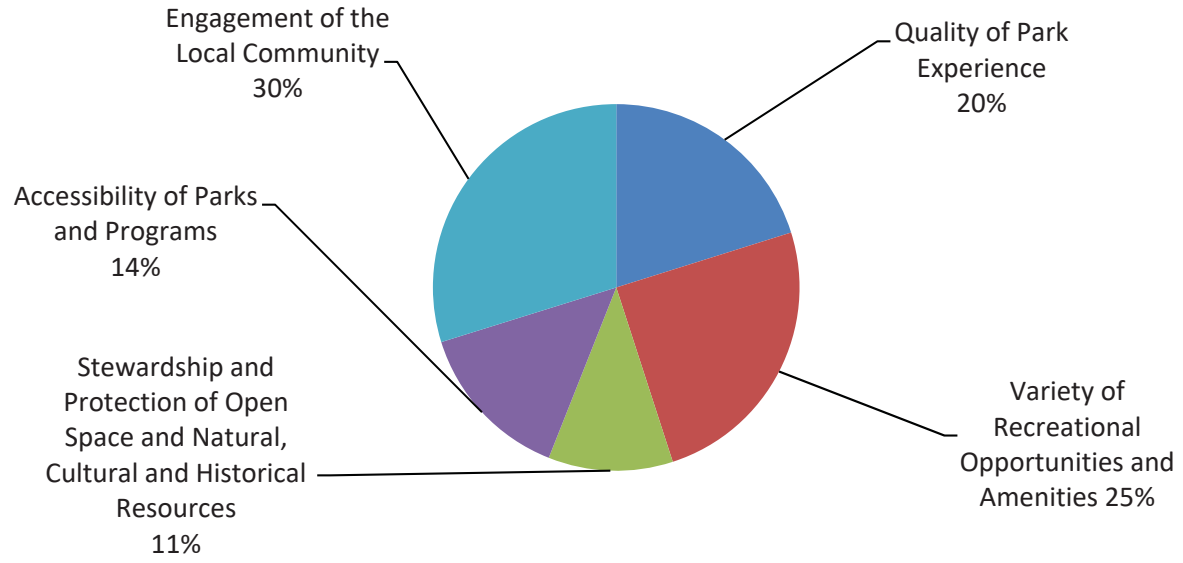
### *VARIETY OF RECREATIONAL OPPORTUNITIES AND AMENITIES*

The parks system needs to provide adequate and appropriate opportunities for both active and passive recreation, and common outdoor spaces and facilities for group activities. Community members expressed a need for a variety of specific activities and new facilities they wished to see within the parks system. These facilities and uses included ***sports facilities, trails, community centers, natural open areas, places to take dogs, additional amenities for youth,*** and other types of parks uses. The range of suggestions reflects the community's diverse needs and their vision for what a healthy lifestyle and improved quality of live mean to them.

### *STEWARDSHIP AND PROTECTION OF OPEN SPACE AND NATURAL, CULTURAL AND HISTORICAL RESOURCES*

Santa Cruz County residents feel strongly about the importance of protecting the natural environment and cultural and historical resources. Particularly, in the parks system, there is a need to ***preserve natural open space*** and to balance the development of recreational facilities with the protection of the environment. There also is a need to improve the ***management*** of natural areas and to restore and enhance natural habitats within the parks system. There is a strong desire to preserve our historical and cultural buildings, sites, landscapes and resources.

*Figure 11: Percent of topics raised in comments during public meetings*






*Greyhound Rock County Park*

### *ACCESSIBILITY OF PARKS AND PROGRAMS*

People find accessibility of parks and programs to all people and geographic areas in the county to be a key need. Many comments related to increasing ***equity in park and program distribution*** and access. Another consistent topic is ***universal access*** to facilities for people with various types of abilities. Improving ***connections*** between and to parks to make them more accessible to local neighborhoods is another key need.

### *ENGAGEMENT OF THE LOCAL COMMUNITY*

Locals expressed a desire for more opportunities to engage with and learn about the Parks Department, the parks system and parks programs. The department needs to increase ***outreach*** about offerings, and especially outreach to ***underrepresented communities***. People would like to see more programs, events and volunteer opportunities in the parks and to have better and more accessible information about these opportunities. This would increase individuals' and the community's connection to the parks system. Educational opportunities and particularly ***interpretive programs*** and facilities are important throughout the parks system.

### *REGIONAL DIFFERENCES*

There are specific needs and unique gaps in the park network in each part of the county, and in each of the five meetings, topics that were most important to participants varied. Prominent themes by region are summarized in more detail in Appendix 2.

*Table 2: Key Needs Summary*

## THEME: ***QUALITY*** OF PARK EXPERIENCE

***PROMINENT TOPICS:***

Safety of park users

Cleanliness of park restrooms and facilities

Local stewardship of parks

Updating and maintaining aging park infrastructure

Adequate and sustainable funding for parks system

Working with other park agencies to provide consistent facilities, hours and regulations

***OTHER FREQUENT COMMENTS:***

Keeping park facilities operational

Upgrading park facilities to accommodate increases in use

Enforcing park rules

Appropriate resources for maintenance and operations of existing facilities

Consistent park funds that are not significantly reduced in times of economic downturn such as the recession of 2008



*Restroom and Concession Building at Polo Grounds County Park in Aptos*

## THEME: VARIETY OF RECREATIONAL ***OPPORTUNITIES*** AND AMENITIES

***PROMINENT TOPICS:***

Providing a variety of types of community-serving park amenities

Adapting to provide opportunities for current and future trends in recreation

Opportunities for active and healthy lifestyles



*Shared Pickleball, Tennis and Basketball Courts at Brommer County Park in Live Oak*

Adding new uses and improvements to existing park properties

Opportunities for people to access open spaces and natural landscapes in the parks system

Partnering with other parks agencies to provide new facilities

***OTHER FREQUENT COMMENTS:***

Additional sports facilities such as soccer, baseball and softball fields, and basketball, tennis and pickleball courts

Additional pool facilities and programs in underserved areas

Additional trail connections for all types of trail users

Spaces to take dogs

Community centers for programs and events

Youth facilities such as bike jumps and pump tracks, skate parks, adventure courses and climbing walls

Joint use agreements with schools and other agencies to provide public access to park-like facilities during off hours

*Table 2: Key Needs Summary (Continued)*

*THEME:*

## ***STEWARDSHIP AND PROTECTION*** OF OPEN SPACE AND NATURAL, CULTURAL AND HISTORICAL RESOURCES

***PROMINENT TOPICS:***

Balancing the development of recreational facilities with protection and enhancement of natural, cultural and historical resources

Functional habitat for native flora and fauna

Protecting sensitive biological communities

Protecting natural open spaces in parks

Working with other park agencies to provide consistent facilities, hours and regulations

***OTHER FREQUENT COMMENTS:***

Connectivity between open spaces and natural areas to maximize benefits to wildlife

Conserving long-term viability of the variety of ecosystems within the county

Allowing natural biological processes to occur and biological systems to adapt to future conditions



*Pinto Lake Regional County Park in Watsonville*

*THEME:*

## ***ACCESSIBILITY*** OF PARKS AND PROGRAMS



*Future Site of LEO's Haven, an Inclusive Playground at Chanticleer County Park*

***PROMINENT TOPICS:***

Equitable opportunities for access to parks and programs for all county residents and people with varying economic resources

Universal accessibility to built infrastructure for people of all abilities

Additional neighborhood parks within walking distance of people's homes, especially in underserved areas

Increasing youth programs and bringing them to new locations

***OTHER FREQUENT COMMENTS:***

Safe pedestrian and bicycle routes to access parks

Public transportation to parks and programs

Signs and materials in both English and Spanish

Shuttle services or other forms of transportation to people who need it to access parks and programs

*THEME:*

## ***ENGAGEMENT*** OF THE LOCAL COMMUNITY

***PROMINENT TOPICS:***

Outreach to all demographics, particularly underrepresented communities

More volunteer opportunities

Additional programs and events

Partnering with community organizations and local cities

Educational opportunities

***OTHER FREQUENT COMMENTS:***

Relevant publicity of parks, programs and events

Coordination with school districts in publicizing parks and programs

Events for families with activities for multiple age groups

Interpretive programs

Working with neighbors and being respectful to local residents



*Strategic Plan Community Meeting in Watsonville*

**Santa Cruz County Parks**
979 17th Avenue
Santa Cruz CA, 95062
Ph: (831) 454-7901 – Fax (831) 454-7940
www.scparks.com

# Adopt-A-Beach Permit Application

*Please print all information*

Thank you for your participation in the Adopt-A-Beach program. Please review this packet, then fill out and sign the application. When the application has been approved, you will receive written confirmation.

Applicant/ Contact Person: _____

Organization Name (if applicable): _____

Address _____

City _____ State _____ Zip Code_____

Day Phone (_____)_____ Cell Phone (_____)_____

Email Address _____ Fax (_____)_____

Requested beach or beach access location(s):

_____

Requested beach clean-up date(s) and times:

_____

Requested materials and quantity needed for beach clean-up (trash and/or recycle bags, gloves, etc.):

_____

**Please return the following documentation to the Facilities office after the beach clean-up:**

___ Adopt-A-Beach Group Participation Agreement and Indemnification Form (if applicable)
___ Adopt-A-Beach Waiver of Liability and Express Assumption of Risk
(to be signed by all participants, or parent/guardian if under 18)

For more information about the California Coastal Commission's Adopt-A-Beach program, please refer to their website: www.coastal.ca.gov/publiced/aab/aab1.html. Save Our SHores provides additional information about local beach cleanups on their website: http://saveourshores.org/volunteer/adopt-a-beach/.

**Disclaimer:**

The undersigned states: The information I have provided to Parks is true and correct; If this Permit is issued to a group or entity, I am the authorized representative of the group or entity, and I am empowered to make this agreement on its behalf; I have received a copy of the Terms and Conditions and Assumption, Waiver, and Indemnity documents, and have read and understand them. Both individually and on behalf of the group or entity, I agree to them, and will comply with them as well as all laws and ordinances of the County of Santa Cruz, the State of California, and the United States.

_____ _____
Permitee Signature Date

## Department Use Only

Parks Department Approval: _____
Confirmed Date: _____ Contract #_____

**ADOPT-A-BEACH GROUP PARTICIPATION AGREEMENT**

**AND INDEMNIFICATION FORM**

WHEREAS_____, and the California

(Group/School Name)

Adopt-A-Beach Program recognize the need and the desirability of litter-free beaches; and

WHEREAS, the California Adopt-A-Beach Program recognizes our group as an adopting school or organization for _____, and

(Adopted Beach)

WHEREAS, our group recognizes the potentially hazardous nature of beach cleanup activities, and desires to protect the health and safety of ie cleanup participants:

Now, therefore, our group agrees to inform cleanup participants of safe methods to use in carrying our beach cleaning activities; and

FURTHER, _____

(Name of Participating Group/School)

agrees to indemnify and hold harmless, the State of California, the California Coastal Commission, the California State Parks, the California State Parks Foundation, all other organizers or sponsors or property owners involved in the Adopt-A-Beach program, and any of their respective employees, officers, agents, or assigns (hereafter collectively referred to as "Released Parties") from any claim of liability for personal injury, property damage, or wrongful death, arising out of, or connected with the group's participation in Adopt-A-Beach activities however caused, including but not limited to the negligence of the released parties, whether passive or active.

FURTHER, our group is aware that during the scheduled beach cleanups, volunteers from outside our groups may be assigned to our group's section of beach, and

FURTHER, our group accepts the responsibility of caring for the beach and promoting awareness in our community of the problems caused by marine debris and the need for protecting coastal and ocean resources for a period of one year, beginning _____, 20 _____, with cleanups scheduled on the following dates:

1st _____ 2nd _____ 3rd _____

Signed_____

(Authorized Group Leader/School Official)

**GENERAL INFORMATION**

Name of Group _____

Contact Person _____

Address _____

Phone (w) _____ (h) _____

Approximate number of people in the group _____

Beach Manager _____

# ADOPT-A-BEACH WAIVER OF LIABILITY AND EXPRESS ASSUMPTION OF RISK

(PLEASE READ CAREFULLY)

I, _____, HEREBY CERTIFY THAT IAM AWARE OF THE INHERENT HAZARDS OF A BEACH CLEANUP.

I agree as follows: 1. I am volunteering my services for the Adopt-A-Beach program ("the Event") on a voluntary basis without ant of payment of any kind; 2. I will perform assigned tasks that are within my physical capability to the best of my ability, and I will not undertake tasks that are beyond my ability; 3. I am familiar with the safe operation and use of equipment and tools that I may utilize in connection with this volunteer activity, and I will not undertake to use any equipment or tools with which I am unfamiliar or do not know how to operate safely; 4. I acknowledge that I have received and read appropriate instruction regarding this Event, including appropriate safety and emergency procedures, and that I fully understand those instructions and that I agree, after proper inspection, to use only the supplies, tools and equipment provided by the Event organizers; 5. 1 will perform only those tasks assigned, observe all safety rules, and use care in the performance of my assignments; 6. I specifically acknowledge that I am engaging in this activity as a volunteer, at my own request and risk, and not as a State of California or Foundation employee, agent, official, officer or representative, and further acknowledge that I am not entitled to any compensation, benefit or insurance coverage from the State of California, the Department of Parks and Recreation, the California Coastal Commission, the California State Parks Foundation, the County of Santa Cruz Parks, or any Event promoter or sponsor, nor will I make any such claim,

I understand and agree that neither the State of California, California Coastal Commission, California Department of Parks and Recreation, California State Parks Foundation, the County of Santa Cruz Parks, nor any other organizers or promoters or sponsors or property owners involved in this event, nor any of their respective employees, officers, agents or assigns, (hereinafter collectively referred to as "Released Parties"), may be held liable or responsible in any way for any injury, death or other damages to me or my family, heirs, or assigns that may occur as a result of my participation in this activity, or as a result of product liability or the negligence of any party, including Released Parties, whether passive or active.

I understand that cleaning up beaches and waterfront areas involves certain inherent risks, 'including but not limited to, the risks of possible injury, infection or loss of life as a result of contact with needles, condoms, metal objects, burning embers or other hazardous materials found on the bench, or from over-exertion or environmental conditions. Despite these risks, I still choose to proceed in such activity. I know of no physical limitation which should keep me from undertaking the activities associated with this Event. In Consideration for being allowed to participate in this activity, I hereby personally assume all risks in connection with the Event for any harm, injury or damage that may befall me as a participant, including all risks connected therewith, whether foreseen or unforeseen. I further save and hold harmless said activity and Released Parties from any claim or lawsuit for personal injury, property damage, or wrongful death, by me, my fa state, heirs, or assigns, arising out of participation in this activity, including both claims arising during the activity and after I complete the activity.

If I should become injured while participating in the Event, I authorize any physician or surgeon licensed in the State of California to perform emergency or surgical treatment as in his or her sole judgment may be necessary. I further declare that I am eighteen and legally competent to sign this liability release, or that I have acquired the written consent of my parent or guardian. I understand that the terms herein are contractual and not a mere recital, that this instrument is a legally binding, and that I have signed this document of my own, free act.

BY THIS INSTRUMENT I DO HEREBY EXEMPT AND RELEASE ALL "RELEASED PARTIES," AS DEFINED ABOVE, FROM ALL LIABILITY OR RESPONSIBILITY WHATSOEVER FOR PERSONAL INJURY, PROPERTY DAMAGE OR WRONGFUL DEATH, HOWEVER CAUSED, INCLUDING NEGLIGENCE OF THE RELEASED PARTIES, WHETHER PASSIVE OR ACTIVE.

**I HAVE FULLY INFORMED MYSELF OF THE CONTENTS OF THIS LIABILITY RELEASE AND ASSUMPTION OF RISK BY READING IT BEFORE I SIGNED IT ON BEHALF OF MYSELF AND MY HEIRS.**

| _____ | _____ | _____ | _____ |
|---|---|---|---|
| Spelling of Participant's Name | Date | Address | Phone |
| _____ | | _____ | |
| Signature of Participant | | Address | |

**IF PARTICIPANT IS UNDER 18, THE PARENT(S) (OR GUARDIAN(S), IF ANY) MUST SIGN.**

**The above participant has my permission to participate in the Adopt-A-Beach program. I have read and agree to the provisions stated above. I know of no health limitations which may restrict this volunteer's participation in this activity.**

| _____ | _____ | _____ | _____ |
|---|---|---|---|
| Signature of Parent(s) or Legal Guardian(s) | Date | Phone | Address |
| _____ | _____ | _____ | _____ |
| Signature of Parent(s) or Legal Guardian(s) | Date | Phone | Address |

**Santa Cruz County Parks**
979 17th Avenue
Santa Cruz CA, 95062
Ph: (831) 454-7901 – Fax (831) 454-7940
www.scparks.com

# Outdoor Facility Conditions of Use

**Hours:** Parks facilities may be reserved daily between 10:00 AM - Dusk. Outdoor facilities must be reserved for a minimum of 2 hours Monday through Friday, and 8 hours Saturday, Sunday and Holidays. The hourly rate may be applied to reservations made within 21 days of the desired date.

**Reservations:** Reservations are made on a first come, first served basis and can be made up to one year in advance. Minors are not eligible to reserve facilities. Full payment is required when the reservation is made.

**Alcohol:** Alcohol consumption is not permitted in the County Parks outdoor facilities.

**Sound Permit:** Public address systems, electronic equipment, live music and amplification are subject to certain restrictions determined by individual facilities. A Sound Permit is required for any event using these devices.

**Time Limits:** Entrance to the facility is limited to the time approved on the permit. If time limits are exceeded, the permittee will be charged an overtime rate of 1-1/2 times the hourly rental rate.

**Cancellations:** Reservations may be cancelled in person or in writing not less than 14 days prior to the scheduled event, with a permit processing fee of $100.00 or 50% of the permit fee, whichever is less. Cancellations of less than 14 days receive no refund of fees. Refunds are not given for inclement weather.

**Damage:** Permittee is responsible for damage or injury to County facilities and equipment. Damage or injury not covered by the amount of the deposit will be invoiced. Labor to repair the facility is charged at current maintenance staff hourly rate. Bills unpaid after 30 days are sent to collections.

**Set-up and Clean-up:** Permittee is responsible for set-up and clean up of the premises. Please leave facilities and grounds free of debris and other refuse from use. Trash and recyclables must be placed in appropriate containers. The facility must be restored to pre-use conditions.

**Decorating:** Poster tape and florist wire are the only fasteners permitted. No staples, tacks, nails, or stakes longer than 6 inches please! Release of balloons, birds or butterflies is prohibited by Parks policy. Biodegradable confetti only; no rice throwing.

**Activities for Minors:** Groups comprised predominately of participants under 21 years of age must be chaperoned at a ratio of one adult (over 21 years) to 12 minors.

**No Overnight Storage:** If you choose to bring rental equipment, you must arrange for it to be delivered and removed the same day as your reservation.

**Flammable Materials:** Flammable materials, including candles, are not permitted. Fuels and hazardous materials are not permitted in the park buildings and facilities. Fires must be confined to fireplaces and barbecue areas.

**Smoking:** Smoking and tobacco products are prohibited in Santa Cruz County Parks.

**Checks and Charge Backs:** Credit card charge backs and checks returned for insufficient funds will be charged at the current processing fee. Please note that credit cards are charged by Santa Cruz County.

**Changes to the Permit:** Any changes to the permit must be made in writing by the permittee only. Changes may result in a change in the permit fee. Date changes are subject to a $50.00 change of date fee. No changes will be made with less than one week notice.

**Sub-Lease:** Permittee shall not assign or sub-lease any portion of the premises, or any rights under approved permit, without prior written approval of the Department.

**Special Conditions:** For large, special or unique events, the department may require Permittee to provide additional services, including security, traffic control, first aid services, fire control, special trash collection, and sanitary facilities beyond those available by the Department.

**Concessions:** The County reserves sole right to control all concessions in and about department buildings and park facilities through separate agreements. Please inquire about concessions agreements if you are planning on selling items or food in the Parks.

**Insurance Requirements:** Groups charging admission and/or selling alcoholic beverages must furnish the department with a Certificate of General Liability and Property Damage Insurance (one million dollars per occurrence) holding the County as additionally insured. The department may also require insurance for activities that it deems to be high risk.

**Deposits:** Deposits may be required. If facilities are left in pre-use conditions, the full deposit will be returned. If facility/equipment is damaged, costs to return facility to pre-use condition will be subtracted from the deposit. Refunds will be mailed approximately four weeks following the event.

**Public Use:** You are reserving a space at a County Park and the park will remain open for use by others. At some parks there may be other events happening at the same time as yours.

**Lost Items**: The Parks Department is not responsible for items left.

**Thank You For Choosing Santa Cruz County Parks**

# ASSUMPTION OF LIABILITY, WAIVER and INDEMNITY

## 1. ASSUMPTION OF LIABILITY

Permitee, whether individual, group, or entity, is solely responsible for any and all liabilities to persons or property resulting from use of the Park Facility, including damage to any County property or structures. Permittee will indemnify, defend and hold harmless the County of Santa Cruz, its elected and appointed Boards, Commisions, Officers, Agents, and Employees from any claims, suits, losses or damages for injury to persons or property arising from or connected to this use of the Park Facility.

## 2. AGREEMENT TO ABIDE BY TERMS AND CONDITIONS

Permittee, whether individual, group, or entity, represents that he/she/it has read these Terms and Conditions, agrees to make them known to persons attending the function or activity, and agrees that no violation of such shall be allowed to occur on the premises or facilities. Permittee understands that permission to use of the Park Facility is contingent upon compliance with these Rules and Regulations (Terms and Conditions) and that permission may be revoked at any time upon failure of persons attending the function or activity to fully comply with these Rules and Regulations (Terms and Conditions).

## 3. PERMITTEE, OR REPRESENTATIVE, TO BE PRESENT

Permittee, or the group or entity individual named in the Permit, will be present during the entire period of use of the facility.

# Coastal Access



**NORTH COUNTY:**
**Greyhound Rock**(pictured above) - On HWY1 north of Scott Creek, it has a paved pedestrian access to beach, picnic tables, a large parking lot, memorial benches and a disabled accessible view platform.
**Scott Creek Beach** - Snowy Plover nesting habitat area.
**Davenport Landing**(pictured above) - Disabled accessible ramp to beach and restrooms, improved shoulder parking.
**Bonny Doon** - On HWY1 where Bonny Doon Road ends it has 45 parking spaces, a bus stop and an improved trail head.

---

**MID COUNTY:**
**Pleasure Point** - At the end of 41st Ave "The Hook" is a popular surfing spot, it has picnic tables, a parking lot and restrooms.
**Rockview Drive** - Near end of 30th Ave, has a picnic table.
**12th Avenue** - Has coastal stairway.
**13th Avenue** - Has coastal stairway.
**20th Avenue** - Has coastal stairway.
**21st - 23rd Avenue** - Access only
**26th Avenue** - Access only
**35th Avenue** - Has coastal stairway.
**38th Avenue** - Has coastal stairway.

---

**SOUTH COUNTY:**
**Hidden Beach**- Also a park, has paved pedestrian access to beach.
**Via Concha Ave.** - Has coastal stairway.
**Via Gaviota Ave.** - Has coastal stairway.
**Via Palo Alto Ave.** - Has coastal stairway.
**Dolphin at Sumner** - One of the most beautiful access spots, this access trail leads under a train tressel to a stairway leading to the beach.

# Garden Plots

Garden plots are located at Jose Avenue Park, Felt Street Park, the future park site of Chanticleer Park, which are located in Live Oak, and The Farm Park in Soquel. Garden plot contracts are annual and currently cost (effective July 1, 2018) $65 resident / $70 non-resident for the year (fees are subject to change). Availability varies per park. If there are no garden plots currently available to rent, your name can be added to a waitlist and will be selected in the order of sign-up in the Spring as plots become available. Email waitlist requests may be sent to reservations@scparks.com which should include your name, address and contact information. When new community garden parks open we will select from a lottery of the existing waitlist. Our brochure is attached below for more information.

**Garden Plot Brochure**

**Santa Cruz County Department of Parks, Open Space and Cultural Services**
979 17th Avenue, Santa Cruz, CA 95062
General Information (Monday-Friday, 9:00 a.m. - 4:00 p.m.)
Phone: (831) 454-7901 • PRCweb@santacruzcounty.us


© 2019 Santa Cruz County Parks

# Surf Schools

## Learn to surf in iconic Pleasure Point!

Santa Cruz County Parks is pleased to offer surf lessons through the Surf School Concessionaire Program, where you can learn to surf with permitted, professional, local surf schools.

**Club Ed**
www.club-ed.com
(831) 464-0177
surf@club-ed.com



**Richard Schmidt Surf School Inc.**
www.richardschmidt.com
(831) 423-0928
surf@richardschmidt.com



**Surf School Santa Cruz**
www.surfschoolsantacruz.com
(831) 428-3647
bud@surfschoolsantacruz.com



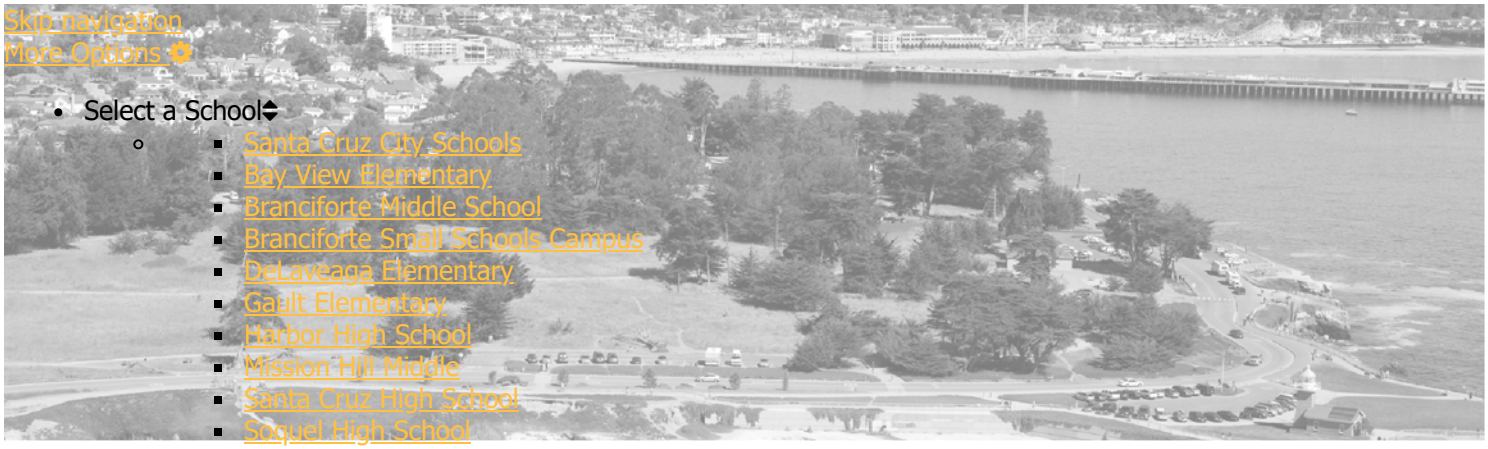
## Surf School Concessionaire Program
## East Cliff Parkway in Live Oak



A permit is required to conduct surf instruction at designated beaches and coastal access points along East Cliff Parkway at Pleasure Point, 36th Avenue, 38th Avenue, and The Hook, per Santa Cruz County Code Section 10.80.010.

The three permitted surf schools provide services that preserve public safety, maximize recreational use by all beach visitors, and maintain quality surfing instruction opportunities for the public.

All surf schools are required to have their students and instructors wear colored uniform shirts or vests while conducting surf school instruction. Permitted surf school with their vest colors are as





133 Mission Street Suite 100
Santa Cruz, CA 95060
Phone (831) 429-3410 | Fax (831) 429-3439

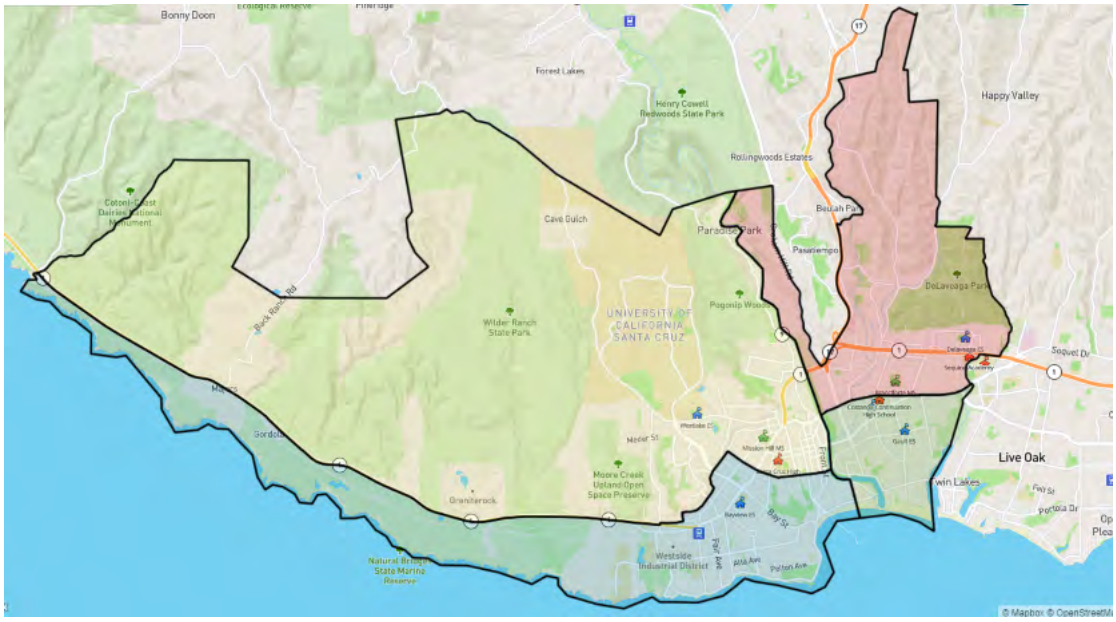


# District Boundary Maps

**To find your neighborhood school, please use My School Locator**

## New Elementary Boundary Map 2020

To determine your neighborhood elementary school, please visit My School Locator




## Middle School Boundary Map

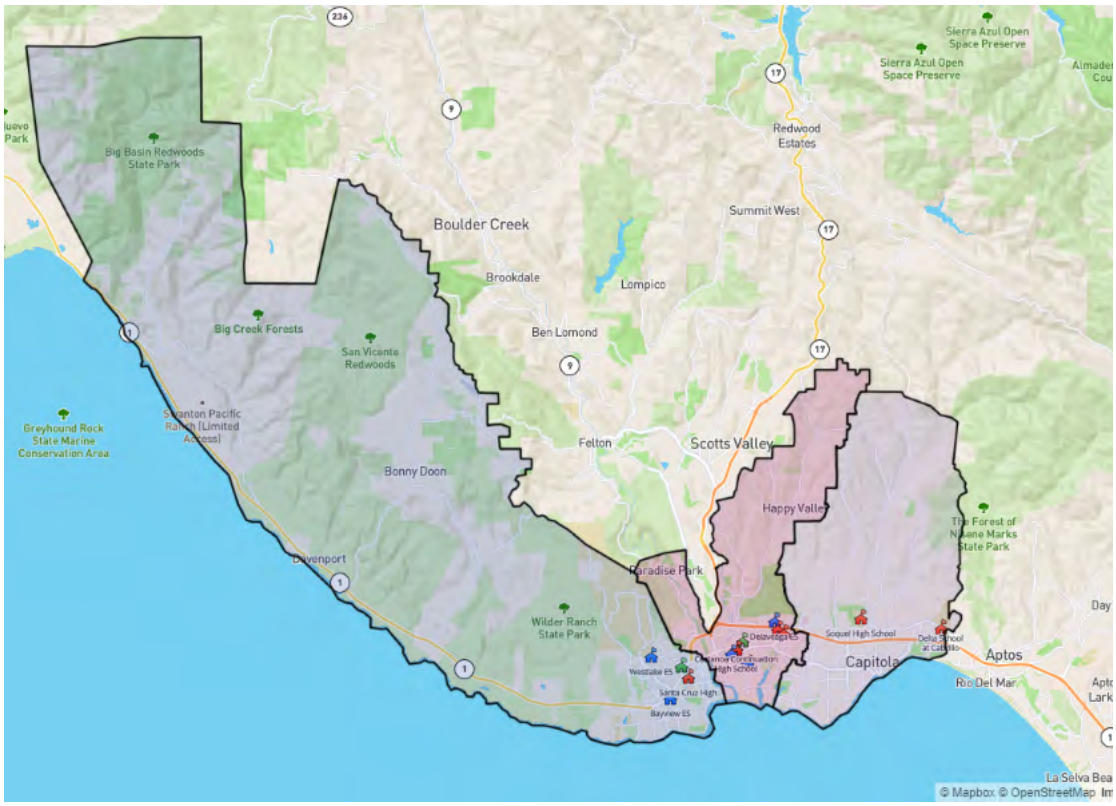
### To determine your neighborhood middle school, please visit My School Locator




## High School Boundary Map

### To determine your neighborhood high school, please visit My

## School Locator




Santa Cruz City Schools does not discriminate on the basis of race, color, national origin, sex, age, or disability in admission to its programs, services, or activities, in access to them, in treatment of individuals, or in any aspect of their operations. The lack of English language skills shall not be a barrier to admission or participation in the district's activities and programs. Santa Cruz City Schools also does not discriminate in its hiring or employment practices.

Our vision is to create and support a learning environment that challenges and enables students to achieve their highest potential.

**Santa Cruz City Schools**

133 Mission Street Suite 100
Santa Cruz, CA 95060
Phone (831) 429-3410 | Fax (831) 429-3439

Website by SchoolMessenger Presence. © 2021 West Corporation. All rights reserved.

# Santa Cruz City Schools

119 Coral Street, Santa Cruz, California 95060, U...

MY SCHOOL LOCATOR

**Showing Results for:**

119 Coral Street, Santa Cruz, California 95060, United States

**Explore the map:**

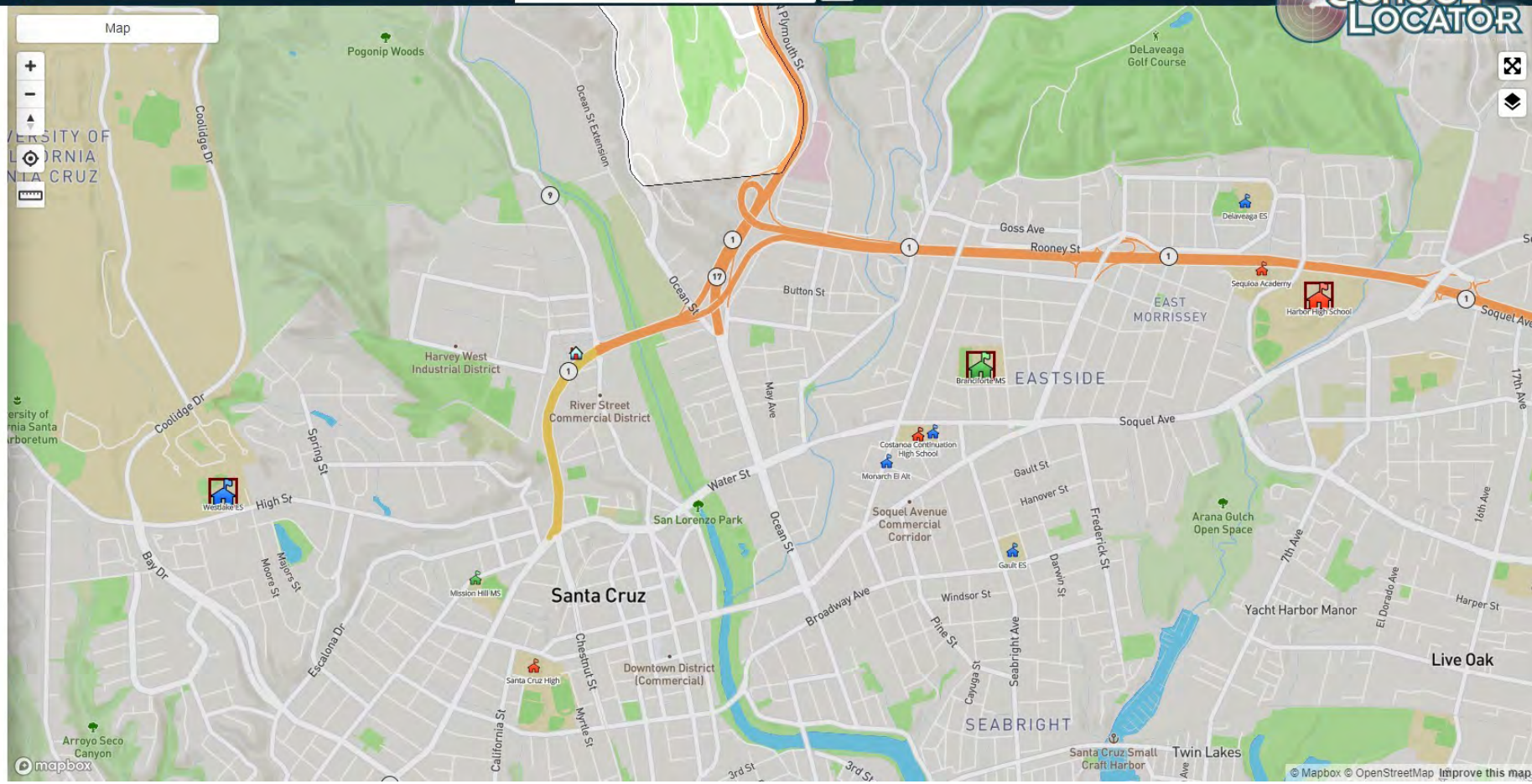
**Top Left side Controls:**

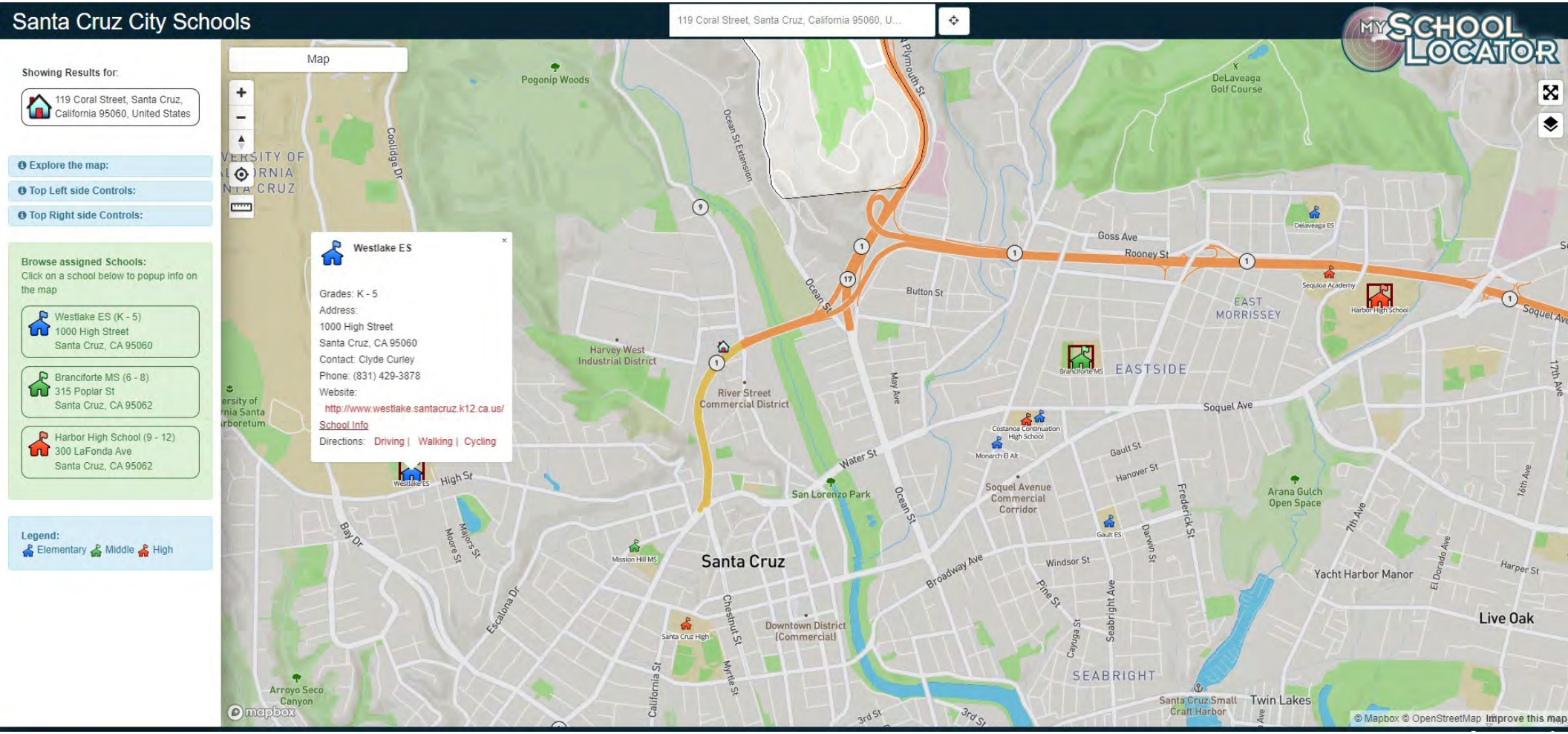
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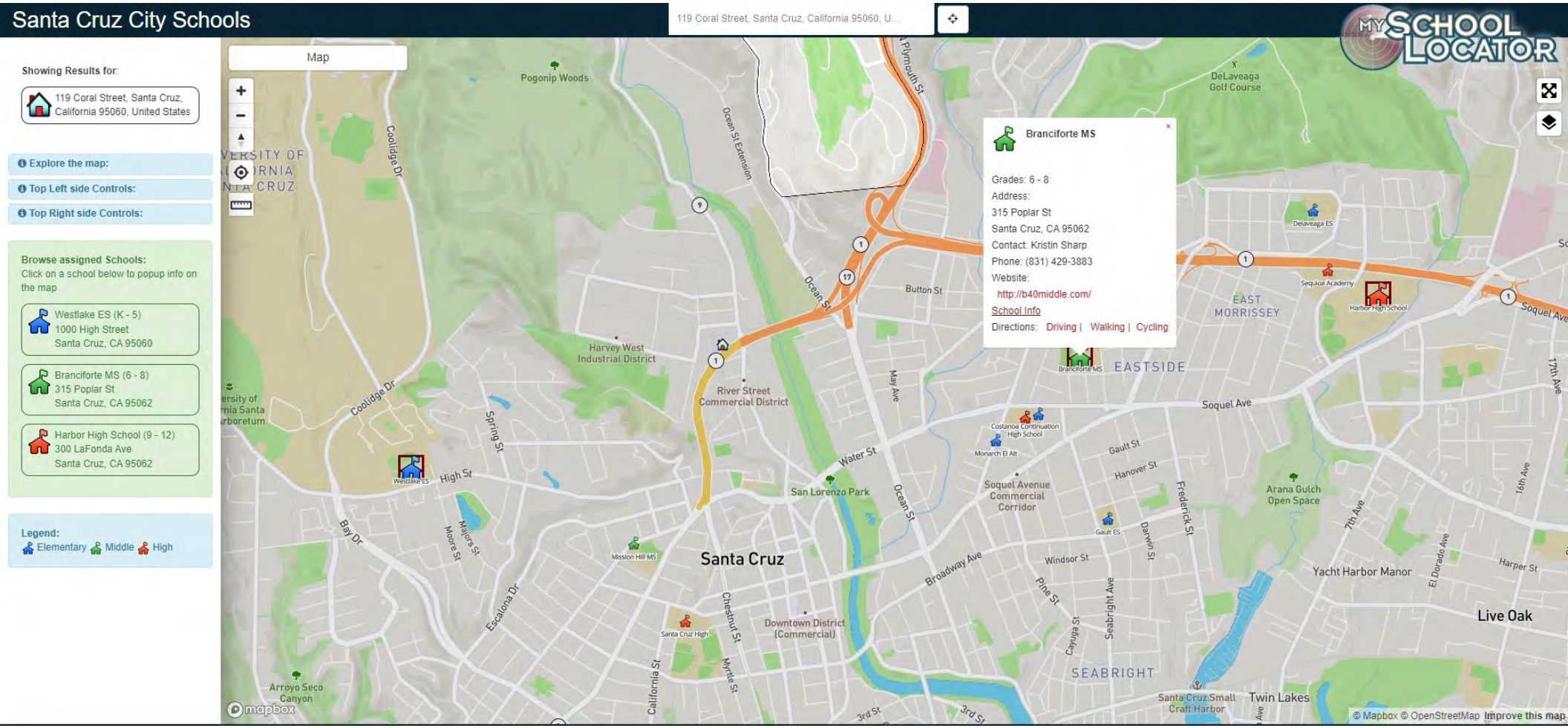
**Browse assigned Schools:**
Click on a school below to popup info on the map

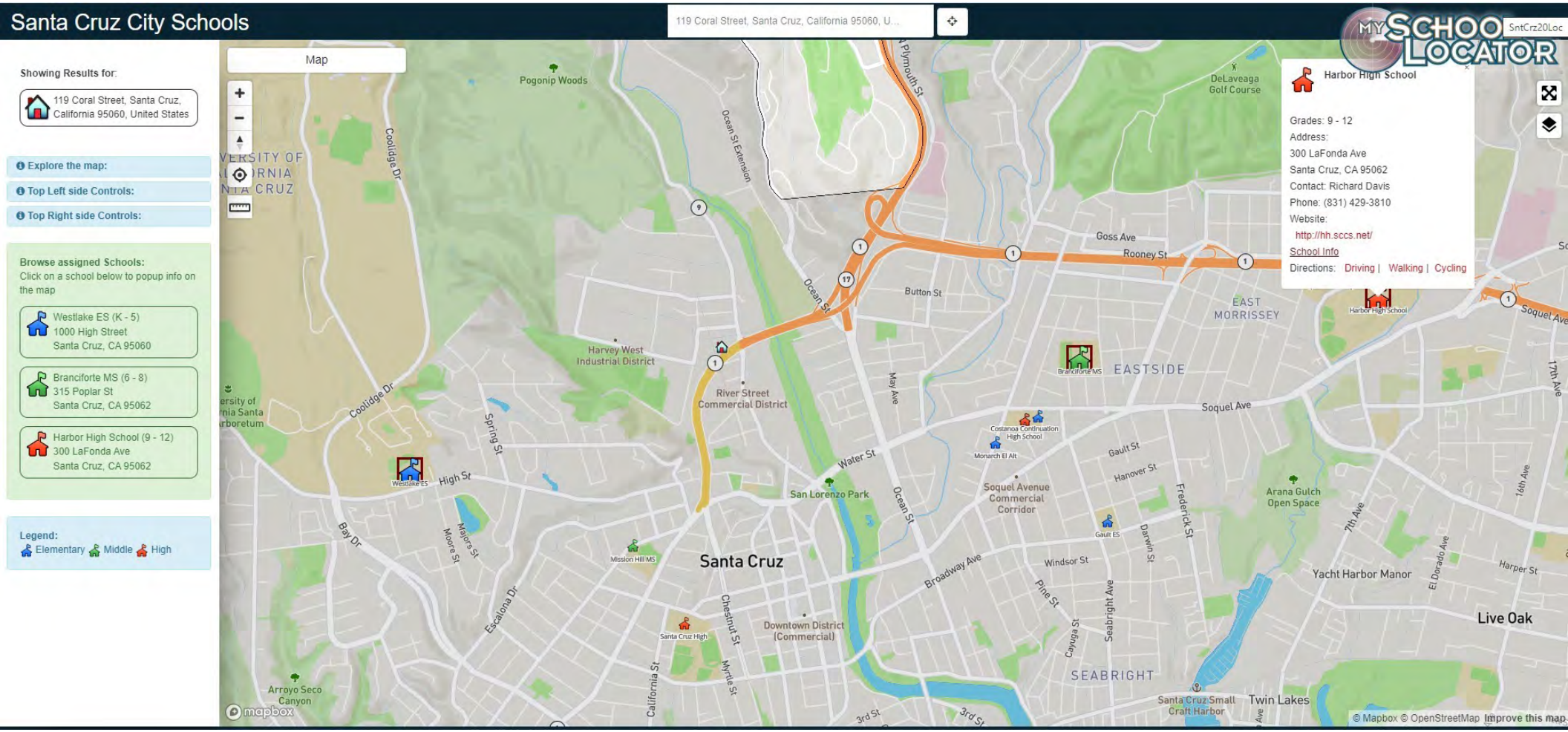
- Westlake ES (K - 5)
  1000 High Street
  Santa Cruz, CA 95060
- Branciforte MS (6 - 8)
  315 Poplar St
  Santa Cruz, CA 95062
- Harbor High School (9 - 12)
  300 LaFonda Ave
  Santa Cruz, CA 95062

**Legend:**
Elementary Middle High




Santa Cruz City Schools
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MY SCHOOL LOCATOR
Showing Results for:
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Explore the map:
Top Left side Controls:
Top Right side Controls:
Browse assigned Schools:
Click on a school below to popup info on the map
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Santa Cruz, CA 95060
Branciforte MS (6 - 8)
315 Poplar St
Santa Cruz, CA 95062
Harbor High School (9 - 12)
300 LaFonda Ave
Santa Cruz, CA 95062
Legend:
Elementary Middle High
Map
Westlake ES
Grades: K - 5
Address:
1000 High Street
Santa Cruz, CA 95060
Contact: Clyde Curley
Phone: (831) 429-3878
Website:
http://www.westlake.santacruz.k12.ca.us/
School Info
Directions: Driving | Walking | Cycling
Pogonip Woods
DeLaveaga Golf Course
Ocean St Extension
Plymouth St
Coolidge Dr
Goss Ave
Rooney St
Button St
Ocean St
Harvey West Industrial District
River Street Commercial District
EAST MORRISSEY
EASTSIDE
Soquel Ave
May Ave
Water St
High St
San Lorenzo Park
Soquel Avenue Commercial Corridor
Arana Gulch Open Space
Gault St
Hanover St
Frederick St
Darwin St
7th Ave
16th Ave
17th Ave
Bay Dr
Moore St
Majors St
Escalona Dr
Mission Hill MS
Santa Cruz
Broadway Ave
Windsor St
Pine St
Seabright Ave
Cayuga St
Chestnut St
Myrtle St
California St
Downtown District (Commercial)
Santa Cruz High
SEABRIGHT
Yacht Harbor Manor
El Dorado Ave
Harper St
Live Oak
Arroyo Seco Canyon
Santa Cruz Small Craft Harbor
Twin Lakes
3rd St
Delaveaga ES
Sequoia Academy
Harbor High School
Branciforte MS
Costanoa Continuation High School
Monarch El Alt
Gault ES
Westlake ES
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Santa Cruz, CA 95060
Branciforte MS (6 - 8)
315 Poplar St
Santa Cruz, CA 95062
Harbor High School (9 - 12)
300 LaFonda Ave
Santa Cruz, CA 95062
Legend:
Elementary Middle High
Map
Branciforte MS
Grades: 6 - 8
Address:
315 Poplar St
Santa Cruz, CA 95062
Contact: Kristin Sharp
Phone: (831) 429-3883
Website:
http://b40middle.com/
School Info
Directions: Driving | Walking | Cycling
Pogonip Woods
DeLaveaga Golf Course
Coolidge Dr
Ocean St Extension
Plymouth St
Button St
Ocean St
EAST MORRISSEY
EASTSIDE
Harvey West Industrial District
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May Ave
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Santa Cruz Small Craft Harbor
Twin Lakes
3rd St
Delaveaga ES
Sequoia Academy
Harbor High School
Costanoa Continuation High School
Monarch El Alt
Gault ES
Westlake ES
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Santa Cruz City Schools
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SntCrz20Loc
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315 Poplar St
Santa Cruz, CA 95062
Harbor High School (9 - 12)
300 LaFonda Ave
Santa Cruz, CA 95062
Legend:
Elementary Middle High
Map
Harbor High School
Grades: 9 - 12
Address:
300 LaFonda Ave
Santa Cruz, CA 95062
Contact: Richard Davis
Phone: (831) 429-3810
Website:
http://hh.sccs.net/
School Info
Directions: Driving | Walking | Cycling
Pogonip Woods
DeLaveaga Golf Course
Coolidge Dr
Ocean St Extension
N Plymouth St
Goss Ave
Rooney St
Button St
Ocean St
EAST MORRISSEY
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Soquel Ave
Harvey West Industrial District
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Pine St
Seabright Ave
Cayuga St
Chestnut St
Santa Cruz High
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Yacht Harbor Manor
El Dorado Ave
Harper St
Live Oak
SEABRIGHT
Arroyo Seco Canyon
California St
Myrtle St
Santa Cruz Small Craft Harbor
Twin Lakes
3rd St
mapbox
© Mapbox © OpenStreetMap Improve this map

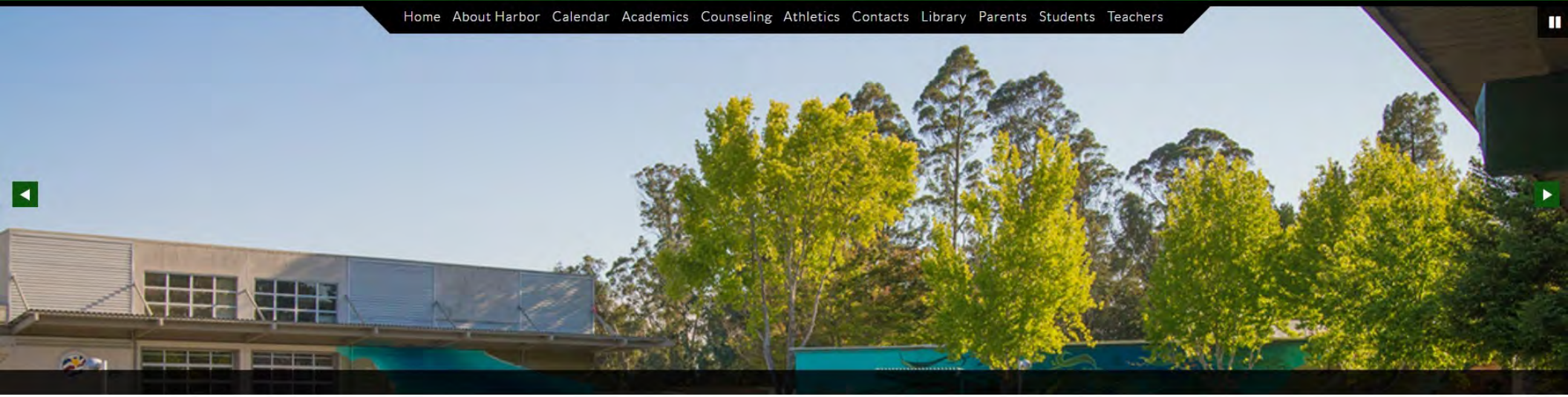
Select a School | Language | Login | Search...

# HARBOR HIGH SCHOOL

Parent/Student Portal | Student E-mail

(831) 429-3810

Home | About Harbor | Calendar | Academics | Counseling | Athletics | Contacts | Library | Parents | Students | Teachers



## NEWS & EVENTS

Free and Reduced Lunch Eligibility

Free and Reduced Lunch Application

Solicitud de Almuerzo Gratis o Reducido

---

¡Bienvenidos! Harbor High y SCCS apoyan a los estudiantes inmigrantes e indocumentados, y a sus

**DEC 14**

**A1 & A2 Finals**
8:30AM - 1:00PM

**Booster Parent Meeting**
7:00PM - 8:30PM

**DEC 15**

**B1 & B2 Finals**
8:30AM - 1:00PM

### QUICK LINKS

*NEW* Bell Schedule & ABC Calendar

2021-2022 Semester 1 Finals Schedule

COVID Guidelines, SCCS

Harbor School Calendar 21-22

REGISTRATION/ ENROLLMENT

SCCS District Calendar

Staff Infinite Campus Portal

# Resource Recovery - Garbage/ Recycling/ Sweeping




**Resource Recovery collection rates are based on the refuse container size (volume) and the frequency of collection.**

Current Collection Rates and Services

Sign up for refuse service here

Resource Recovery and Recycling Organizational Chart 2014 [PDF]

- Residential Services -**Learn about all the services included in your Garbage Bill-** (PDF)
- Business Services
- Resource Recovery Facility/Landfill/Recycling Center
- Recycling and Waste Reduction/Recycle guide, videos




- Electronic Waste (e-Waste)
- Household Hazardous Wastes
- Organics Diversion Programs

**Helpful guides, brochures and newsletters:**

Refuse & Recycling Newsletter 2022 [PDF]

EASY Curbside Recycling Guide [PDF]

Complete Curbside Recycling Guide [PDF]

Household Hazardous Waste [PDF]

Carpet Recycling Brochure [PDF]

Motor Oil Recycling Guide

# Resource Recovery Facility




## General Information about the Dimeo Lane Resource Recovery Facility

The **Resource Recovery Facility (RRF)** includes a sanitary landfill, recycling center, yard waste drop-off, construction & demolition (C&D) drop-off and Household Hazardous Waste Drop-Off.

**Location:**
The City of Santa Cruz Resource Recovery Facility and Recycling Center is located at 605 Dimeo Lane, 3 miles north of the City limits off of Highway 1.

**The RRF is open to City of Santa Cruz residents and businesses.** North County residents may use the facility but must pay a 28% surcharge above the established rates. ID is required.

**Residents of the City of Santa Cruz** who need to self-haul materials from their home to the landfill must be prepared to provide proof of residency (driver's license and municipal utility bill or similar document with a City address) to the gate house attendant.

**Businesses hauling materials which were generated within the City of Santa Cruz may use the RRF/landfill**. Businesses must be prepared to provide proof that the materials came from within the City limits. A typical way to provide proof would be to present a signed and dated letter or contract from the property owner or manager where the materials were generated, indicating that the business has been hired to haul those materials.

**Hours**:

The Resource Recovery Facility and Recycling Center are open Monday through Saturday 7:30 a.m. to 3:30 p.m. and closed on Sundays, and the following holidays:

**Days and times RRF is closed**

| | |
|---|---|
| **Closed** | Sundays |
| **Closed** | Thanksgiving Day |
| **Closed** | 12 noon • December 24 (Christmas Eve) |
| **Closed** | December 25 (Christmas Day) |
| **Closed** | 12 noon • December 31 (New Year's Eve) |
| **Closed** | January 1 (New Year's Day) |

**FEES: Current RRF rate schedule:** Resource Recovery Facility Fees **[PDF]**

**Note:** City residents and businesses are permitted to use the County of Santa Cruz-Buena Vista Landfill and Ben Lomond Transfer Station. A surcharge of 28% will be added to regular county disposal fees. City residents may drop-off "non-fee" recyclable material without charge and use Household Hazardous Waste Drop-off centers at County facilities.

# Treated Wood Waste (TWW)

On August 31, 2021, Governor Newsom signed Assembly Bill 332 and the bill takes effect immediately. AB332 adopts new Alternative Management Standards (AMS) for treated wood waste that are codified in Health and Safety Code section 25230. As a result of the chaptering of the bill, all treated wood waste variances issued by DTSC since March 2021 are now inoperative and have no further effect. The variances are no longer necessary because they have been replaced by the AMS. The new AMS are similar to the rules that applied under the variance program, except that no variance is required.

Assembly Bill 332 (AB 332) restores the alternative management standards for treated wood waste. As a result variances are no longer needed for disposal facilities, handlers, and generators of treated wood waste. A link to the new statute language is found below:

- AB 332 Text

**Fact Sheet and Other Information**

DTSC has developed a fact sheet to help generators and handlers understand what the new requirements are for the alternative management standards for treated wood waste. A link to the new fact sheet and list of landfills approved to accept TWW are found below:

- Requirements for Generators and Handlers of Treated Wood Waste – September 2021 Fact Sheet
- List of Landfills approved by the Waterboard to accept TWW- The City of Santa Cruz Landfill is on the list approved by the Waterboard

**For Questions on Treated Wood Waste: Call 831-420-6108**

**Household Hazardous Waste - Drop-Off Center:**
Household Hazardous Waste is accepted only on Saturdays from 7:30 a.m. to 3:30 p.m.

### Trash Disposal

The City operates and maintains the sanitary landfill for use by City refuse operations and private individuals and businesses. The City ensures that the landfill meets all state and federal regulatory requirements, and operates and performs field maintenance on equipment and pumps used at the landfill.

### Recycling Center Processing

The City operates and maintains the recycling drop-off and processing center at the Dimeo Lane Resource Recovery Facility. Recyclable items such as mixed paper, cardboard, plastic, metal, glass, used oil, E waste and appliances are accepted, sorted and processed. All recycled material is sold to commercial markets.

**Recycling Center - Drop Off**

**Yard Waste**

**Mattress Recycling**

**Carpet Recycling [PDF]**

**Household Hazardous Waste [PDF]**

### Questions?

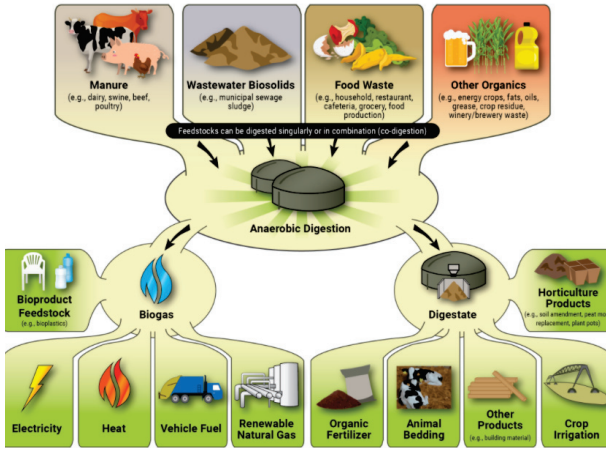
- For questions regarding curbside recycling or trash collection call City of Santa Cruz Customer Service at 831-420-5220 or email.

### For more information please contact:

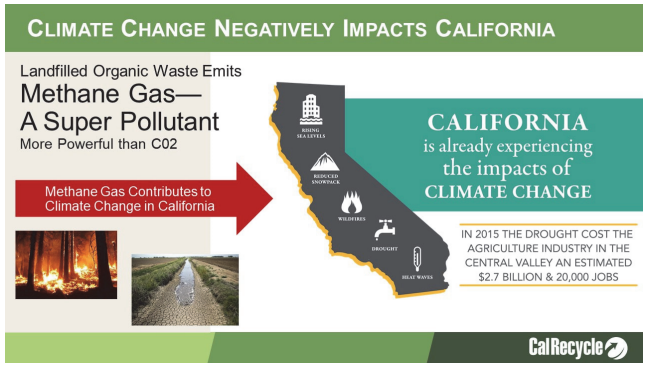
Superintendent of Resource Recovery Facility
831-420-6273

# Why Do We Need Mandatory Organics Recycling?

An important part of California's efforts to protect the environment is to increase the diversion of organic materials away from landfills and toward the production of value-added products such as compost, fertilizers, and biofuels.




By using organics for compost, energy creation, and recovering edible food for hungry community members, we are helping to slow the impacts of climate change.




## Have Questions?

Resource Recovery Staff are available to assist you in the following ways.

- Identify opportunities that ensure your business is in full compliance with these state-required mandates.
- Help you find compatible food recovery organizations.
- Provide employee training & signage
- Conduct a waste audit to ensure you have the appropriate level of service.

**Call or Email Resource Recovery**
(831) 420-5377
**Organics@cityofsantacruz.com**

## More Information

### City of Santa Cruz: Resource Recovery
https://www.cityofsantacruz.com/organics

### State Level: CalRecycle
**Mandatory Recycling:**
https://www.calrecycle.ca.gov/recycle/commercial

**Mandatory Organics :**
https://www.calrecycle.ca.gov/Recycle/Commercial/Organics/

**To sign-up for organics collection service: Contact Customer Service at (831) 420-5220 or at scmu@cityofsantacruz.com.**

CITY OF SANTA CRUZ



# State Mandated Recycling and Organics Compliance Guide For Businesses

# RECYCLING LAWS

### AB 341-*Mandatory Commercial Recycling*

Requires all commercial businesses and public entities that generate two cubic yards or more of waste per week to have a recycling collection program in place.



### AB 1826- *Mandatory Organics Recycling*

requires businesses that generate two cubic yards or more of commercial solid waste per week (total for trash, recycling, and organics) a specified amount of organic waste per week to arrange for organic waste recycling services for that waste.



### AB 827- *Customer Access to Recycling*

This bill Requires commercial waste and organics generators to provide customers access to a recycling bin or an organic waste recycling bin to collect materials purchased on the premises.

**Keeping recyclable and compostable materials out of the garbage is an excellent first step toward cost savings and improved operational efficiency.**

### SB 1383- *California's Short-Lived Climate Pollutants Reduction Strategy*

Goes into effect January 1, 2022, and builds on AB1826. It Requires every business and resident in California to separate and divert organics, including food scraps, from the landfill. The State's goal is to reduce organics disposal by 75% and recover and redirect 20% of edible food currently landfilled by 2025.

### Next Steps for your business

- **Subscribe** to the organic waste collection service offered by the City. Resource Recovery Staff are available to assist you in determining the appropriate level of service.

- **Educate and Sort**- Businesses shall annually provide information to employees, contractors, tenants, and customers about waste diversion requirements and about the proper sorting of waste. Businesses must prohibit their employees from placing organic waste and recyclables in the wrong bins.

- **Monitor Contamination**- Businesses are responsible for making sure that their organic waste and recycling is sorted properly by performing regular inspection of their recycling and organics bins for contamination, and reminding employees about proper sorting.

### SB1383 requirements beginning January 1, 2022 for "Tier 1" Commercial Food Generators.

*"Tier 1" Commercial Edible Food Generators" defined as supermarkets, grocery stores with 10,000+ square feet, food distributors or, wholesale food vendors*

- **Recover and Redirect** the maximum amount of Edible Food to organizations that work to feed people. will need to work with Food Recovery Organizations to comply with the following:
- **Establish written agreements/contracts** with Food Recovery Establishments to record, report, and track recovered and redirected food.

### "Tier 2 Commercial Edible Food Generators" who do not fall into the Tier 1 definition will be required to comply with edible food recovery regulations on January 1, 2024.

For assistance with the above requirements or to find out if you are a Tier 1 or Tier 2 commercial food generator, please call Waste Reduction staff at 831-420-5991.

**While the requirements of SB1383 are State mandated, the City is required to enforce compliance. Therefore, penalties for noncompliance may apply.**

# Wastewater System



**Our short video provides an important reminder to help prevent unsanitary sewer overflows during the current pandemic and always: in English; en español.**

Our **Santa Cruz Wastewater Treatment Facility** provides quality of life service to the community while helping to reduce the City's carbon footprint and protecting the environment as demonstrated in this video. We welcome you to a 2020 virtual tour of our facility led by our Operations staff in English or español. You can also learn more about us in our latest edition of Neighborhood News.

The Santa Cruz Wastewater Treatment Facility is proud to have been awarded 2020 Collection System of the Year (Small) from the California Wastewater Environment Association-Monterey Bay Section. Previous honors include 2013 Best in State Plant of the Year (Medium) and four 2017 California Water Environment Association-Monterey Bay Section awards: Overall Plant of the Year, Plant of the Year (Medium), Collections Person of the Year and Operator of the Year. We received second place for California Wastewater Environment Association 2017 Best in State Plant of the Year (Medium).

Santa Cruz Plant Honored as Best Wastewater Treatment Facility in California. This award honors exceptional California treatment plants and collection systems. It is based on a review of infrastructure, management practices and compliance records.

We have also been honored for our energy-saving achievements:
EPA Recognizes Santa Cruz Wastewater Treatment Facility for Its Green Power Accomplishments

The history and processes of the Wastewater Treatment Facility and our use of recycled wastewater are outlined in this presentation by Public Works Director Mark Dettle.

**Purpose and Functions** (37 Employees)
Organization chart [PDF]

**Wastewater Treatment Facility**
Operates and maintains a regional wastewater treatment and disposal facility. Wastewater treatment and ocean outfall disposal are provided for the City of Santa Cruz and the Santa Cruz County Sanitation District (includes Live Oak, Capitola, Soquel and Aptos). Ocean outfall disposal is provided for the City of Scotts Valley.

**Wastewater Source Control**
Provides inspection, sampling and monitoring of business and industrial establishments to limit discharge of harmful constituents into the sanitary sewer system and storm drain system. Issues wastewater discharge permits to industrial discharges. Issues citations and levies fines for code violations. This program is a requirement of the State of California and U.S. Environmental Protection Agency.

The City of Santa Cruz has been treating sewage at the Wastewater Treatment Facility near Neary Lagoon and disposing of the effluent in the ocean since 1928. Treatment capacity has been expanded several times to accommodate the growth of the city and the addition of flows from the Santa Cruz County Sanitation District. The current rated design capacity is 17 MGD (millions of gallons per day) and with an average daily flow of less than 10 MGD. Design for wet weather flow is 81 MGD.

**Pure Water Soquel Project:** The City of Santa Cruz Wastewater Treatment Facility continues to expand its production and use of recycled water through a regional partnership which will provide source water to the Pure Water Soquel Project.

The project will provide a reliable supplemental water supply for the community and prevent seawater from contaminating groundwater. It includes the installation of about eight miles of pipeline under various streets between Santa Cruz and Aptos. These pipelines will carry recycled water from our regional Santa Cruz Wastewater Treatment Facility to the Chanticleer Water Purification Center (to be built) in the Live Oak area; and, will carry purified water from the new Center to three Seawater Intrusion Prevention (SWIP) wells where it will be pumped into the groundwater basin.

This project will also provide an increased capacity to produce Title 22 tertiary water at the Wastewater Treatment Facility. Read more.

**Major Accomplishments Over the Last 5 Years:**

- WWTF Energy and Environmental Summary

- Completion of 50 Kw photovoltaic system
- Integration of 1.3 megawatt cogeneration system into facility power grid
- Implementation of staffing reorganization to optimize plant efficiency
- Adoption of revised Sewer Use Ordinance
- Adoption of Storm Water Ordinance
- Adoption of Extended Producers Responsibility Ordinance

Wastewater Treatment Facility brochure: Page 1 - Page 2

Information on Sewer Rates and Sewer Rate Table

### Water Pollution Control Facility Annual Reports

2019 [PDF] 2015 [PDF] 2011 [PDF] Archives 2006-10

### Pretreatment Program Annual Reports

2019 [PDF] 2015 [PDF] Archives 2006-10

**California Integrated Water Quality System Reports**

**Annual Dye Study Report 2016 [PDF]**
**Annual Dye Study Report 2013 [PDF]**

Additional Reports are filed online at the **Electronic Self-Monitoring Report** website of the California Integrated Water Quality System. You can find the reports that have been filed at this web link:

**For more information contact**:

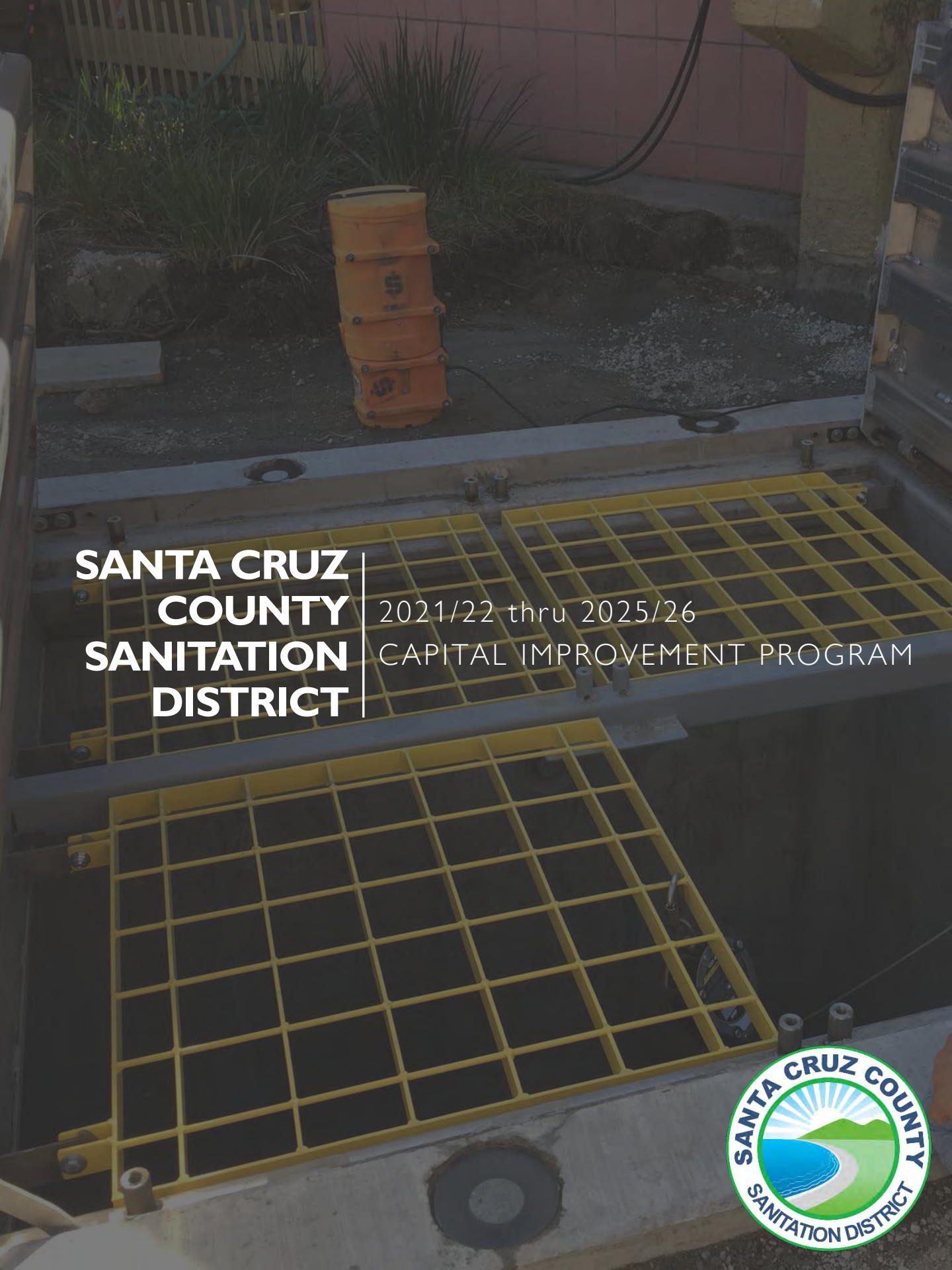
**Anne Hogan**
Wastewater System Manager
831-420-5425
831-420-6489 (fax)
email



# SANTA CRUZ COUNTY SANITATION DISTRICT

2021/22 thru 2025/26

CAPITAL IMPROVEMENT PROGRAM



# SANTA CRUZ COUNTY SANITATION DISTRICT

2021/22 thru 2025/26

CAPITAL IMPROVEMENT PROGRAM

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41st Avenue at Soquel Drive Sewer Rehabilitation Project

# INTRODUCTION

2021/22 thru 2025/26
CAPITAL IMPROVEMENT PROGRAM

SANTA CRUZ COUNTY SANITATION DISTRICT

SANTA CRUZ COUNTY SANITATION DISTRICT
701 OCEAN STREET, SUITE 410 · SANTA CRUZ, CA · 95060-4073
(831) 454-2160 · FAX (831) 454-2089 · TDD: (831) 454-2123 · WWW.SCCSD.US
**MATT MACHADO, DISTRICT ENGINEER**

# INTRODUCTION

The purpose of this Capital Improvement Program is to identify and prioritize needs and project costs, under the direction of the Santa Cruz County Sanitation District's Board of Directors, for planned improvements to the infrastructure that will serve the District's ratepayers in an efficient and cost-effective manner throughout the next five-plus years of growth and change.

Worn out and antiquated facilities must be repaired or replaced in a timely manner in order to protect public health and safety. This report will help identify and describe specific sanitary sewer projects for pump stations, transmission lines and collector lines which are planned to take place over the next five-plus years, along with their estimated project costs. It will help prevent sudden shifts in the debt service requirements, inform the Board and the public about future projects, provide coordination with other County projects, and plan budget allocations for the identified capital needs. This report may also aide the District in obtaining grants and may improve the District's credit rating.

# FACTS ABOUT UNDERGROUND CONSTRUCTION

Underground construction is complex and costly compared to other types of construction. According to the U. S. National Committee on Tunneling Technology, Subcommittee on Management of Major Underground Construction Projects, in their executive presentation, "Recommendations for Better Management of Major Underground Construction Projects," they state that "Among today's most complicated and costly large projects are those being built underground...because geotechnical considerations assume greater importance than in other types of construction, and because the nature of underground work requires special equipment, techniques, and skills."[1] Because of this, in 1976, three Federal agencies requested that the National Research Council obtain a set of guidelines that could be used to address the problems of underground construction.

Underground construction is quite unique among the different types of construction projects, mainly due to the fact that you cannot see, ahead of time, the exact conditions that you will be encountering during the construction of the project. You can't physically see if there are underground waterways, huge rocks, underground utilities, buried structures, or soft or hard soil conditions.

Prior to construction, various measures are typically used to investigate what may be hidden underground; however, it is nearly impossible and not cost effective to test every square inch of the project area, thus large rocks, underground streams, undocumented utilities, old septic tanks, tree roots, old contaminated soil, gases and other noxious waste, unsuitable soils, and other surprises often show up and lead to contract change orders and increased costs to deal with the obstacle or condition. From the time of testing to the time of actual construction, soil conditions may change appreciably[2]. Thus, economic risk, geotechnical uncertainties, and complex technologies are inherent in underground projects.[3]

In addition, there is high wear and tear on equipment when having to bore or cut through rock, especially rock with high uniaxial compressive strength. This is illustrated in one project where the average strength of the rock was about 120 Megapascals and the average penetration rate was less than 1 meter/hour, sometimes going as slow as 0.36 meter/hour.[3] The average cutter life was far less (37.3 cubic meters[4]/disc) than desired (100 cubic meters/disc) and cutter replacement led to a long downtime, contributing to higher costs and delays.

Even when an underground construction project is well-planned at its inception, conditions and requirements change during execution. The key to a project's ultimate success is the identification and management of risks during construction.[5]

1. U. S. National Committee on Tunneling Technology, Subcommittee on Management of Major Underground Construction Projects, in their executive presentation, "Recommendations for Better Management of Major Underground Construction Projects
2. Problems of Underground Construction in a Dense Urban Setting.
3. Rock Mechanics in Underground Construction, at the 2006 International Society of Rock Mechanics* International Symposium
4. Contracting Practices for the Underground Construction of the Superconducting Super Collider.
5. Problems in Underground Construction: Lessons learned and Methods Developed for Success (M. Petrov and P. Galloway, 2004)

# BOARD OF DIRECTORS

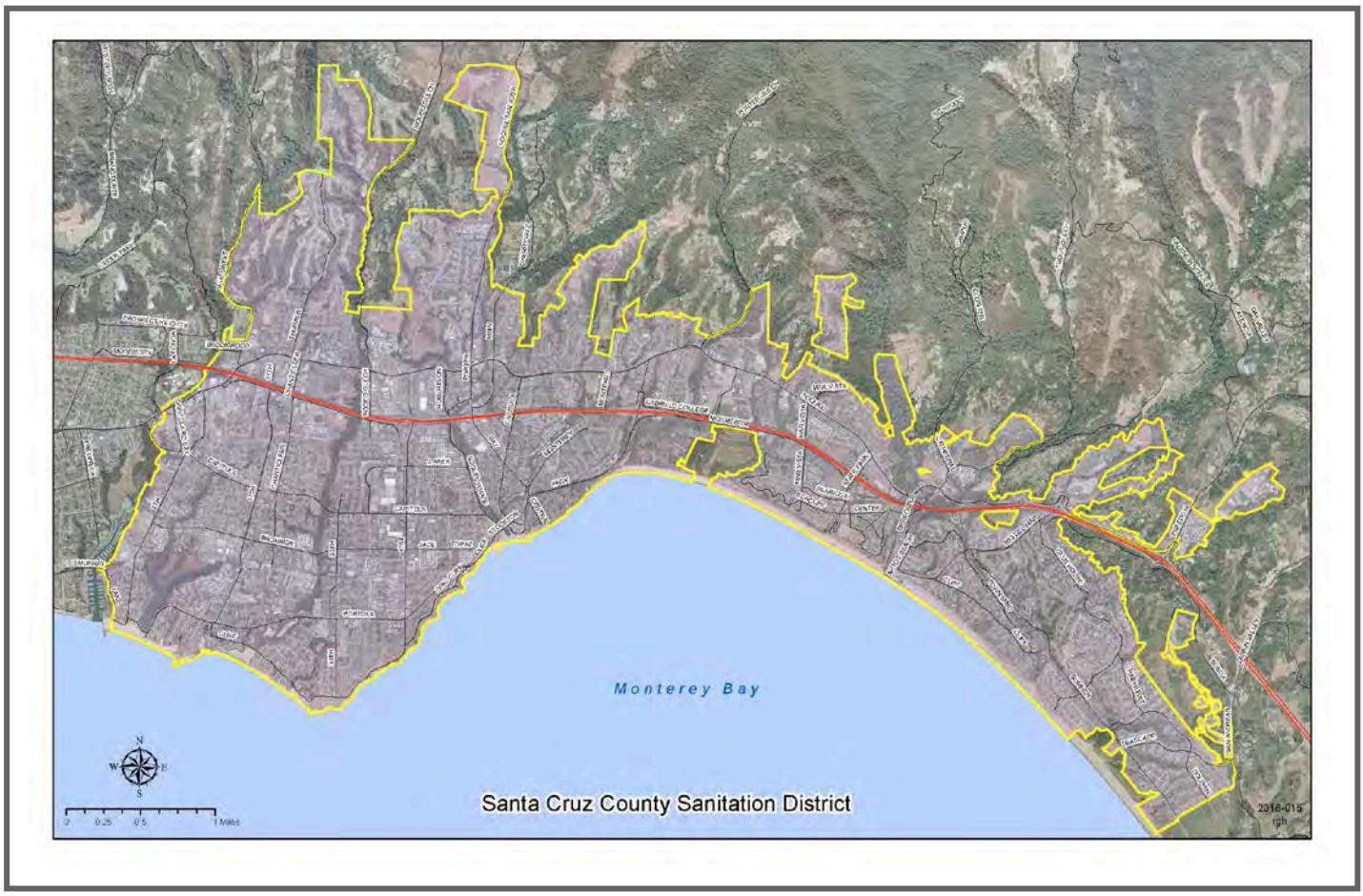
The Santa Cruz County Sanitation District Board of Directors is comprised of three members plus one alternate:

- The County Supervisor from the Branciforte - Soquel (1st) District;
- The County Supervisor from the Aptos (2nd) District;
- A member of the Capitola City Council, plus an alternate.

The Chairperson of the Board is a member of the Capitola City Council. The Vice-Chairperson is the 1st District representative during even-numbered years and the 2nd District representative during odd-numbered years.

The current Board consists of the following elected officials:

- **Chairperson:** **Jacques Bertrand, City of Capitola**
- **Director:** **Manu Koenig, 1st District Supervisor**
- **Director:** **Zach Friend, 2nd District Supervisor**
- **City Alternate:** **Sam Storey, City of Capitola**



# DISTRICT PERSONNEL

Current District personnel include the following:

- District Engineer – Matt Machado
- Assistant District Engineer – Kent Edler
- Assistant Director of Administrative Services – Kim Moore
- District Counsel – Justin Graham
- Sanitation Engineer – Ashleigh Trujillo
- Water/Wastewater Operations Manager – Beatriz Barranco
- Environmental Programs Coordinator – Monica Tomlinson
- Construction Manager – Carisa Duran
- District Secretary – Terra Prestwich
- Deputy Secretary (part-time) – Andrea Gifford








ENVIRONMENTAL COMPLIANCE UNIT

# HISTORY & PURPOSE

2021/22 thru 2025/26
CAPITAL IMPROVEMENT PROGRAM

Alley South of Bennet Sewer Project



# HISTORY AND PURPOSE OF THE DISTRICT

The Santa Cruz County Sanitation District was formed as an autonomous district under the State of California, on May 9, 1973, and encompasses the community of Live Oak, the City of Capitola and portions of the communities of Aptos and Soquel. It previously consisted of three separate districts: Aptos Sanitation District, Capitola Sanitation District, and East Cliff Sanitation District. At the time of formation, it was one of the largest of its type in the State and had the highest per capita assessed valuation of any Sanitation District.

The objectives of the formation were to:

- Merge resources to pay for improvements in order to be in compliance with federal orders to clean up the quality of wastewater discharged into the Pacific Ocean.

- Shut down individual sewage treatment facilities and build a sewage transmission line, from Aptos to the City of Santa Cruz's treatment facility at Neary Lagoon in the City of Santa Cruz.

- Join with the City of Santa Cruz in tripling the capacity of the City treatment facility and build a new outfall line into the Pacific Ocean.

- Secure a favorable bond rate (the larger District allowed bonds to sell at one-fourth to one-half percent lower interest rates than if they were issued by individual Districts).

The purpose of the District is to construct and maintain pipelines transporting waste from the District to the Santa Cruz City Wastewater Treatment Facility, located at Neary Lagoon, as well as to provide instruction, services, and monitoring for environmental compliance. To accomplish this last item, the District's Environmental Compliance Unit conducts programs to educate residents, professionals, and business owners about the proper use of their sewer and drainage systems in order to help preserve their own, as well as the District's, facilities and to help protect the environment.

# REVENUE STUDY & BUDGET



Cliff Drive Sewer Trench Repair Project

2021/22 thru 2025/26
CAPITAL IMPROVEMENT PROGRAM

SANTA CRUZ COUNTY SANITATION DISTRICT

# CAPITAL IMPROVEMENT BUDGET PROGRAM

Unlike the Capital Improvement Program, the Capital Improvement Budget normally only includes the current fiscal year's projects and is prepared each year as part of the overall budget of the District.

The Santa Cruz County Sanitation District funds its capital improvement projects through collection of sewer service fees, grants, bond sales, and various state and federal loan programs.

Of the thirty-two capital improvements planned for the 2021/22 thru 2025/26 fiscal years, the most significant are the Arana Trunkline Replacement; Valencia Creek Sewer Relocation; D.A. Porath Valve Replacement and Emergency Bypass; Rodeo Pump Station Capacity Upgrade; Upper and Lower Rodeo Trunkline Replacements; East Cliff, Portola, and Richmond Drives Sewer Replacement; Capitola Village Sewer Rehabilitation; Rio Del Mar Sewer Rehabilitation – Phase 2; Santa Cruz Harbor Area Sewer Rehabilitation – Phase 2; Soquel Village Sewer Rehabilitation – Phase 2; Townsend Area Sewer Rehabilitation; and the Arana Pump Station Relocation. Additionally, the Santa Cruz Harbor Transmission Main project will be a significant project when the City of Santa Cruz retrofits the Murray Street Bridge in the next couple of years.

Significant pipe rehabilitation/replacement projects recently completed include the Soquel Pump Station Force Main Replacement; 41$^{st}$ Avenue at Soquel Drive Sewer Rehabilitation; and Cliff Drive Area Sewer Rehabilitation. Together these projects installed approximately 11,040 linear feet of new sewer force main and 3,600 linear feet of gravity sewer main. The Soquel Pump Station project was completed. New pumps, programmable logic controllers (PLCs), and valves were purchased to replace aging equipment at various pump stations.

For a more in-depth study of the District's financial outlook, attached is the 2021/22 Revenue Study prepared by Hornberger Engineering, which includes a projection of revenue requirements through the year 2023/24 fiscal year.

Also attached is the District's budget for the 2021/22 fiscal year. This budget is based on the sewer service charge rates which were adopted by the District's Board on May 20, 2021. The budget has expected expenditures and contingencies of $55.0 million and reserves of $4.5 million for a total of $59.5 million. This includes expenditures of $23.3 million in operating expenses ($6.6 million of which is for the District's share of operating expenses at the City of Santa Cruz's wastewater treatment plant and ocean outfall), $1.5 million in loan payments, $3.2 million in wastewater capital improvement projects, and $27.0 million in construction improvement projects.



Cliff Drive Sewer Rehabilitation Project

# 2021-22 REVENUE STUDY

2021/22 thru 2025/26
CAPITAL IMPROVEMENT PROGRAM

SANTA CRUZ COUNTY SANITATION DISTRICT

# SANTA CRUZ COUNTY SANITATION DISTRICT

# 2021/22 REVENUE STUDY

**February 2021**

**Hornberger Engineering**
**San Jose, California**

2661 Thrasher Lane • San Jose, CA • 95125 • (408) 264-5029

February 18, 2021

Mr. Matt Machado, P.E.
District Engineer
Santa Cruz County Sanitation District
701 Ocean Street
Santa Cruz, CA 95060

Subject: Santa Cruz County Sanitation District
2021/22 Revenue Study

Dear Mr. Machado,

We are pleased to submit this three-year program of sewer service charges for the Santa Cruz County Sanitation District. The purpose of this study is to incorporate the latest costs associated with the District's projects and programs and to project revenue requirements for the years 2021/22 through 2023/24. The study is based on the projected capital costs, operation and maintenance expenses and customer information prepared by the District staff.

As a result of this study, the overall fee increase for fiscal year 2021/22 is 4.0%. Approximately two-thirds of this increase, or 2.6%, is due a significant reduction in nonresidential revenue in 2020. The remaining 1.6% is due to increased costs. Proposed fee increases for the individual user groups are shown in the following table.

We appreciate this opportunity to prepare this three-year program for the Santa Cruz County Sanitation District. Please do not hesitate to contact me if you have any questions or would like any additional information.

Sincerely,

Hornberger Engineering

Gary Hornberger

Gary Hornberger

2661 Thrasher Lane • San Jose, CA • 95125 • (408) 264-5029

## SANTA CRUZ COUNTY SANITATION DISTRICT
## PROPOSED 2021/22 FEE INCREASES

| User Group | Proposed 2021/22 Fees | | Existing 2020/21 Fees | | 2021/22 Increases |
|---|---|---|---|---|---|
| | Flat Fee ($/year) | Volume Fee ($/HCF) | Flat Fee ($/year) | Volume Fee ($/HCF) | Change (%) |
| Single Family | $880.92 | | $846.96 | | 4.0% |
| Townhomes & Condominiums | $762.48 | | $731.76 | | 4.2% |
| Multiple Family | $762.48 | | $731.76 | | 4.2% |
| Mobile Homes | $655.80 | | $628.20 | | 4.4% |
| Bakeries/Donut Shops | $372.48 | $12.01 | $351.36 | $12.10 | -0.1% |
| Restaurants/Catering | $372.48 | $12.01 | $351.36 | $12.10 | -0.1% |
| Food Processing | $372.48 | $13.74 | $351.36 | $13.95 | -1.4% |
| Funeral Parlor/Mortuary | $372.48 | $13.74 | $351.36 | $13.95 | |
| Other Businesses | $372.48 | $9.32 | $351.36 | $8.97 | 4.5% |
| Schools (Sr. High ADA Basis) (1) | $372.48 | $36.30 | $351.36 | $34.80 | 4.3% |
| Schools (Sr. High Usage Basis) | $372.48 | $9.05 | $351.36 | $8.68 | 4.3% |
| Schools (Elem. & Jr. High ADA Basis) (1) | $372.48 | $24.17 | $351.36 | $23.17 | 4.4% |
| Schools (Elem. & Jr. High Usage Basis) | $372.48 | $9.05 | $351.36 | $8.68 | 4.4% |
| Junior Colleges (2) | $372.48 | $31.96 | $351.36 | $30.63 | 4.3% |
| State Parks | $372.48 | $9.05 | $351.36 | $8.68 | 4.7% |
| Dominican Hospital | $372.48 | $9.66 | $351.36 | $9.36 | 3.2% |
| Chaminade | $372.48 | $12.13 | $351.36 | $12.13 | 0.0% |
| Overall Increase | | | | | 4.0% |

(1) Volume Rate = $/ADA/year
(2) Volume Rate = $/FTES/year

**SANTA CRUZ COUNTY SANITATION DISTRICT**
**2021/22 REVENUE STUDY**
**February 2021**

## Introduction

The Santa Cruz County Sanitation District will require approximately 4% to 5% annual increases in revenue from fees for sewer service in the next three fiscal years, 2021/22 through 2023/24. The overall fee increase for 2021/22 developed in this study is 4.0%. These increases are primarily related to the loss of nonresidential revenue, increased capital projects at the wastewater treatment plant operated by the City of Santa Cruz, the District's capital program and general inflation.

The District staff has reviewed connection charge revenue, capital outlay needs, operation and maintenance expenses, debt service and miscellaneous revenues for the next three fiscal years. Based on this updated information, proposed fees for sewer service in 2021/22 through 2023/24 have been calculated. The development of these fees is discussed in the following sections.

## Requirements for Sewer Service Fees

The District's fees for sewer service are subject to the requirements contained in the Revenue Program Guidelines issued by the California State Water Resources Control Board. This is a condition of the State and Federal grants and loans received by the District.

The Guidelines require that fees for sewer service be designed to recover adequate revenues for the operation and maintenance of the District's facilities. In addition, each user and user class must pay its proportional share of those costs, based on its proportional contribution to the total wastewater loadings from all users. The District's sewer service fees have been reviewed by the State staff and are in compliance with the Guidelines.

The District's fees are also subject to the requirements of Proposition 218. This proposition, passed in 1996, requires that fees shall not exceed the proportional cost of service attributable to any parcel.

## Customer Revenue

The projected revenue received for sewer service under the current 2020/21 fees has decreased by $708,000, as shown in Table 1. This is a combination of a $2,000 increase in residential revenue and a $710,000 decrease in nonresidential revenue. The most significant usage reductions in 2020 were for restaurants, which were down 29%, and Other Businesses, which were down 14%. This decrease in customer revenue has the effect of increasing the proposed 2021/22 sewer service fees by 2.6%.

**Table 1**
**Customer Revenue at Current 2020/21 Fees**

| Year | Residential Revenue ($/year) | Nonresidential Revenue ($/year) | Total Revenue ($/year) |
|---|---|---|---|
| 2020/21 | $22,859,000 | $4,893,000 | $27,752,000 |
| 2021/22 | $22,861,000 | $4,183,000 | $27,044,000 |
| Difference | $2,000<br>0.0% | ($710,000)<br>(14.5%) | ($708,000)<br>(2.6%) |

## Connection Charge Revenue

Actual connection charge revenue for the first seven months of 2020/21 was $139,000. Based on the current year, connection charge revenues of $200,000 annually have been projected for 2021/22 and 2022/23. An increase to $250,000 has been projected for the following years when the current moratorium is lifted.

## Capital Improvement Program Funding

Connection charge revenue and contributions from rates are used to fund the District's Capital Improvement Program projects that are not funded by loans or grants. The funding for 2021/22 is $5,498,000. This will be generated by $200,000 in connection charge revenue and $5,298,000 in sewer service fees. The funding for those projects in the three years of the study period is show in Table 2. The projects included in this program are listed in Table 3. Existing fund balances will be used for the additional costs of these projects.

## Table 2
## Capital Improvement Program Funding

| Item | Annual Capital Improvement Program Funding | | |
|---|---|---|---|
| | 2021/22 ($/year) | 2022/23 ($/year) | 2023/24 ($/year) |
| Connection Charge Revenue | $200,000 | $200,000 | $250,000 |
| Contribution from Rates | $5,298,000 | $3,942,000 | $3,494,000 |
| Capital Improvement Program Funding | $5,498,000 | $4,142,000 | $3,744,000 |

## Table 3
## District Funded Capital Improvement Program

| Project | 2021/22 | 2022/23 | 2023/24 |
|---|---|---|---|
| East Cliff, Portola, & Richmond Drives | $649,000 | | |
| Valencia Creek Sewer Relocation | | $371,393 | |
| Lower Rodeo Trunkline | | $325,000 | |
| Esplanade Pump Station | | | $400,000 |
| Pump Station Repair/Modifications (Rodeo PS) | | $1,032,200 | |
| Upper Rodeo Trunkline Replacement | | $1,100,000 | |
| East Cliff Trans. Main Replacement at Murray St. Bridge | $1,800,000 | | |
| Arana Trunkline | $500,000 | | |
| Cabrillo Park Sewer Replacement Project Phases 1 & 2 | | | $1,510,000 |
| D.A Porath Facility Improvements | $600,000 | $600,000 | $600,000 |
| Butterfly Habitat Management | $10,000 | $10,000 | $10,000 |
| Transmission Line Inspection | $100,000 | $100,000 | $100,000 |
| SCADA System Improvements | $150,000 | $150,000 | $150,000 |
| Pump Station Sewage Level Monitoring | $50,000 | $50,000 | $50,000 |
| Cathodic Protection | $100,000 | $100,000 | $100,000 |
| Road Repairs | $50,000 | $50,000 | $50,000 |
| 2021 Pipe Rehabilitation | $800,000 | | |
| Capitola Pump Station improvements | $200,000 | | |
| Aptos Esplanade PS Valve Replacements | | $400,000 | |
| Arana Pump Station | | $300,000 | $1,175,000 |
| Soquel Force Main Inspection | $20,000 | | |
| 2023 Pipe Rehabilitation | | | $1,000,000 |
| Contigencies | $300,000 | $300,000 | $300,000 |
| Total District Funded Capital Projects | $5,329,000 | $4,888,593 | $5,445,000 |

## Operation and Maintenance Expenses

The projected operation and maintenance expenses include treatment costs paid to the City of Santa Cruz and the District's expenses for pump station and collection line maintenance, engineering, source control and fixed assets.

As shown in Table 4, projected treatment expenses have decreased from those used in the 2020/21 fees. The District's share of treatment operations costs has increased by $141,000 due to inflation and a slight increase in the percentage of total operation expenses allocated to the District. The decrease in capital expenses allocated to the District is due a reduction of major capital improvement projects at the treatment plant in 2021/22. Significant increases in projects at the treatment plant are projected for the following two years. These projects are shown in Table 5. The District's 8/17 share of capital projects has decreased by $1,117,000. The total decrease in City treatment costs for 2020/21 is $976,000.

**Table 4**
**2020/21 City Treatment Expenses**

| Year | Operations ($/year) | Capital ($/year) | Total ($/year) |
|---|---|---|---|
| 2020/21 | $5,434,000 | $1,663,000 | $7,097,000 |
| 2021/22 | $5,575,000 | $546,000 | $6,121,000 |
| Difference | $141,000<br>2.6% | ($1,117,000)<br>(67.2%) | ($976,000)<br>(13.8%) |

As shown in Table 6, the District's O&M expense projections for the next fiscal year have decreased by $165,000 from those used in the 2020/21 fees. This includes increases of 1.8%, or $245,000, in operating costs and $410,000 decrease in routine capital expenses.

**Table 5**
**Treatment Plant Capital Improvement Program**

| Project | 2021/22 | 2022/23 | 202/24 |
|---|---|---|---|
| Equipment Replacement | $500,000 | $1,000,000 | $1,000,000 |
| Neary Mitigation CIP | $0 | $250,000 | $250,000 |
| Upgrade Digester Equipment (1) | ($200,000) | $500,000 | |
| Water Piping Rehabilitation | | | |
| WWTP Electrical System | $500,000 | $500,000 | |
| Modernize Lab | $300,000 | $500,000 | $500,000 |
| WWTP Infrastructure and Major Equipment | $500,000 | $1,500,000 | $4,000,000 |
| Total Treatment Plant Capital Projects | $1,600,000 | $4,250,000 | $5,750,000 |

(1) Project cost reduced from $500,000 in 2020/21 to $300,000 in 2021/22.

**Table 6**
**2020/21 District Operation and Maintenance Expenses**

| Year | Operations ($/year) | Capital ($/year) | Total ($/year) |
|---|---|---|---|
| 2020/21 | $13,377,000 | $1,755,000 | $15,132,000 |
| 2021/22 | $13,622,000 | $1,345,000 | $14,967,000 |
| Difference | $245,000<br>**1.8%** | ($410,000)<br>**(23.4%)** | ($165,000)<br>**(1.1%)** |

## Debt Service

The District currently has three projects funded by loans. These include $12 million for the Aptos Transmission Relocation Project and $5 million for the Soquel Creek, Pump Station Force Main, which are funded by State Revolving Fund (SRF) loans. The Capitola/Jewel Box Sewer project is funded by a $7 million California Infrastructure and Economic Development Bank (IBank) loan.

As developed in the ten-year financing plan, the District will apply for a series of low cost SRF and IBank loans to fund five additional projects over the study period, shown in Table 7. The projected interest rates are 0.9% for SRF loans and 2.50% for IBank loans with terms of 30 years.

In addition, the District will be participating in IBank loans for two projects at the treatment plant. These include a $3.5 million loan for the Ultraviolet System Replacement and a $20 million loan for the Electrical System Upgrade. The District will pay 8/17 of the debt service for those loans.

The proposed debt service for all the District's loans over the next three fiscal years is shown in Table 8.

**Table 7**
**District Loan Funded Capital Improvement Program**

| Project | 2021/22 | 2022/23 | 2023/24 |
|---|---|---|---|
| East Cliff, Portola, & Richmond Dr. (IBank) | $4,300,000 | | |
| Valencia Creek Sewer Relocation (SRF) | $2,154,000 | | |
| Upper Rodeo Gulch Trunkline (IBank) | | $7,750,000 | |
| Arana Trunkline (IBank) | $2,500,000 | | |
| Arena Pump Station (Ibank) | | | $3,700,000 |
| Total Loan Funded Projects | $8,954,000 | $7,750,000 | $3,700,000 |

**Table 8**
**District Debt Service**

| Item | Annual Debt Service | | |
|---|---|---|---|
| | 2021/22 ($/year) | 2022/23 ($/year) | 2023/24 ($/year) |
| SRF Loan - Aptos Transmission Project | $790,000 | $790,000 | $790,000 |
| SRF Loan - Soquel Creek Pump Station | $201,000 | $217,000 | $217,000 |
| SRF Loan - Valencia Creek Sewer Relocation | | $164,000 | $82,000 |
| IBank Loan - Capitola/Jewel Box | $405,000 | $404,000 | $403,000 |
| IBank Loans - Four New Projects | | $345,000 | $739,000 |
| Treatment Plant Ultraviolet System Replacement | $83,000 | $83,000 | $83,000 |
| Treatment Plant Electrical System Upgrade | | $212,000 | $475,000 |
| Total Debt Service | $1,479,000 | $2,215,000 | $2,789,000 |

## Revenue Trust Interest Income

The District uses the investment income received in the Revenue Trust Fund to fund a portion of its operating expenses every year. This reduces the total revenues required from fees for sewer service. Based on actual earnings, the projected annual interest income for 2021/22 and the following years is $120,000.

## Reserve Fund

The District's Reserve Fund will have a balance of $4,000,000 at the beginning of 2021/22. The District's plan is to continue annual increases of $100,000 over the next ten years, which will bring the balance to $4,300,000 by the end of 2023/24. This amount will be recovered annually in the sewer service fees.

## Total Revenues

Projected revenues required for 2021/22 through 2023/24 from fees for sewer service are shown in Table 9. The total revenue required in 2021/22 is $28,126,000, which will require an overall fee increase of $1,081,000 or 4.0%. The increase includes $708,000 for the loss of customer revenue (2.6%) and $373,000 for increased costs (1.4%).

**Table 9**
**Total Revenue Requirements**

| Item | 2021/22 ($/year) | 2022/23 ($/year) | 2023/24 ($/year) |
|---|---|---|---|
| Capital Improvement Funding | $5,298,000 | $3,942,000 | $3,494,000 |
| Debt Service | $1,479,000 | $2,215,000 | $2,789,000 |
| City Treatment | $6,121,000 | $7,852,000 | $8,769,000 |
| District O&M | $14,967,000 | $15,248,000 | $15,667,000 |
| Reserve Fund | $100,000 | $100,000 | $100,000 |
| Revenue Collection Expense | $281,000 | $295,000 | $310,000 |
| Interest Earnings | ($120,000) | ($120,000) | ($120,000) |
| Total Revenue Requirement | $28,126,000 | $29,532,000 | $31,009,000 |
| Fee Increase | 4.0% | 5.0% | 5.0% |

## Sewer Service Fees

The proposed 2021/22 fees for sewer service, based on decreased customer usage and total revenue requirements, are shown in Table 10. The overall 2021/22 fee increase is 4.0%. Residential increases are in the range of 4.0% to 4.4%.

Nonresidential fee increases vary based on customer size and strength of wastewater discharged. Restaurants, which have high strength wastewater, will have almost no increases. Pollutant costs are a significant portion of their fees and those costs are reduced as total City treatment costs have been reduced in 2021/22. Slight reductions for other high strength customers are similar. These customers will receive higher than average fee increases in the following years as treatment costs increase.

A three-year fee program for the study period is shown in Table 11. This table includes adopted fees since 1991/92 and proposed increases through 2023/24.

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**Table 10**
**Proposed 2021/22 Fees**

| User Group | Proposed 2021/22 Fees | | Existing 2020/21 Fees | | 2021/22 Increases | | |
|---|---|---|---|---|---|---|---|
| | Flat Fee ($/year) | Volume Fee ($/HCF) | Flat Fee ($/year) | Volume Fee ($/HCF) | Flat Fee ($/year) | Volume Fee ($/HCF) | Change (%) |
| Single Family | $880.92 | | $846.96 | | $33.96 | | 4.0% |
| Townhomes & Condominiums | $762.48 | | $731.76 | | $30.72 | | 4.2% |
| Multiple Family | $762.48 | | $731.76 | | $30.72 | | 4.2% |
| Mobile Homes | $655.80 | | $628.20 | | $27.60 | | 4.4% |
| Bakeries/Donut Shops | $372.48 | $12.01 | $351.36 | $12.10 | $21.12 | ($0.09) | -0.1% |
| Restaurants/Catering | $372.48 | $12.01 | $351.36 | $12.10 | $21.12 | ($0.09) | -0.1% |
| Food Processing | $372.48 | $13.74 | $351.36 | $13.95 | $21.12 | ($0.21) | -1.4% |
| Funeral Parlor/Mortuary | $372.48 | $13.74 | $351.36 | $13.95 | $21.12 | ($0.21) | |
| Other Businesses | $372.48 | $9.32 | $351.36 | $8.97 | $21.12 | $0.35 | 4.5% |
| Schools (Sr. High ADA Basis) | $372.48 | $36.30 | $351.36 | $34.80 | $21.12 | $1.50 | 4.3% |
| Schools (Sr. High Usage Basis) | $372.48 | $9.05 | $351.36 | $8.68 | $21.12 | $0.37 | 4.3% |
| Schools (Elem. & Jr. High ADA Basis) | $372.48 | $24.17 | $351.36 | $23.17 | $21.12 | $1.00 | 4.4% |
| Schools (Elem. & Jr. High Usage Basis) | $372.48 | $9.05 | $351.36 | $8.68 | $21.12 | $0.37 | 4.4% |
| Junior Colleges (FTES Basis) | $372.48 | $31.96 | $351.36 | $30.63 | $21.12 | $1.33 | 4.3% |
| State Parks | $372.48 | $9.05 | $351.36 | $8.68 | $21.12 | $0.37 | 4.7% |
| Dominican Hospital | $372.48 | $9.66 | $351.36 | $9.36 | $21.12 | $0.30 | 3.2% |
| Chaminade | $372.48 | $12.13 | $351.36 | $12.13 | $21.12 | $0.00 | 0.0% |
| Overall Increase | | | | | | | 4.0% |

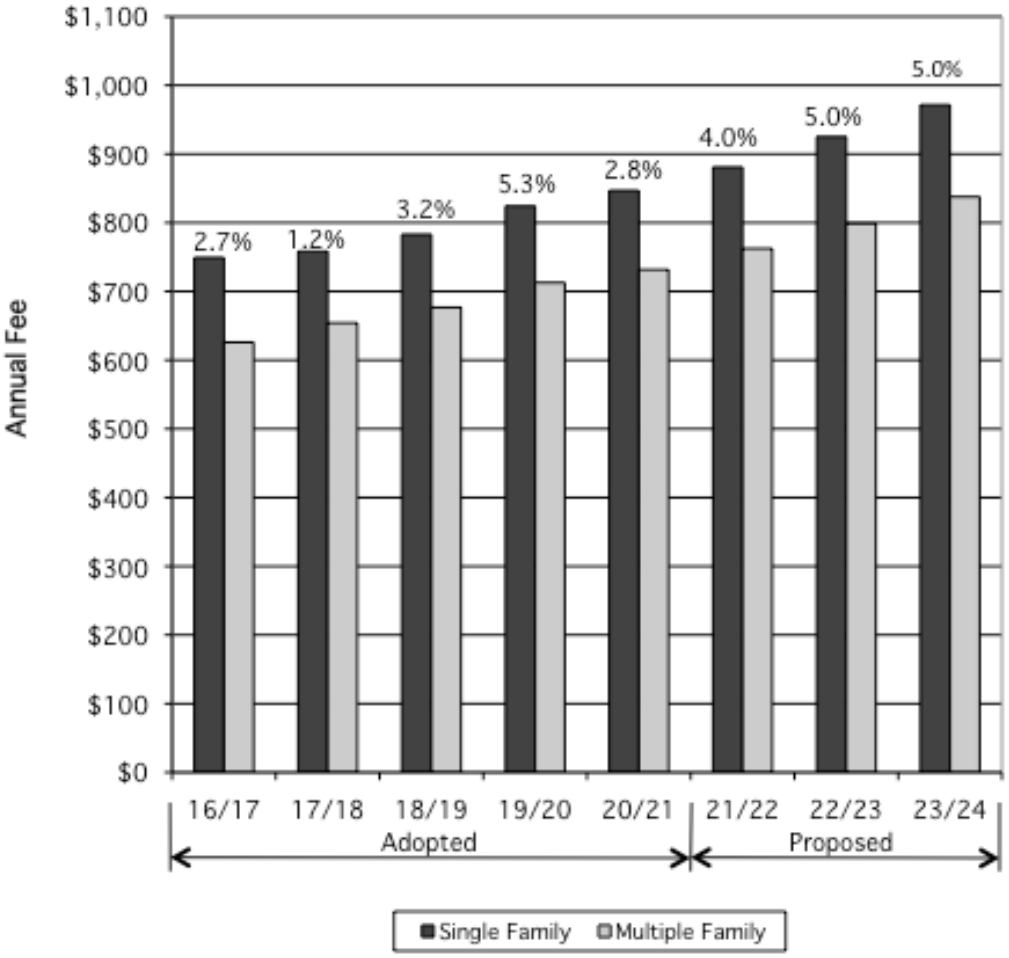
## Summary

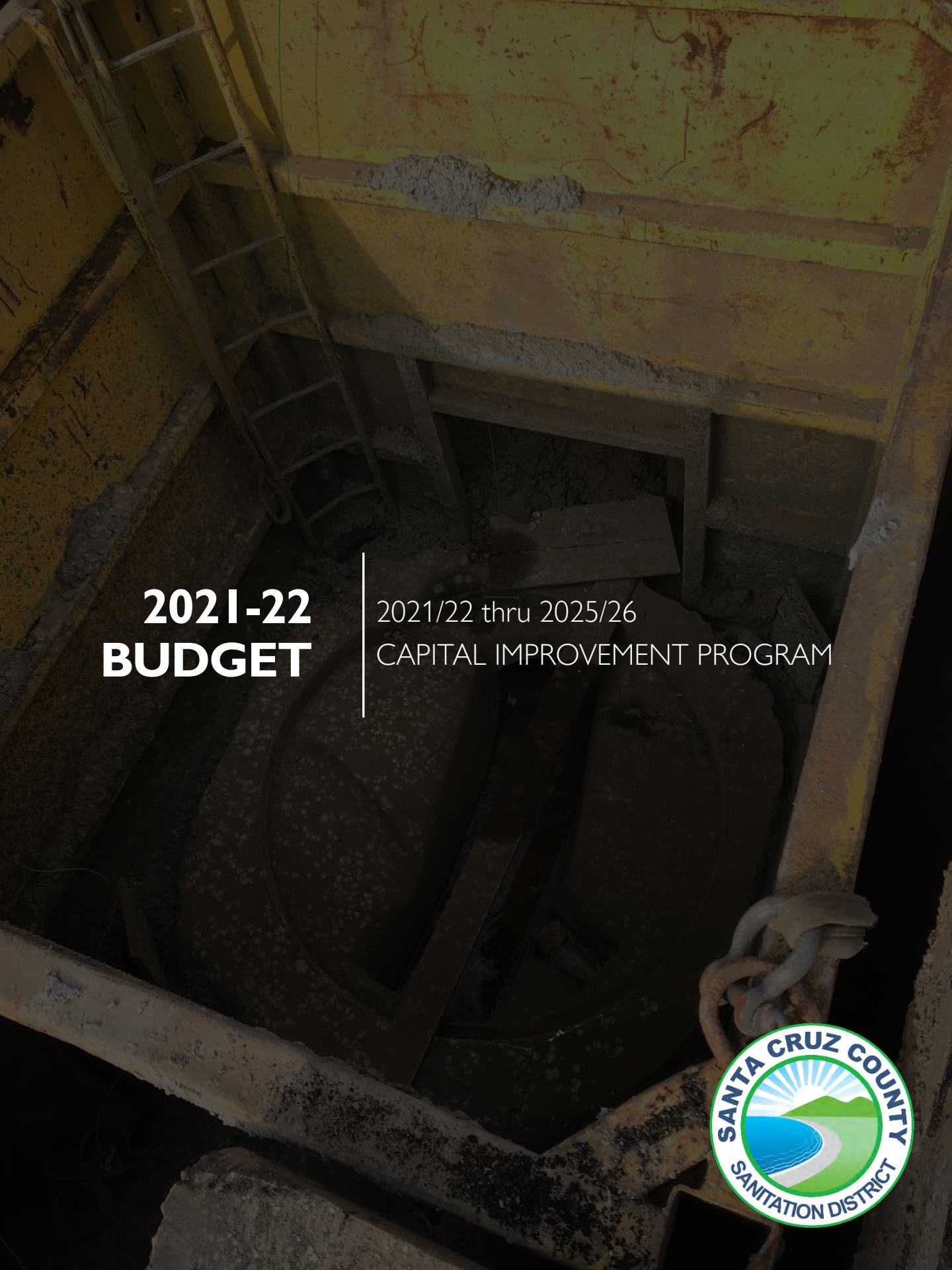
The overall projected increase in fees for sewer service for fiscal year 2021/22 is 4.0%. The annual increases for the following two years are 5.0%. These increases reflect reduced customer usage, additional debt service, treatment plant operating costs and capital improvements and District operating costs and capital improvements. The proposed single family and multiple family annual fees are shown in Figure 1. Future fee increases are dependent upon the magnitude of treatment and collection operating costs, general inflationary trends, interest rates and customer usage.

## Table 11
## Three-Year Fee Program

| Fiscal Year | Average Increase | | | | | |
|---|---|---|---|---|---|---|
| | Single Family | Multiple Family | Mobile Home | Average Other Business | Average Restaurant | Elementary School |
| | 5.2 HCF/mo. | 4.2 HCF/mo. | 3.3 HCF/mo. | 12 HCF/mo. | 44 HCF/mo. | 632 HCF/yr. |
| Adopted | | | | | | |
| 1991/92 | 27.1% | 23.9% | 23.9% | | | |
| 1992/93 | 4.2% | 13.5% | 13.5% | 4.5% | 8.2% | 0.4% |
| 1993/94 | 22.4% | 35.7% | 35.7% | 25.9% | 30.3% | 19.4% |
| 1994/95 | 5.6% | 5.4% | 5.4% | 5.9% | 9.5% | 5.5% |
| 1995/96 | 5.3% | 5.7% | 5.7% | 5.5% | -1.1% | 5.9% |
| 1996/97 | 4.4% | 4.3% | 4.3% | 3.5% | 9.6% | -25.8% |
| 1997/98 | 3.1% | 2.1% | 2.1% | 2.6% | 12.5% | -2.0% |
| 1998/99 | 2.9% | 3.3% | 3.3% | 2.6% | 2.2% | 1.7% |
| 1999/00 | 2.9% | 3.3% | 3.3% | 3.2% | 0.3% | 2.1% |
| 2000/01 | 4.7% | 3.9% | 3.9% | 4.9% | 7.9% | 6.3% |
| 2001/02 | 3.3% | 3.0% | 3.0% | 3.8% | 4.7% | 4.0% |
| 2002/03 | 9.8% | 20.6% | -5.4% | -1.1% | -2.3% | -1.1% |
| 2003/04 | 4.1% | 4.1% | 4.0% | 4.6% | 3.4% | 5.1% |
| 2004/05 | 4.9% | 5.1% | 5.3% | 4.6% | 3.7% | 4.3% |
| 2005/06 | 3.7% | 1.2% | 6.8% | 5.7% | 1.6% | 4.9% |
| 2006/07 | 2.3% | 2.3% | 2.5% | 2.2% | -1.1% | 2.7% |
| 2007/08 | 3.2% | 2.9% | 2.6% | 3.1% | 6.5% | 3.2% |
| 2008/09 | 1.3% | 0.9% | 2.5% | 7.2% | 10.0% | 7.8% |
| 2009/10 | 5.2% | 5.1% | 5.0% | 5.0% | 4.3% | -30.6% |
| 2010/11 | 4.2% | 4.0% | 4.0% | 3.9% | 5.5% | 4.3% |
| 2011/12 | 1.6% | 3.9% | 4.3% | 11.0% | 10.7% | 10.6% |
| 2012/13 | 3.7% | 3.7% | 3.7% | 3.4% | 2.0% | 4.0% |
| 2013/14 | 2.7% | 2.8% | 2.9% | 2.0% | 2.6% | 2.0% |
| 2014/15 | 0.2% | 1.5% | 3.9% | 8.3% | 9.9% | 8.2% |
| 2015/16 | 4.8% | 4.9% | 5.0% | 2.3% | 1.3% | 2.4% |
| 2016/17 | 2.7% | 2.7% | 2.7% | 3.1% | 1.1% | 3.9% |
| 2017/18 | 1.2% | 4.5% | 3.6% | 8.7% | 7.2% | 9.3% |
| 2018/19 | 3.3% | 3.5% | 3.7% | 5.2% | 0.7% | 3.4% |
| 2019/20 | 5.3% | 5.3% | 5.4% | 5.2% | 2.0% | 5.7% |
| 2020/21 | 2.8% | 2.7% | 2.6% | 1.3% | 2.2% | 2.4% |
| Proposed | | | | | | |
| 2021/22 | 4.0% | 4.2% | 4.4% | 4.3% | -0.4% | 4.4% |
| 2022/23 | 5.0% | 4.8% | 4.4% | 4.5% | 10.7% | 4.3% |
| 2023/24 | 5.0% | 4.9% | 4.7% | 4.8% | 7.5% | 4.7% |

**Figure 1**
**Annual Residential Fees**





# 2021-22 BUDGET

2021/22 thru 2025/26
CAPITAL IMPROVEMENT PROGRAM

SANTA CRUZ COUNTY SANITATION DISTRICT

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SANTA CRUZ COUNTY SANITATION DISTRICT
701 OCEAN STREET, SUITE 410 · SANTA CRUZ, CA · 95060-4073
(831) 454-2160 · FAX (831) 454-2089 · TDD: (831) 454-2123 · WWW.SCCSD.US
MATT MACHADO, DISTRICT ENGINEER

AGENDA DATE: OCTOBER 21, 2021

BOARD OF DIRECTORS
SANTA CRUZ COUNTY SANITATION DISTRICT
701 Ocean Street, Room 410
Santa Cruz, California 95060

SUBJECT: ADOPTION OF 2021-22 FINAL BUDGET

Members of the Board:

Attached is the Santa Cruz County Sanitation District Final Budget for the 2021-22 fiscal year. This budget has been adjusted to include the fiscal year 2020-21 year-end revenues, expenditures and fund balances.

Minor adjustments from the Proposed Budget, presented to the Board in June, to the Final Budget, were made based on year-end expenditure data for the 2020-21 fiscal year. Significant adjustments are summarized in the following tables.

**625175 OPERATING FUND – FIXED ASSETS (50/175)**

| BUDGET NO. | ITEM | 2020-21 ADOPTED | 2020-21 ACTUAL | 2021-22 RECOMMENDED | 2021-22 ADOPTED | EXPLANATION |
|---|---|---|---|---|---|---|
| 53246 | Motorized Valves | $300,000 | $0 | $300,000 | $407,761 | 2020-21 valve purchases will be paid for in this fiscal year. |
| 53357 | PLC Upgrade | $100,000 | $0 | $200,000 | $282,260 | 2020-21 PLC purchases will be paid for in this fiscal year. |
| 53358 | VFD Replacements | $200,000 | $0 | $150,000 | $289,471 | 2020-21 VFD purchases will be paid for in this fiscal year. |
| 53359 | Pumps | $400,000 | $0 | $0 | $228,246 | 2020-21 pump purchases will be paid for in this fiscal year. |
| 53361 | PS Grinders | $165,000 | $0 | $150,000 | $418,536 | 2020-21 grinder purchases will be paid for in this fiscal year. |
| 53292 | Fleet Pickups | $0 | $53,822 | $80,000 | $230,000 | Additional trucks are needed for Operations staff. |
| 53293 | Ford F250 Pickups | $269,851 | $176,448 | $0 | $107,413 | 2020-21 truck purchase will be paid for in this fiscal year. |
| 53354 | Flush Truck Reel | $40,000 | $0 | $0 | $40,000 | 2020-21 flush truck reel purchase will be paid for in this fiscal year. |

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**136409 SCCSD CONSTRUCTION IMPROVEMENT FUND (50/185)**

| BUDGET NO. | ITEM | 2020-21 ACTUAL | 2021-22 RECOMMENDED | 2021-22 ADOPTED | EXPLANATION |
|---|---|---|---|---|---|
| 53601 | Rio Sands Sewer Rehab | $3,154 | $440,000 | $665,000 | This increase is due to increases in construction costs and better understanding of the project scope. |
| 53602 | Cliff Drive Sewer Trench Repair | $338,533 | $630,000 | $570,000 | This decrease is due to the project being completed with only minimal change orders. |
| 53603 | Eddy Lane Sewer Relocations | $5,015 | $435,000 | $880,000 | This increase is due to added scope due to deteriorated sewers in the project area. |
| 53604 | Rodriquez Street Sewer Rehabilitation | $4,678 | $800,000 | $660,000 | This decrease is due to a portion of the sewer main work being completed as part of a separate project. |
| 53812 | Minor Projects | $39,257 | $309,314 | $717,552 | Additional fund balance in 2020-21 allows an increase here for any small or emergency projects that may arise this fiscal year. |
| 53817 | Consulting Engineering Services | $67,949 | $400,000 | $967,848 | This increase is due to a contract budgeted in 2020-21 that will be paid out in this fiscal year. |
| 53824 | Cabrillo Park Sewer Replacement | $474,955 | $0 | $188,953 | This increase is due to a design contract for the Phase 2 project budgeted in 2020-21 that will be paid out in this fiscal year. |
| 53854 | 2021 Pipe Rehabilitation | $1,461 | $1,160,000 | $1,000,000 | This decrease is due to the actual bid price for the project being lower than anticipated. |
| 53881 | East Cliff, Portola & Richmond Drives Sewer Replacement | ($1,123) | $4,949,000 | $5,345,696 | This increase is due to added scope due to deteriorated sewers in the project area. |
| 53892 | Arana Trunkline Replacement | $339,437 | $3,000,000 | $3,188,326 | This increase is due to design work contracted in 2020-21 that will be paid out in this fiscal year. |

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It is therefore recommended that the Board of Directors take the following actions:

1. Approve the 2021-22 Final Budget as presented; and

2. Adopt the attached resolution adopting the Final Budget.

Yours truly,

DocuSigned by:
[signature]
5BBA0C4145C45C...

MATT MACHADO
District Engineer

AT:tlp/B2360.docx

Attachments:
Resolution Adopting Final Budget
Final 2021-22 Budget
Board letter of May 20, 2021

Copy to:
Mark Dettle, Director, City of Santa Cruz, Public Works
Auditor Controller
Business Services

Adopted by the Board of Directors, SCCSD on October 21, 2021

ATTEST: [signature]
Secretary

DocuSign Envelope ID: B0850895-F9C8-45BB-ADA0-F1D0D01668C7

BEFORE THE BOARD OF DIRECTORS
OF THE SANTA CRUZ COUNTY SANITATION DISTRICT
SANTA CRUZ COUNTY, CALIFORNIA

RESOLUTION NO. 21-10

On the motion of Director STOREY duly seconded by Director FRIEND the following resolution is adopted:

RESOLUTION ADOPTING FINAL BUDGET

WHEREAS, the Board of Directors of the Santa Cruz County Sanitation District held a public hearing on its proposed budget on June 10, 2021, after duly published notice, and

WHEREAS, said hearings have been terminated, during which time all additions and deletions to the proposed budget for 2021-22 were made or authorized, and

NOW THEREFORE, IT IS HEREBY RESOLVED the final budget of the Santa Cruz County Sanitation District for which the Board of Directors is the governing board, for the fiscal year 2021-22 be and is hereby adopted by reference to the attached final budget.

BE IT FURTHER RESOLVED that the District Engineer is authorized, as follows, to approve changes in equipment classification of fixed asset acquisitions as to quantity, type, and cost as long as the original total budget unit amounts approved by the Board of Directors are not exceeded:

1. Substitution or other items shall be limited to items of original appropriation of $1,000 or less with a substitution cost not to exceed a unit cost of $1,000.

2. Original items unit cost can be increased up to 15 percent provided that appropriation savings are available within the expenditure subobject. Changes in items costing more than that will continue to be approved by the Board of Directors regardless of amount.

BE IT FURTHER RESOLVED that the means of financing the expenditure programs will be by monies derived from revenue to accrue and fund balance available, and they are attached hereto and made a part hereof (on file with the District Secretary).

PASSED AND ADOPTED by the Board of Directors of the Santa Cruz County Sanitation District this 21st day of October, 2021, by the following vote:

AYES: DIRECTORS STOREY AND FRIEND
NOES: NONE
ABSENT: DIRECTORS KOENIG AND BERTRAND

DocuSigned by:
Zach Friend
2C437165727F4FD...
Vice Chairperson of said Board

ATTEST: _____
Deputy Secretary of said Board

Approved as to Form:
DocuSigned by:
Justin Graham
40E85ACDEDAB42D...
District Counsel

Distribution: Auditor-Controller; Business Services; Sanitation Engineer

State of California )
County of Santa Cruz )

I the undersigned Secretary of the Board of Directors of the Santa Cruz County Sanitation District, County of Santa Cruz, State of California, do hereby certify that the foregoing is a true and correct copy of an resolution passed and adopted by said Board and entered in the Minutes of said Board.

In witness whereof, I have hereunto set my hand and affixed the seal of the said Board on October 25, 2021

Signed: _____

# SANTA CRUZ COUNTY SANITATION DISTRICT

## 2021-22 FINAL BUDGET



625175 SCCSD OPERATING FUND (50/175)

The Operating Fund is responsible for funding the expenses for the general operations of the District. No sewer connection fee revenue can be used to fund these operations pursuant to State guidelines.

| | | | | 19/20 | 20/21 | 21/22 | 21/22 | |
|---|---|---|---|---|---|---|---|---|
| EXPENDITURES: | | | | Actual | Actual | Recommended | Adopted | % Change |
| P53173 | 62330 | SCCSD-Sewage Treatment - City Of Santa Cruz | Engr | 5,195,313 | 8,284,813 | 6,600,000 | 6,600,000 | 0% |
| **Maintenance and Operations:** | | | | | | | | |
| P53107 | 62330 | Public Outreach | Opns | 83,201 | 60,138 | 55,700 | 55,700 | 0% |
| P53110 | 62330 | Permit Reviews | Opns | 23,904 | 18,450 | 6,510 | 6,510 | 0% |
| P53113 | 62330 | Spill Response-Private Prop | Opns | 16,163 | 7,185 | 10,000 | 10,000 | 0% |
| P53115 | 62330 | Spill Response-Main Sewer Spill | Opns | 117,755 | 4,528 | 30,000 | 30,000 | 0% |
| P53128 | 62330 | Pump Stations | Opns | 1,961,728 | 1,997,982 | 2,040,000 | 2,040,000 | 0% |
| P53130 | 62330 | Collection System | Opns | 2,304,307 | 1,931,652 | 2,549,336 | 2,549,336 | 0% |
| P53132 | 62330 | East Cliff Facility | Opns | 1,767,404 | 1,571,692 | 1,695,013 | 1,695,013 | 0% |
| P53133 | 62330 | Electrical | Opns | 1,782,260 | 1,648,274 | 1,800,000 | 1,800,000 | 0% |
| P53136 | 62330 | Sulfide Control | Opns | 1,155,776 | 1,504,594 | 1,550,000 | 1,550,000 | 0% |
| P53138 | 62330 | Utilities | Opns | 716,402 | 667,586 | 750,000 | 750,000 | 0% |
| P53140 | 62330 | Tree Trimming | Opns | 45,869 | 70,384 | 110,000 | 110,000 | 0% |
| P53142 | 62330 | Source Control Lab Work | Opns | 17,669 | 23,504 | 35,000 | 35,000 | 0% |
| P53174 | 62330 | Source Control Program | Opns | 560,295 | 477,487 | 506,389 | 506,389 | 0% |
| P53190 | 62330 | Infiltration/Inflow Reduction | Both | 4,873 | - | - | - | 0% |
| P53193 | 62330 | Green Business Program | Opns | 40,443 | 87,863 | 120,000 | 120,000 | 0% |
| P53194 | 62330 | Operations Lab Work | Opns | 6,812 | 20,375 | 27,000 | 27,000 | 0% |
| P53195 | 62330 | Annual Cathodic Protection Testing & Repairs | Opns | 13,710 | 16,005 | 53,923 | 53,923 | 0% |
| P53198 | 62330 | Permit Fees | Opns | 44,823 | 41,569 | 46,000 | 46,000 | 0% |
| P53342 | 62330 | Hidden Beach Pump Station Recovery | Opns | 83,155 | - | - | - | 0% |
| P53343 | 62330 | Soquel Pump Station Recovery | Opns | 9,747 | - | - | - | 0% |
| P53344 | 62330 | East Cliff Emergency Repair | Opns | 24,132 | - | - | - | 0% |
| P53346 | 62330 | PSPS Response (PG&E) | Opns | 53,829 | - | - | - | 0% |
| P53352 | 62330 | M&O Training | Opns | - | - | 25,000 | 25,000 | 0% |
| P53363 | 62330 | Tranmission Line Inspection | Opns | 358,579 | 81,585 | - | - | 0% |
| P53364 | 62330 | heat-related power outages | Opns | 358,579 | 15,621 | - | - | 0% |
| **Engineering:** | | | | | | | | |
| Various | 62330 | Permit Reviews | Engr | 6,489 | 7,350 | - | - | 0% |
| P53259 | 62330 | SCCSD Encroachment Permits | Engr | 8,128 | 2,677 | 7,500 | 7,500 | 0% |
| P53164 | 62330 | General Engineering | Engr | 1,695,264 | 1,631,493 | 1,834,000 | 1,834,000 | 0% |
| P53168 | 62330 | Service Charge Administration | Engr | 30,640 | 15,039 | 50,000 | 50,000 | 0% |
| **Salaries and Wages:** | | | | | | | - | |
| P53102 | 62330 | Salaries-Secretaries | Engr | 194,469 | 224,030 | 263,353 | 263,353 | 0% |
| P53104 | 62330 | Salaries-Directors | Engr | 4,427 | 6,075 | 5,000 | 5,000 | 0% |
| **Miscellaneous:** | | | | | | | - | |
| P53105 | 62330 | Printing & Mailing | Engr | 21,554 | 23,199 | 26,000 | 26,000 | 0% |
| P53106 | 62330 | Office Expenses | Engr | 13,273 | 14,460 | 11,200 | 11,200 | 0% |
| P53108 | 62330 | Telephone & Communications | Engr | 21,613 | 35,892 | 22,000 | 22,000 | 0% |
| P53170 | 62330 | Accounting & Audit Fees | Engr | 16,479 | 6,674 | 16,000 | 16,000 | 0% |
| P53178 | 62330 | Legal Costs & Fees | Engr | 97,206 | 82,587 | 130,000 | 130,000 | 0% |
| P53171 | 62330 | IRWM Coordination | Engr | - | 11,250 | 11,250 | 11,250 | 0% |
| P53188 | 62330 | Codification Of Ordinances | Engr | 1,409 | - | 7,500 | 7,500 | 0% |
| P53165 | 62330 | SSMP | Opns | - | - | 12,000 | 12,000 | 0% |
| P53196 | 62330 | Revenue Study | Engr | 16,685 | 16,538 | 30,000 | 30,000 | 0% |
| **Computers:** | | | | | | | - | |
| P53180 | 62330 | Systems & Programming | MIS | 68,649 | 29,777 | 50,000 | 50,000 | 0% |
| P53186 | 62330 | Computers-Software | MIS | 85,943 | 76,395 | 120,000 | 120,000 | 0% |
| P53192 | 62330 | Computers-Facility Computer Mapping | MIS | 26,486 | 65,950 | 60,000 | 60,000 | 0% |
| **Routine Equipment Repair & Replacement:** | | | | | | | - | |
| P53152 | 62330 | East Cliff Pump Station and Line Equip | Opns | 175,342 | 109,811 | 200,000 | 200,000 | 0% |
| **Fixed Assets:** | | | | | | | - | |
| See Pg2 | 86204 | Equipment | | 207,979 | 70,840 | 945,000 | 1,771,274 | 87% |
| See Pg2 | 86209 | Mobile Equipment | | 194,603 | 732,751 | 280,000 | 577,413 | 106% |
| **Contingencies:** | | | | | | | - | |
| P53499 | 98700 | Contingencies | | - | - | 50,000 | 50,000 | 0% |
| TOTAL EXPENDITURES | | | | 19,274,785 | 21,694,076 | 22,140,674 | 23,264,362 | 5% |
| SOURCE OF FUNDS: | | | | | | | | |
| | 34400 | Fund Balance | | (283,613) | 2,375,342 | - | 786,488 | 0% |
| | 41322 | Plan Checking Fees | | 12,837 | 30,373 | 5,000 | 5,000 | 0% |
| | 42047 | Other Charges Current Services | | 32,485 | 32,303 | 3,000 | 3,000 | 0% |
| | 42384 | Other Revenues, Transfers and Adjustments | | - | 1,400 | 1,000 | 1,000 | 0% |
| | 42462 | Transfer from Revenue Trust | | 19,629,377 | 19,929,446 | 22,131,674 | 22,468,873 | 2% |
| AVAILABLE FUNDS | | | | 19,391,087 | 22,368,864 | 22,140,674 | 23,264,362 | 5% |

Engr = Engineering
Opns = Operations
Both = Engineering & Operations
MIS = Management Information Services

625175 SCCSD OPERATING FUND - SCHEDULE OF FIXED ASSETS

| | | Equipment | | | 19/20 Actual | 20/21 Actual | 21/22 Recommended | 21/22 Adopted |
|---|---|---|---|---|---|---|---|---|
| P53226 | 86204 | Emergency Diesel Generators (4) | R | Opns | 971 | - | 80,000 | 80,000 |
| P53240 | 86204 | Network Equipment | R | MIS | 15,464 | - | 20,000 | 20,000 |
| P53246 | 86204 | Motorized Valves | N | Opns | 156,863 | - | 300,000 | 407,761 |
| P53256 | 86204 | Radios | R | Opns | - | - | 10,000 | 10,000 |
| P53258 | 86204 | Cameras -TV'ing Sewer Mains | R | Opns | 34,681 | 36,095 | - | - |
| P53267 | 86204 | Mixers | R | Opns | - | 34,746 | - | - |
| P53356 | 86204 | Flowmeter Replacements | R | Opns | - | - | 35,000 | 35,000 |
| P53357 | 86204 | PLC Upgrades | R | Opns | - | - | 200,000 | 282,260 |
| P53358 | 86204 | VFD Replacements | R | Opns | - | - | 150,000 | 289,471 |
| P53359 | 86204 | Pumps | R | Opns | - | - | - | 228,246 |
| P53361 | 86204 | PS Grinders | R | Opns | - | - | 150,000 | 418,536 |
| Subtotal | | | | | 207,979 | 70,840 | 945,000 | 1,771,274 |
| | | | | | | | | |
| Mobile Equipment | | | | | | | | |
| P53293 | 86209 | Ford F250 Pickups | R | Opns | 43,067 | 176,448 | - | 107,413 |
| P53299 | 86209 | Dump Truck | R | Opns | 151,537 | - | - | - |
| P53282 | 86209 | 4WD Truck | R | Opns | - | 61,481 | - | - |
| P53285 | 86209 | Truck(s) with Boom | R | Opns | | - | 200,000 | 200,000 |
| P53292 | 86209 | Fleet Pickups | R | Engr | - | 53,822 | 80,000 | 230,000 |
| P53279 | 86209 | Combonation Vacuum Truck | N | Opns | - | 406,105 | - | - |
| P53353 | 86209 | Fleet - Vehicle | R | Opns | - | 34,895 | - | - |
| P53354 | 86209 | Flush Truck Reel | R | Opns | - | - | - | 40,000 |
| Subtotal | | | | | 194,603 | 732,751 | 280,000 | 577,413 |
| | | | | | | | | |
| TOTAL | | | | | 402,582 | 803,592 | 1,225,000 | 2,348,687 |

N = New
R = Replacement
E = Existing

625195 SCCSD WASTEWATER CAPITAL IMPROVEMENT FUND (50/195)

The Wastewater Capital Improvement fund is required by the provisions of the Clean Water Grants we accepted to build the East Cliff and Aptos Transmission Projects. The fund receives cash, which represents the depreciation on the facilities constructed with Clean Water grant funds. These funds are accumulated so that the facilities can be repaired or reconditioned to insure continued use.

| | | | | 19/20 | 20/21 | 21/22 | 21/22 | |
|---|---|---|---|---|---|---|---|---|
| EXPENDITURES: | | | | Actual | Actual | Recommended | Adopted | % Change |
| P54002 | 86110 | DA Porath - Facility Improvements | Opns | 32,653 | 177,901 | 1,473,000 | 1,474,229 | 0% |
| P54004 | 86110 | DA Porath - Butterfly Habitat Plan | Engr | - | - | 10,000 | 10,000 | 0% |
| P54005 | 86110 | Transmission Line Inspection | Both | 338,520 | - | 200,000 | 200,000 | 0% |
| P54018 | 86110 | Flow Meter Replacement & Repairs | Opns | (1,737) | - | - | - | 0% |
| P54023 | 86110 | SCADA System Improvements | Opns | - | 144,348 | 150,000 | 150,000 | 0% |
| P54038 | 86110 | Pump Station Sewage Level Monitoring Imprvmnt | Opns | - | - | 50,000 | 50,000 | 0% |
| P54041 | 86110 | Concrete Repairs at Various Pump Stations | Engr | 25,526 | (10,073) | - | 4,759 | 0% |
| P54046 | 86110 | Hidden Beach Pump Station Manhole Rehabilitation | Engr | 53,572 | - | - | - | 0% |
| P54048 | 86110 | Santa Cruz Harbor Transmission Main Rehabilitation | Engr | 284,357 | 129,787 | 1,100,000 | 1,215,323 | 10% |
| P54051 | 86110 | Soquel Pump Station Force Main Replacement | Engr | 4,929,402 | 2,450,333 | - | 123,742 | 0% |
| P54054 | 86110 | Wet Weather Retention Basin | Engr | - | 554 | - | - | 0% |
| P54058 | 86110 | Capitola / Jewel Box Sewer Improvements | Engr | 7,906 | 3,082 | - | - | 0% |
| P54059 | 86110 | Hidden Beach Way Sewer Extension | Engr | 328 | - | - | - | 0% |
| P54062 | 86110 | E. Cliff Trans Secondary Forcemain Feasibility Study | Engr | 4,534 | 1,009 | - | - | 0% |
| P54099 | 86110 | Wastewater Capital Reserves | Engr | (16,497) | - | 200,000 | 200,000 | 0% |
| P54101 | 86110 | DA Porath Modular Building | Engr | - | 322,340 | - | - | 0% |
| P54102 | 86110 | Soquel Force Main Building | Engr | - | - | 20,000 | 20,000 | 0% |
| P54050 | 90000 | Operating Transfer out to Const Imp Fund | Engr | - | - | - | - | 0% |
| TOTAL EXPENDITURES | | | | 5,658,563 | 3,219,282 | 3,203,000 | 3,448,053 | 8% |
| | | | | | | | | |
| SOURCE OF FUNDS: | | | | | | | | |
| | 34400 | Fund Balance | | 2,414,399 | 2,364,398 | 1,253,474 | 1,288,619 | 3% |
| | 40877 | SWRCB Prop 84 - Soquel P.S. (P54051) | | 1,160,140 | 514,482 | | 302,109 | 0% |
| | 42506 | Loan Proceeds - Soquel P.S. (P54051) | | 2,634,637 | 1,625,319 | | 740,044 | 0% |
| | 42462 | Transfer from Revenue Trust Fund | | 1,813,785 | 3,703 | 1,949,526 | 1,117,281 | -43% |
| AVAILABLE FUNDS | | | | 8,022,961 | 4,507,902 | 3,203,000 | 3,448,053 | 8% |

136409 SCCSD CONSTRUCTION IMPROVEMENT FUND (50/185)

The Construction Improvement Fund was established to construct needed improvements in the District.

| | | | | 19/20 | 20/21 | 21/22 | 21/22 | |
|---|---|---|---|---|---|---|---|---|
| EXPENDITURES: | | | | Actual | Actual | Recommended | Adopted | % Change |
| P53600 | 86110 | Bennett Rd Sewer Rehab | Engr | - | 67,494 | - | - | 0% |
| P53601 | 86110 | Rio Sands Sewer Rehab | Engr | - | 3,154 | 440,000 | 665,000 | 51% |
| P53602 | 86110 | Cliff Drive Sewer Trench Rep | Engr | - | 338,553 | 630,000 | 570,000 | -10% |
| P53603 | 86110 | Eddy Lane Sewer Relocations | Engr | - | 5,015 | 435,000 | 880,000 | 102% |
| P53604 | 86110 | Rodriguez Street Sewer Rehab | Engr | - | 4,678 | 800,000 | 660,000 | -18% |
| P53802 | 86110 | Pump Station Repair/Modifications | Opns | 98,876 | 131,919 | - | - | 0% |
| P53803 | 86110 | Jewel Box Sewer Replacement | Engr | 4,632,517 | (62,177) | - | - | 0% |
| P53804 | 86110 | Cathodic Protection Construction | Opns | - | - | 100,000 | 100,000 | 0% |
| P53809 | 86110 | Arana P.S. Reconstruction | Engr | 37,916 | 7,711 | - | - | 0% |
| P53810 | 86110 | Schwan Pump Station Generator Room | Engr | 375,924 | 34,625 | - | - | 0% |
| P53811 | 86110 | 2019 Pipe Rehabilitation | Engr | 948,585 | - | - | - | 0% |
| P53826 | 86110 | 2020 Pipe Rehabilitation | Engr | 21,606 | 1,736,234 | - | - | 0% |
| P53812 | 86110 | Minor Projects | Engr | 281,695 | 39,257 | 309,314 | 717,552 | 132% |
| P53813 | 86110 | Electrical Panel Upgrades At Various Pump Stations | Opns | - | 119,250 | - | - | 0% |
| P53816 | 86110 | Arana Trunkline Emergency Repair | Engr | 973 | 9,064 | - | - | 0% |
| P53817 | 86110 | Consulting Engineering Services | Engr | (11,544) | 67,949 | 400,000 | 967,848 | 142% |
| P53824 | 86110 | Cabrillo Park Sewer Replacement | Engr | 198,391 | 474,955 | - | 188,953 | 0% |
| P53827 | 86110 | Lower Rodeo Trunkline | Engr | 1,069 | 123 | 5,400,000 | 5,400,000 | 0% |
| P53829 | 86110 | Rio Del Mar Sewer Rehabilitation | Engr | 8,570 | 663,458 | - | - | 0% |
| P53831 | 86110 | East SC Harbor Sewer Rehab | Engr | 4,585 | 152,968 | - | - | 0% |
| P53832 | 86110 | Mansfield St. Sewer Emergency | Engr | 4,824 | - | - | - | 0% |
| P53837 | 86110 | Cliff Dr. Area Sewer Rehab | Engr | 2,338 | 1,172,163 | - | - | 0% |
| P53840 | 86110 | Road/Trench Repairs | Engr | - | 2,003 | 50,000 | 50,000 | 0% |
| P53842 | 86110 | Capitola Avenue - Beverly to Bay | Engr | 772,938 | 239,568 | - | - | 0% |
| P53845 | 86110 | Cliff Drive Emergency Repair | Engr | 421,568 | - | - | - | 0% |
| P53846 | 86110 | Ewell Ave Manhole Replacement | Engr | - | 11,610 | - | - | 0% |
| P53850 | 86110 | Seascape Golf Man Hole Relocate | Engr | 4,288 | 389,663 | - | - | 0% |
| P53853 | 86110 | 41St @ Soquel Dr Sewer Rehab | Engr | 1,368 | 905,051 | - | - | 0% |
| P53854 | 86110 | 2021 Pipe Rehabilitation | Engr | - | 1,461 | 1,160,000 | 1,000,000 | -14% |
| P53870 | 86110 | Valencia Creek Sewer Relocation | Engr | 48,941 | 17,940 | 2,088,000 | 2,088,000 | 0% |
| P53876 | 86110 | Upper Rodeo Gulch Trunkline & Soquel Sewer Bridge Repl | Engr | 174,853 | 225,103 | 5,000,000 | 5,000,000 | 0% |
| P53877 | 86110 | Searidge Drive Sewer | Engr | 255 | (170) | - | - | 0% |
| P53881 | 86110 | East Cliff, Portola & Richmond Drives Sewer Replacement | Engr | 1,684 | (1,123) | 4,949,000 | 5,345,696 | 8% |
| P53884 | 86110 | Trunkline Right Of Way | Opns | 1,613 | 28,125 | - | - | 0% |
| P53890 | 86110 | Capitola Pump Station Pumps, Motors & Controls | Engr | - | - | 200,000 | 200,000 | 0% |
| P53892 | 86110 | Arana Trunkline Replacement | Engr | 162,067 | 339,437 | 3,000,000 | 3,188,326 | 6% |
| P53997 | 74425 | Interest Expense ( Valencia and Jewel Box) | Engr | 239,427 | 103,133 | - | - | 0% |
| P53999 | 98700 | Contingencies | | - | - | - | - | 0% |
| TOTAL EXPENDITURES | | | | 8,435,325 | 7,228,197 | 24,961,314 | 27,021,375 | 8% |
| | | | | | | | | |
| SOURCE OF FUNDS: | | | | | | | | |
| | 34400 | Fund Balance | | 6,295,427 | (1,659,017) | 2,055,199 | 5,161,850 | 151% |
| | 42384 | Other Revenue | | | 173,765 | | | 0% |
| | 42506 | Loan Proceeds - SRF for Valencia (53870) | | - | - | 1,763,000 | 1,393,000 | -21% |
| | 42506 | Loan Proceeds - Ibank for Jewel Box (P53803) | | - | 6,930,000 | 2,204,720 | - | -100% |
| | 42506 | Loan Proceeds - Bond Financing | | | - | 17,000,000 | 17,000,000 | 0% |
| | 42462 | Transfer from WasteWater Cap Improvement Fund | | - | - | | | 0% |
| | 42462 | Transfer from Revenue Trust | | 2,722,441 | 6,945,299 | 1,938,395 | 3,466,525 | 79% |
| AVAILABLE FUNDS | | | | 9,017,867 | 12,390,047 | 24,961,314 | 27,021,375 | 8% |

625177 SCCSD CLEAN WATER STATE REVOLVING FUND DEBT SERVICE FUND (50/177)

This fund was established during the 2011/12 fiscal year to receive the transfers from the Revenue Trust for the p of principle and interest to repay the money borrowed through the Clean Water State Revolving Fund.

For Finance Agreement No. 09-848-550-0, the total amount borrowed was $11,981,910 and the principal balance June 30, 2020 was $8,106,842. This debt will be retired in 2032.

| EXPENDITURES: | | | 19/20 Actual | 20/21 Actual | 21/22 Recommended | 21/22 Adopted |
|---|---|---|---|---|---|---|
| 54610 | 74110 | Principal | 573,309 | 587,642 | 602,333 | 602,333 |
| 54611 | 74310 | Interest | 213,391 | 198,968 | 187,980 | 187,980 |
| TOTAL EXPENDITURES | | | 786,700 | 786,610 | 790,313 | 790,313 |
| SOURCE OF FUNDS: | | | | | | |
| | 34400 | Fund Balance | 8,281 | 578,869 | 8,281 | 588,655 |
| | 40430 | Interest | 5,559 | 3,013 | 2,000 | 2,000 |
| | 42462 | Transfer from Revenue Trust | 778,419 | 205,741 | 780,032 | 199,658 |
| AVAILABLE FUNDS | | | 792,260 | 787,623 | 790,313 | 790,313 |

For Finance Agreement No. D17-01046, the total amount to be borrowed is $5,000,000 and the principal balance June 30, 2020 was $2,365,363. This debt will be retired in 2032.

| EXPENDITURES: | | | 19/20 Actual | 20/21 Actual | 21/22 Recommended | 21/22 Recommended |
|---|---|---|---|---|---|---|
| 54610 | 74110 | Principal | - | | 138,160 | 138,160 |
| 54611 | 74310 | Interest | 1,949 | - | 129,453 | 129,453 |
| TOTAL EXPENDITURES | | | 1,949 | - | 267,613 | 267,613 |
| SOURCE OF FUNDS: | | | | | | |
| | 34400 | Fund Balance | - | - | - | 71,990 |
| | 40430 | Interest | - | - | 2,000 | 2,000 |
| | 42462 | Transfer from Revenue Trust | 1,949 | 71,990 | 265,613 | 193,623 |
| AVAILABLE FUNDS | | | 1,949 | 71,990 | 267,613 | 267,613 |

625179 SCCSD CALIFORNIA INFRASTRUCTURE & ECONOMIC DEVELOPMENT BANK DEBT SERVICE FUND (50/179)

This fund was established during the 2019/20 fiscal year to receive the transfers from the Revenue Trust for the payment of principal and interest on the money borrowed through a California Infrastructure and Economic Development Bank loan. The total amount borrowed is budgeted to be $7M with loan distributions to occur in FY21. Payments of principle will begin iAugust of 2021 and the debt will be retired in 2048.

| EXPENDITURES: | | | 19/20 Actual | 20/21 Actual | 21/22 Recommended | 21/22 Adopted |
|---|---|---|---|---|---|---|
| 54610 | 74110 | Principal - Jewel Box Loan | | 144,025 | 149,009 | 149,009 |
| 54611 | 74310 | Interest - Jewel Box Loan | 239,427 | 131,544 | 258,483 | 258,483 |
| 54611 | 74310 | Annual Fee | | 21,000 | 21,000 | 21,000 |
| TOTAL EXPENDITURES | | | 239,427 | 296,569 | 428,492 | 428,492 |

| SOURCE OF FUNDS: | | | | | | |
|---|---|---|---|---|---|---|
| | 34400 | Fund Balance (Restricted) | | - | - | 252,801 |
| | 40430 | Interest | | 592 | - | - |
| | 42462 | Transfer from Revenue Trust | 239,427 | 404,753 | 428,492 | 175,691 |
| AVAILABLE FUNDS | | | 239,427 | 405,345 | 428,492 | 428,492 |

625178 SCCSD CLEAN WATER STATE REVOLVING FUND DEBT RESERVE FUND (50/178)

This fund was established during the 2020/21 fiscal year as a condition of the Clean Water State Revolving Fund, Finance Agreement No. D17-01046. The agreement requires the District to establish a Restricted Reserve Fund equal to one year's debt service. The total amount to be borrowed is estimated to be $5,000,00 and the principal balance on June 30, 2020 was $2,634,637. Payments on the debt will be begin one year from completion of construction of the Soquel Pump Station . The debt will be retired in 30 years.

| EXPENDITURES: | | 19/20 Actual | 20/21 Actual | 20/21 Recommended | 21/22 Adopted |
|---|---|---|---|---|---|
| | Reserves | - | 218,000 | 218,300 | - |
| | | - | - | - | - |
| | | | - | - | - |
| TOTAL EXPENDITURES | | - | 218,000 | 218,300 | - |

| SOURCE OF FUNDS: | | | | | |
|---|---|---|---|---|---|
| 34400 | Fund Balance (Restricted) | - | - | 218,250 | 218,469 |
| 40430 | Interest | - | 469 | 300 | 300 |
| 42462 | Transfer from Revenue Trust | - | 218,000 | 218,000 | - |
| AVAILABLE FUNDS | | - | 218,469 | 436,550 | 218,769 |

625205 SCCSD REVENUE TRUST (50/205)

The Revenue Trust was created to receive the general revenue for Santa Cruz County Sanitation District. It makes payments to the Debt Service, Operating, Wastewater Capital Improvement and Construction Improvement Funds as needed to fund those activities.

| | | EXPENDITURES: | 19/20 Actual | 20/21 Actual | 20/21 Recommended | 21/22 Adopted | % Change |
|---|---|---|---|---|---|---|---|
| Transfers to: | | | | | | | |
| 54500 | 90000 | Operating Fund (625175) | 19,629,377 | 19,929,446 | 22,131,674 | 22,468,873 | 2% |
| 54500 | 90000 | Wastewater Capital Improvement Fund (625195) | 1,813,785 | 3,703 | 1,949,526 | 1,117,281 | -43% |
| 54500 | 90000 | Construction Improvement Fund (136409) | 2,722,441 | 6,945,299 | 1,938,395 | 3,466,525 | 79% |
| 54500 | 90000 | Clean Water State Revolving Fund loan (625177) | 778,419 | 205,741 | 780,032 | 199,658 | -74% |
| 54500 | 90000 | Clean Water State Revolving Fund loan (625177 - Soquel Pun | 1,949 | 71,990 | 265,613 | 193,623 | -27% |
| 54500 | 90000 | iBank Debt Service Fund (625179) | 239,427 | 404,753 | 428,492 | 175,691 | -59% |
| New | 90000 | SWRCB - Valencia Debt Service Fund (New) | | | | | 0% |
| 54500 | 90000 | Clean Water State Revolving Fund Debt Reserve (625178) | | 218,000 | 218,000 | - | -100% |
| TOTAL EXPENDITURES | | | 25,185,399 | 27,778,933 | 27,711,732 | 27,621,651 | 0% |
| SOURCE OF FUNDS (FOR TRANSFERS): | | | | | | | |
| | 34400 | Beginning Fund Balance (Unrestricted) | 3,659,894 | 3,705,097 | 219,962 | 3,556,911 | 1517% |
| | | **Revenues** | | | | | |
| | 40430 | Interest | 201,305 | 88,024 | 120,000 | 120,000 | 0% |
| | 41842 | Connection Fees | 260,000 | 264,563 | 200,000 | 200,000 | 0% |
| | 41866 | Sewer Service Charges | 26,793,000 | 27,278,010 | 27,844,740 | 27,844,740 | 0% |
| | 42384 | Other Revenues | - | 150 | - | - | 0% |
| | | Revenues Subtotal | 27,254,305 | 27,630,747 | 28,164,740 | 28,164,740 | - |
| SOURCE OF FUNDS SUBTOTAL | | | 30,914,199 | 31,335,844 | 28,384,702 | 31,721,651 | 12% |
| | | Reserves | - | - | (4,100,000) | (4,100,000) | 0% |
| AVAILABLE FUNDS | | | 30,914,199 | 31,335,844 | 24,284,702 | 27,621,651 | 14% |

SANTA CRUZ COUNTY SANITATION DISTRICT
ADOPTED BUDGET 2021/2022

.

| **USES OF FUNDS** | | **21/22 Adopted** |
|---|---|---|
| Expenditures | | |
| 625175 | Operating Fund | 23,264,362 |
| 625195 | Wastewater Capital Impr Projects | 3,248,053 |
| 136409 | Construction Improvement Fund | 27,021,375 |
| 625177 | Clean Water State Revovling Fund DS | 1,057,926 |
| 625179 | iBank - Jewel Box DS | 428,492 |
| | Total Expenditures | 55,020,207 |
| Reserves | | |
| 625195 | Wastewater Capital Improvement | 200,000 |
| 625178 | SWRCB - Soquel Pump Station - Reserve | 218,769 |
| 625205 | Revenue Trust | 4,100,000 |
| | Total Reserves | 4,518,769 |
| TOTAL EXPENDITURES AND RESERVES | | 59,538,976 |
| **SOURCES OF FUNDS** | | |
| Fund Balances | | |
| 625175 | Operating Fund | 786,488 |
| 625195 | Wastewater Capital Improvement | 1,288,619 |
| 136409 | Construction Improvement Fund | 5,161,850 |
| 625177 | Clean Water State Revolving Fund DS | 660,645 |
| 625179 | iBank - Jewel Box DS | 252,801 |
| 625178 | SWRCB - Soquel Pump Station - Reserve | 218,469 |
| 625205 | Revenue Trust | 3,556,911 |
| | Total Fund Balance | 11,925,783 |
| Revenues | | |
| 625175 | Plan Checking Fees | 5,000 |
| 625175 | Other Charges Current Services | 3,000 |
| 625175 | Other Revenues, Transfers and Adjustments | 1,000 |
| 625195 | SRF Prop 40 & Prop 50 Grants | 302,109 |
| 625195 | Loan Proceeds | 740,044 |
| 136409 | Loan Proceeds | 1,393,000 |
| 136409 | Loan Proceeds - Bond Financiing | 17,000,000 |
| 625177 | Interest | 2,000 |
| New | Interest | 2,000 |
| 625178 | Interest | 300 |
| 625205 | Interest | 120,000 |
| 625205 | Connection Fees | 200,000 |
| 625205 | Sewer Service Charges | 27,844,740 |
| | Total Revenues | 47,613,193 |
| TOTAL FUND BALANCES AND REVENUES | | 59,538,976 |
| DIFF THIS SCHEDULE | | 0 |

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SANTA CRUZ COUNTY SANITATION DISTRICT
701 OCEAN STREET, SUITE 410 · SANTA CRUZ, CA · 95060-4073
(831) 454-2160 · FAX (831) 454-2089 · TDD: (831) 454-2123 · WWW.SCCSD.US
MATT MACHADO, DISTRICT ENGINEER

AGENDA DATE: MAY 20, 2021

Accepted by the Board of Directors, SCCSD on May 20, 2021
ATTEST: _____ Secretary

BOARD OF DIRECTORS
SANTA CRUZ COUNTY SANITATION DISTRICT
701 Ocean Street, Room 410
Santa Cruz, California 95060

SUBJECT: PROPOSED 2021-22 SANTA CRUZ COUNTY SANITATION DISTRICT BUDGET

Members of the Board:

Attached for the Boards review is the proposed District budget for the 2021-22 fiscal year. The budget is based on raising the sewer service charge rates 4.0%. The proposed budget has expected expenditures and contingencies of $51,491,406 million and reserves of $4,518,000 million for a total of $56,109,406 million. This includes expenditures of $22,140,674 million in operating expenses (including $6.6 million for the District's share of operating the City of Santa Cruz wastewater treatment plant and capital improvements at the plant), $1,486,418 million in loan payments, $3,003,000 million in wastewater capital improvement projects, and $24,961,314 million in construction improvement projects.

The following projects are among those proposed to be under construction in 2021-22 or are currently under construction during these last months of 2020-21:

1) Cliff Drive Sewer Trench Repair
2) 2021 Sewer Pipe Rehabilitation Project (District-wide)
3) Rio Sands Sewer Rehabilitation
4) Eddy Lane Sewer Relocation
5) Rodriquez Street Sewer Rehabilitation
6) Lower Rodeo Trunkline Rehabilitation and Pump Station Upgrade
7) Upper Rodeo Gulch Trunkline & Soquel Sewer Bridge Sewer Replacement
8) East Cliff, Portola, & Richmond Drives Sewer Replacement
9) Valencia Creek Sewer Relocation
10) Arana Trunkline Replacement

The District staff proposes obtaining $17.0 million in bonds to cover the improvements to the Lower Rodeo Trunkline Rehabilitation and Pump Station Upgrade; Upper Rodeo Gulch Trunkline; East Cliff, Portola, & Richmond Drives Sewer Replacement; and Arana Trunkline Replacement projects. The District is in the final stages of securing a $1 to $2 million loan from the State Water Resources Control Board's State Revolving fund for the Valencia Creek Sewer Relocation project. The resulting debt service on these loans is similar to that presented in this fiscal year's rate study by Hornberger Engineering.

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**FIXED ASSETS**

This year's proposed fixed assets budget includes funding for a portable diesel generator, network equipment, motorized valves, and pump station grinders. The proposed budget includes funding for a boom truck with a crane for the electrical crew and two fleet pickup trucks to replace aging equipment.

**OVERHEAD**

The department overhead of 12.5 percent includes administrative service salaries within the Public Works Department (personnel, fiscal, safety, MIS, and clerical) and executive salaries for staff providing oversight of the District as well as County Overhead (A-87 Cost Plan). The County overhead charges allocate the cost related to central support departments such as County Counsel, Personnel Department, Auditor-Controller-Treasurer-Tax Collector, Purchasing, and other miscellaneous departments that provide a direct service to the District, as well as general costs for such items as facilities management, building use allowance, communications, and warehouse storage. There is also a 22.9 percent Division overhead that pays for insurance, training, salaries not billable to specific projects, and other indirect costs.

The following budgetary items reflect significant differences between the current and proposed budget amounts (see explanation below):

**625175 OPERATING FUND (50/175)**

| BUDGET NO. | ITEM | 2019-20 ACTUAL | 2020-21 ADOPTED | 2021-22 RECOMMENDED | EXPLANATION |
|---|---|---|---|---|---|
| 53173 | City of Santa Cruz Treatment Costs | $5,195,312 | $6,400,000 | $6,600,000 | This increase is due to new capital improvement projects at the City's treatment plant. |
| 53136 | Sulfide Control | $1,155,776 | $1,233,000 | $1,550,000 | This increase is for odor control and corrosion services |
| 53140 | Tree Trimming | $45,869 | $75,027 | $110,000 | The project number combines tree and brush clearing expenses under tree trimming. |
| 53142 | Source Control Lab Work | $17,669 | $26,250 | $35,000 | Additional sampling and laboratory testing is required to reexamine local limit discharges from significant industrial users. |
| 53196 | Revenue Study | $16,685 | $20,000 | $30,000 | This increase will pay for a residential flow study, along with the regular rate study. |

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**625175 OPERATING FUND (50/175) CONTINUED**

| BUDGET NO. | ITEM | 2019-20 ACTUAL | 2020-21 ADOPTED | 2021-22 RECOMMENDED | EXPLANATION |
|---|---|---|---|---|---|
| 53226 | Emergency Diesel Generators | $971 | $8,018 | $80,000 | A new portable generator is required to replace aging equipment. |
| 53357 | PLC Upgrades | $0 | $100,000 | $200,000 | The pump stations require programmable logic controller upgrades. |
| 53285 | F550 Truck with Boom | $0 | $0 | $200,000 | A new boom truck with a crane is needed for the electrical crew. |
| 53293 | F250 Pickups | $0 | $0 | $80,000 | Operations requires two fleet truck to replace aging equipment. |

**625195 SCCSD WASTEWATER CAPITAL IMPROVEMENT FUND (50/195)**

| BUDGET NO. | ITEM | 2019-20 ACTUAL | 2020-21 ADOPTED | 2021-22 RECOMMENDED | EXPLANATION |
|---|---|---|---|---|---|
| 54002 | D.A. Porath Lode St. Facility Improvements | $32,653 | $1,167,347 | $1,473,000 | These funds are for the D.A Porath Facility Improvements, including consultation with an architectural firm for office improvements. |
| 54048 | Santa Cruz Harbor Transmission Main Rehabilitation | $284,357 | $250,000 | $1,100,000 | Nearly 95% of the design for this project was completed in 2020-21 and District funds will be required to cover a portion of the construction not covered by the City's FHWA grant. |

**136409 SCCSD CONSTRUCTION IMPROVEMENT FUND (50/185)**

| BUDGET NO. | ITEM | 2019-20 ACTUAL | 2020-21 ADOPTED | 2021-22 RECOMMENDED | EXPLANATION |
|---|---|---|---|---|---|
| 53601 | Rio Sands Sewer Rehabilitation | $0 | $0 | $440,000 | These funds would continue to fund the repair and replacement of deteriorating pipes identified in Rio Del Mar. |
| 53602 | Cliff Drive Sewer Trench Repair | $0 | $0 | $630,000 | These funds would be used to construct the trench repairs required prior to the Measure D paving project. |

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**136409 SCCSD CONSTRUCTION IMPROVEMENT FUND (50/185) CONTINUED**

| BUDGET NO. | ITEM | 2019-20 ACTUAL | 2020-21 ADOPTED | 2021-22 RECOMMENDED | EXPLANATION |
|---|---|---|---|---|---|
| 53603 | Eddy Lane Sewer Relocation | $0 | $0 | $435,000 | These funds would be used to relocate a broken sewer main. |
| 53604 | Rodriquez Street Sewer Rehabilitation | $0 | $0 | $800,000 | These funds would be used to fund the repair and replacement of deteriorating pipes identified in Rodriquez Street. |
| 53804 | Cathodic Protection Construction | $0 | $0 | $100,000 | Repairs to components of the rectifiers and test sites are required. |
| 53827 | Lower Rodeo Gulch Trunkline Replacement | $1,069 | $20,000 | $5,400,000 | These funds would be for construction in 2022 to upsize the trunk line and increase capacity at the Rodeo Pump Station. |
| 53854 | 2021 Pipe Rehabilitation | $0 | $2,500,000 | $1,160,000 | These funds would continue to fund the repair and replacement of deteriorating pipes throughout the District. |
| 53876 | Upper Rodeo Gulch Trunkline | $174,853 | $600,000 | $5,000,000 | These funds would be for construction in 2022 to reduce infiltration in the trunk line. |
| 53881 | East Cliff, Portola & Richmond Sewer Replacement | $1,684 | $4,300,000 | $4,949,000 | Rather than occurring in 2021, construction to replace deteriorated sewer mains in East Cliff Drive are planned for 2022. |
| 53890 | Capitola Pump Station Pumps, Motors, & Controls | $0 | $0 | $200,000 | Aging pumps will be replaced in the coming fiscal year. |
| 53892 | Arana Trunkline Replacement | $162,067 | $3,800,000 | $3,000,000 | Rather than occurring in 2021, construction to replace deteriorated sewer mains along Arana Gulch will occur in 2022. |

The final budget hearing is set for 4:45 p.m., Thursday, June 10, 2021. This public hearing will employ a hybrid meeting format that combines face-to-face and virtual (Zoom video/audio-conferencing) meeting components. The District is mindful of the need to provide a variety of methods for the public to receive information and provide input, while meeting public health guidelines and protecting vulnerable populations. The attached Notice of Public Hearing will be published in the Santa Cruz Sentinel 15 days and 7 days prior to the budget hearing.

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It is therefore recommended that the Board of Directors accept this proposed budget and direct the District Secretary to publish the Notice of Public Hearing.

Yours truly,

DocuSigned by:
50EBAC64454C48C...
MATT MACHADO
District Engineer

AT:tlp/B2314.docx
Attachment

Copy to: Mark Dettle, Director, City of Santa Cruz, Public Works



Hidden Beach Pump Station

# DESCRIPTION OF FACILITIES

2021/22 thru 2025/26
CAPITAL IMPROVEMENT PROGRAM

SANTA CRUZ COUNTY SANITATION DISTRICT

# DESCRIPTION OF FACILITIES

The Santa Cruz County Sanitation District (SCCSD) maintains 234 miles of sanitary sewer pipeline (220 miles of gravity lines, which use gravity to move the sewage along, and 14 miles of force main, which is pressurized), 4,780 manholes and 35 sanitary sewer pump stations. The District serves a population of 72,200 with approximately 36,000 sewer lateral connections.

The D. A. Porath Sanitation Facility is the District's main pump station and is the location of the Board of Directors' in-person meetings. It is located at 2750 Lode Street, Santa Cruz, California. This pump station receives wastewater from the collection system which is pumped through a force main to the City of Santa Cruz's Wastewater Treatment Facility which is a publicly owned treatment works (POTW) plant at Neary Lagoon, in the City of Santa Cruz.

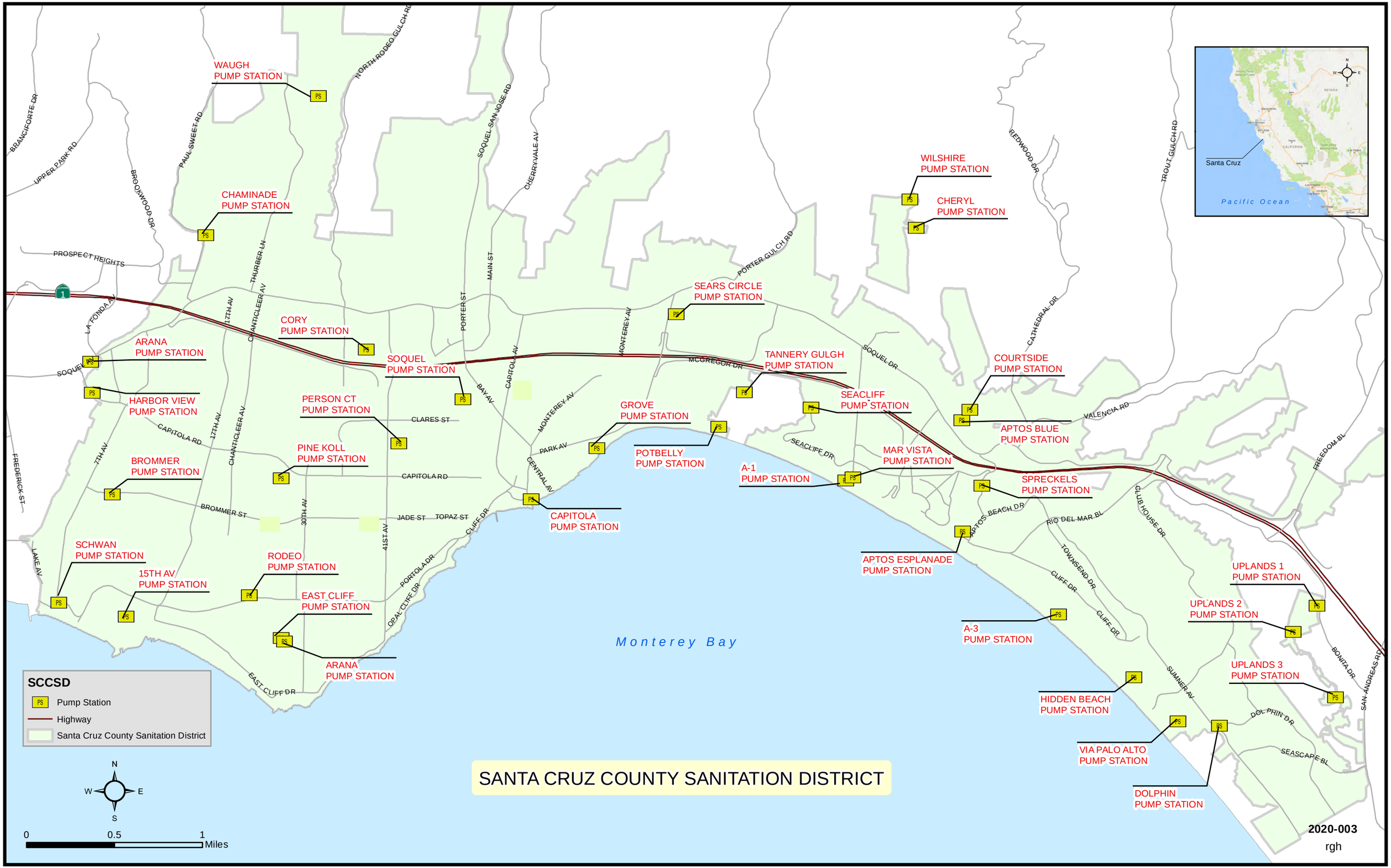
Pump stations (or lift stations) are designed to move raw sewage that is fed from gravity pipelines to pipelines at a higher elevation. Sewage flows into an underground pit, called a wet well. The well is equipped with electrical instrumentation to detect the level of sewage, and when the sewage level rises to a pre-set point, a pump motor creates pressure to push the sewage into a force main where it is eventually discharged into a gravity manhole. The cycle then starts over again until the sewage reaches the City Treatment Facility. The size of the pump station depends on the connections being served and the pumps are between 2hp to 230hp. Typically, large pump stations are located in above ground enclosed structures and smaller pump wet wells are located below ground in residential streets.

**SCCSD PUMP STATIONS**

| | | |
|---|---|---|
| 15th Avenue + | Pearson Court + | KEY |
| A-1[1] | Pine Knoll + | |
| A-3[2] | Potbelly Beach [3] | +On site generator |
| Aptos Blue + | Rodeo + | [1] Fed from Aptos Esplanade Pump Station |
| Aptos Esplanade + | Schwan Lake + | [2] Can also gravity to Hidden Beach Pump Station |
| Arana + | Seacliff + | |
| Brommer + | Sears Circle | [3] Fed from Tannery Pump Station |
| Capitola + | Soquel (at Nob Hill) + | |
| Chaminade + | Spreckels + | |
| Cheryl Way+ | Tannery Gulch + | |
| Cory Street + | Uplands 1 + | |
| Courtside + | Uplands 2 + | |
| D. A. Porath + | Uplands 3 + | |
| Dolphin Drive + | Via Palo Alto + | |
| Grove + | Waugh + | |
| Harbor View + | Wilshire + | |
| Hidden Beach + | | |
| Mar Vista + | | |
| Moran + | | |

**OTHER FACILITIES**

SCADA Repeater Sites: Mt. Toro (Monterey County) and Empire Grade (Santa Cruz County)


WAUGH PUMP STATION
CHAMINADE PUMP STATION
CORY PUMP STATION
ARANA PUMP STATION
SOQUEL PUMP STATION
HARBOR VIEW PUMP STATION
PERSON CT PUMP STATION
PINE KOLL PUMP STATION
BROMMER PUMP STATION
SCHWAN PUMP STATION
15TH AV PUMP STATION
RODEO PUMP STATION
EAST CLIFF PUMP STATION
ARANA PUMP STATION
SEARS CIRCLE PUMP STATION
GROVE PUMP STATION
POTBELLY PUMP STATION
CAPITOLA PUMP STATION
A-1 PUMP STATION
WILSHIRE PUMP STATION
CHERYL PUMP STATION
TANNERY GULGH PUMP STATION
SEACLIFF PUMP STATION
MAR VISTA PUMP STATION
APTOS ESPLANADE PUMP STATION
A-3 PUMP STATION
COURTSIDE PUMP STATION
APTOS BLUE PUMP STATION
SPRECKELS PUMP STATION
HIDDEN BEACH PUMP STATION
VIA PALO ALTO PUMP STATION
DOLPHIN PUMP STATION
UPLANDS 1 PUMP STATION
UPLANDS 2 PUMP STATION
UPLANDS 3 PUMP STATION
Monterey Bay
Santa Cruz
Pacific Ocean
SCCSD
Pump Station
Highway
Santa Cruz County Sanitation District
0 0.5 1 Miles
SANTA CRUZ COUNTY SANITATION DISTRICT
2020-003
rgh

# PUMP STATIONS






2021/22 thru 2025/26
CAPITAL IMPROVEMENT PROGRAM

SANTA CRUZ COUNTY SANITATION DISTRICT




15th AVENUE



A1

(At Seacliff Beach)


A3
(At end of Beach Drive)


APTOS BLUE



APTOS ESPLANADE
(At Rio Del Mar Beach)



ARANA
(2 stories underground)



BROMMER



CAPITOLA



CHAMINADE



CHERYL WAY



CORY STREET



COURTSIDE



D.A. PORATH



DOLPHIN DRIVE



GROVE



HARBOR VIEW



HIDDEN BEACH



MAR VISTA



MORAN



PEARSON COURT



PINE KNOLL



POTBELLY BEACH



RODEO

(On Richmond Drive)



SCHWAN LAKE

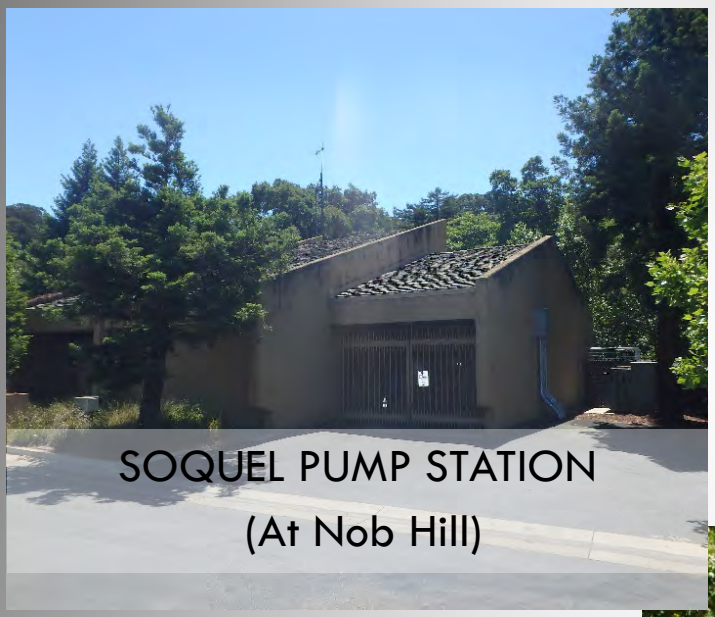


SEACLIFF



SEARS CIRCLE

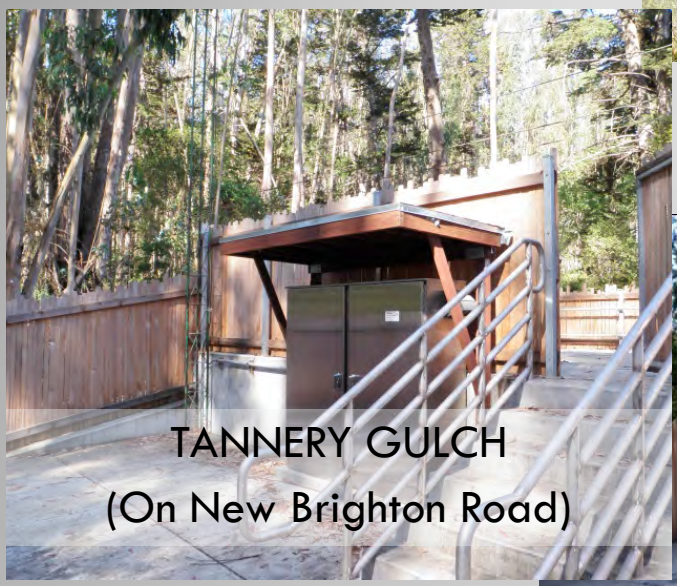




SOQUEL PUMP STATION
(At Nob Hill)




SPRECKELS



TANNERY GULCH
(On New Brighton Road)





UPLANDS 1
(On Zanzibar Drive, Rio Del Mar)



UPLANDS 2
(Also on Zanzibar Drive)




UPLANDS 3
(On Castillo Court)





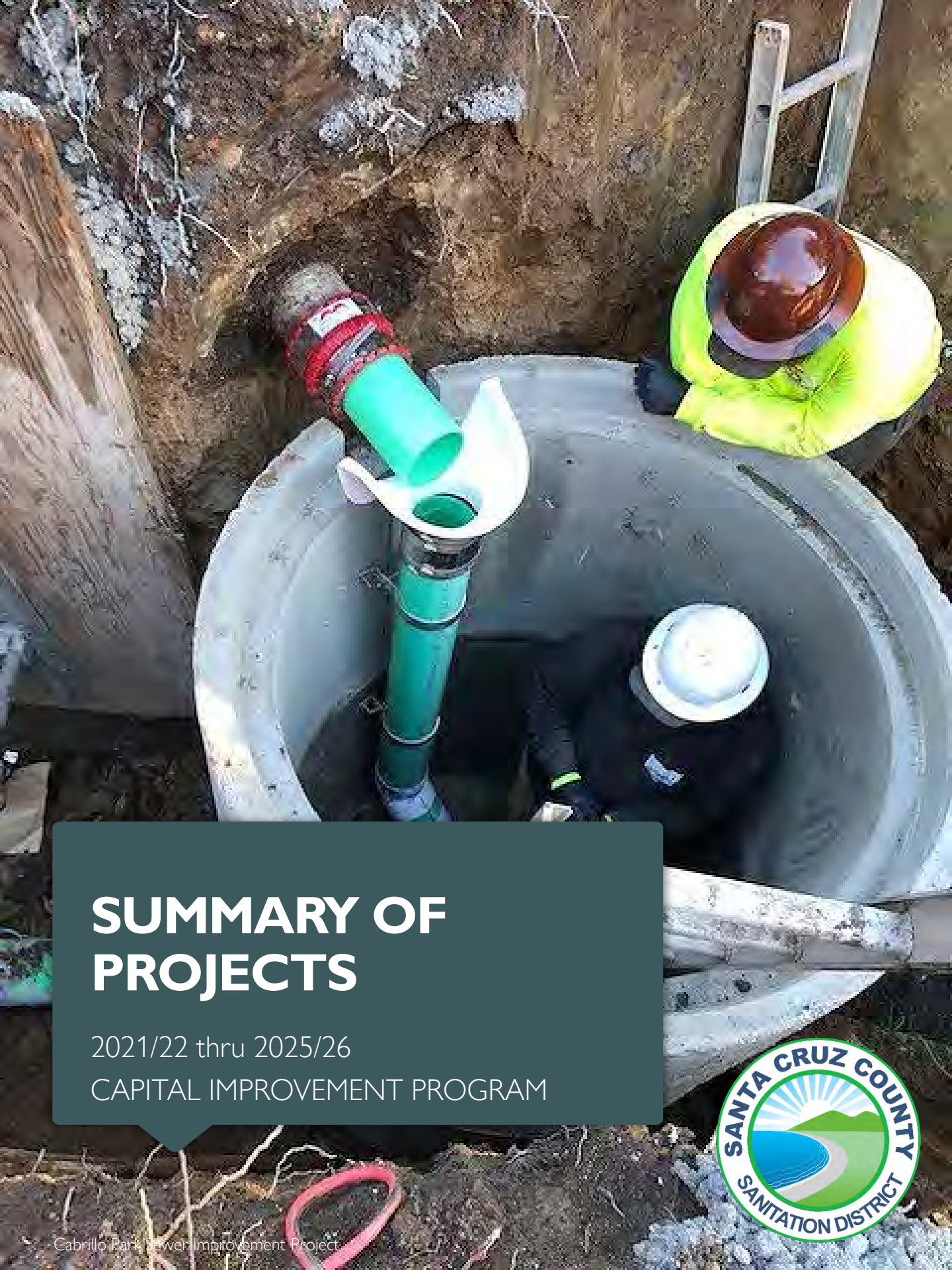
VIA PALO ALTO



WAUGH AVENUE



WILSHIRE



# SUMMARY OF PROJECTS

2021/22 thru 2025/26

CAPITAL IMPROVEMENT PROGRAM

SANTA CRUZ COUNTY SANITATION DISTRICT

Cabrillo Park Sewer Improvement Project

# SUMMARY OF PROJECTS

| PROJECT NO. | PROJECT | CAPITOLA | DISTRICT 1 | DISTRICT 2 | CITY OF SC | TOTAL PROJECT COST ESTIMATE | YEAR | STATUS |
|---|---|---|---|---|---|---|---|---|
| P53853 | 41ST AVENUE AT SOQUEL DRIVE SEWER REHABILITATION | | X | | | $ 1,013,420 | 2020/21 | COMPLETED |
| P53824 | CABRILLO PARK SEWER REPLACEMENT PROJECT— PHASE I | | | X | | $ 624,200 | 2020/21 | COMPLETED |
| P53359 | CAPITOLA PUMP REPLACEMENTS 2020/21 (PURCHASE ONLY) | X | | X | | $ 213,000 | 2020/21 | COMPLETED |
| P53837 | CLIFF DRIVE AREA SEWER REHABILITATION | | | X | | $ 1,482,200 | 2020/21 | COMPLETED |
| P53802 | DOLPHIN PUMP STATION IMPROVEMENTS | | | X | | $ 50,000 | 2020/21 | COMPLETED |
| P53357 | PLC UPGRADES 2020/21 | | X | X | | $ 200,000 | 2020/21 | IN PROGRESS |
| P53829 | RIO DEL MAR SEWER REHABILITATION | | | X | | $ 832,500 | 2020/21 | COMPLETED |
| P54051 | SOQUEL PUMP STATION FORCE MAIN REPLACEMENT PROJECT | X | X | X | | $ 8,174,600 | 2018/19 | COMPLETED |
| P53358 | VFD REPLACEMENTS 2020/21 (RODEO PUMP STATION AND SOQUEL PUMP STATION) | X | X | X | | $ 165,000 | 2020/21 | IN PROGRESS |
| P53837 | CLIFF DRIVE SEWER TRENCH REPAIRS | | | X | | $ 606,400 | 2021/22 | COMPLETED |
| P53246 | VALVE REPLACEMENTS 2021/22 (PURCHASE ONLY) | | X | | | $ 251,000 | 2021/22 | COMPLETED |

# SUMMARY OF PROJECTS

| PROJECT NO. | PROJECT | CAPITOLA | DISTRICT 1 | DISTRICT 2 | CITY OF SC | TOTAL PROJECT COST ESTIMATE | YEAR | STATUS |
|---|---|---|---|---|---|---|---|---|
| P53854 | 2021 SEWER PIPE REHABILITATION | | X | X | | $ 1,135,900 | 2021/22 | IN CONSTRUCTION |
| P53892 | ARANA TRUNKLINE REPLACEMENT | | X | | X | $ 3,474,200 | 2021/22 | IN DESIGN |
| P53881 | EAST CLIFF, PORTOLA, & RICHMOND DRIVES SEWER REPLACEMENTS | | X | | | $ 7,239,000 | 2021/22 | IN DESIGN |
| P54048 | EAST CLIFF TRANSMISION MAIN RELOCATION AT MURRAY STREET BRIDGE | | | | X | $ 7,350,400 | 2021/22 | IN DESIGN |
| P53357 | PLC UPGRADES 2021/22 | | X | X | | $ 200,000 | 2021/22 | FUTURE DESIGN |
| P53870 | VALENCIA CREEK SEWER RELOCATION | | | X | | $ 2,351,400 | 2021/22 | IN DESIGN |
| P53358 | VFD REPLACEMENT 2021/22 (CAPITOLA PUMP STATION & D.A. PORATH PUMP STATION) | X | X | X | | $ 150,000 | 2021/22 | FUTURE DESIGN |
| P53802 | CAPITOLA PUMP STATION PUMP REPLACEMENT | X | | X | | $ 300,000 | 2022/23 | IN DESIGN |
| TBD | D.A. PORATH PUMP STATION ACCESS HATCHES | | X | | | $ 436,000 | 2022/23 | FUTURE DESIGN |
| TBD | D.A. PORATH FACILITY PARKING IMPROVEMENTS | | X | | | $ 257,000 | 2022/23 | IN DESIGN |
| TBD | D.A. PORATH VALVE REPLACEMENT AND EMERGENCY BYPASS | | X | | | $ 1,199,000 | 2022/23 | FUTURE DESIGN |

# SUMMARY OF PROJECTS

| PROJECT NO. | PROJECT | CAPITOLA | DISTRICT 1 | DISTRICT 2 | CITY OF SC | TOTAL PROJECT COST ESTIMATE | YEAR | STATUS |
|---|---|---|---|---|---|---|---|---|
| P53603 | EDDY LANE SEWER RELOCATION | | X | | | $ 930,000 | 2022/23 | IN DESIGN |
| P53827 | LOWER RODEO TRUNKLINE REPLACEMENT | | X | | | $ 1,738,000 | 2022/23 | IN DESIGN |
| P53357 | PLC UPGRADES 2022/23 | X | X | X | | $ 300,000 | 2022/23 | FUTURE DESIGN |
| P53601 | RIO SANDS SEWER REHABILITATION | | | X | | $ 715,000 | 2022/23 | IN DESIGN |
| P53802 | RODEO PUMP STATION CAPACITY UPGRADE | | X | | | $ 1,915,000 | 2022/23 | IN DESIGN |
| P53604 | RODRIGUEZ STREET SEWER REHABILITATION | | X | | | $ 730,000 | 2022/23 | IN DESIGN |
| P53876 | UPPER RODEO GULCH TRUNKLINE & SOQUEL BRIDGE SEWER REPLACEMENT | | X | | | $ 5,420,000 | 2022/23 | IN DESIGN |
| TBD | HIDDEN BEACH SEWER TRUNK LINE REHABILITATION | | | X | | $ 1,003,000 | 2023/24 | FUTURE DESIGN |
| P53357 | PLC UPGRADES 2023/24 | X | X | X | | $ 350,000 | 2023/24 | FUTURE DESIGN |
| TBD | CAPITOLA VILLAGE SEWER REHABILITATION | X | | X | | $ 6,171,200 | 2024/25 | FUTURE DESIGN |
| P53363 | EAST CLIFF TRANSMISSION MAIN INSPECTION | | X | | X | $ 100,000 | 2024/25 | FUTURE DESIGN |

# SUMMARY OF PROJECTS

| PROJECT NO. | PROJECT | CAPITOLA | DISTRICT 1 | DISTRICT 2 | CITY OF SC | TOTAL PROJECT COST ESTIMATE | YEAR | STATUS |
|---|---|---|---|---|---|---|---|---|
| P53357 | PLC UPGRADES 2024/25 | | X | X | | $ 200,000 | 2024/25 | FUTURE DESIGN |
| TBD | RIO DEL MAR SEWER REHABIILITATION—PHASE 2 | | | X | | $ 2,019,800 | 2024/25 | FUTURE DESIGN |
| TBD | SANTA CRUZ HARBOR AREA SEWER REHABILITATION - PHASE 2 | | X | | | $ 3,925,200 | 2024/25 | FUTURE DESIGN |
| TBD | SOQUEL VILLAGE SEWER REHABILITATION—PHASE 2 | | X | | | $ 4,837,000 | 2024/25 | FUTURE DESIGN |
| TBD | TOWNSEND AREA SEWER REHABILITATION | | | X | | $ 2,148,400 | 2024/25 | FUTURE DESIGN |
| P53809 | ARANA PUMP STATION RELOCATION | | X | | X | $ 5,175,000 | 2025/26 | IN DESIGN |
| P54055 | EAST CLIFF TRANSMISSION MAIN REPAIRS | | X | | X | $ 900,000 | 2025/26 | FUTURE DESIGN |
| TBD | VIENNA WOODS SEWER REHABILITATION— PHASE 1 | | | X | | $ 1,670,000 | 2025/26 | FUTURE DESIGN |

# ONGOING OPERATIONS PROJECTS



East Cliff Drive and 12th Avenue Sewer Main Repairs

2021/22 thru 2025/26
CAPITAL IMPROVEMENT PROGRAM

SANTA CRUZ COUNTY SANITATION DISTRICT

# ONGOING OPERATIONS PROJECTS

| PROJECT NO. | PROJECT | 2020/21 | 2021/22 | 2022/23 | 2023/24 | 2024/25 | 2025/26 | 2026/27 |
|---|---|---|---|---|---|---|---|---|
| P53804 | CATHODIC PROTECTION | $ 100,000 | $ 100,000 | $ 100,000 | $ 100,000 | $ 100,000 | $ 100,000 | $ 100,000 |
| P54002 | D.A. PORATH FACILITY IMPROVEMENTS | $ 250,000 | $ 1,473,000 | $ 600,000 | $ 600,000 | $ NA | $ NA | $ NA |
| P54023 | SCADA IMPROVEMENTS | $ 263,991 | $ 150,000 | $ 150,000 | $ 150,000 | $ 150,000 | $ 150,000 | $ 150,000 |
| P54005 | TRANSMISSION LINE INSPECTION | $ NA | $ 200,000 | $ 100,000 | $ 100,000 | $ 100,000 | $ 100,000 | $ 100,000 |



Soquel Pump Station Force Main Replacement Project
Horizontal Directional Drilling

# INDIVIDUAL PROJECTS

2021/22 thru 2025/26
CAPITAL IMPROVEMENT PROGRAM

SANTA CRUZ COUNTY SANITATION DISTRICT

# 41ST AVENUE AT SOQUEL DRIVE SEWER REHABILITATION

| | |
|---|---|
| CAPITOLA | |
| DISTRICT 1 | X |
| DISTRICT 2 | |
| CITY OF SANTA CRUZ | |





| | | | |
|---|---|---|---|
| PROJECT TYPE: | SYSTEM UPGRADE | PROJECT STATUS: | COMPLETED |
| LOCATION: | SOQUEL | ESTIMATED CONSTRUCTION YEARS: | 2020/21 |
| DESCRIPTION: | Replacement of three broken sewer mains and rehabilitation of the existing manholes. | | |

| ESTIMATED PROJECT COSTS | | |
|---|---|---|
| Land Survey | $ | 5,000 |
| Preliminary Design | $ | - |
| Environmental | $ | - |
| Geotechnical | $ | - |
| Engineering Design | $ | 30,000 |
| Acquisition | $ | 34,200 |
| Construction | $ | 632,620 |
| Construction Management | $ | 20,000 |
| Construction Inspection | $ | 125,800 |
| Other | $ | 70,000 |
| **Total Estimated Project Costs** | **$** | **200,000** |

| FUNDING SOURCES | | |
|---|---|---|
| District Funds | $ | 1,013,420 |
| Loans | $ | - |
| | | |
| | | |
| | | |
| Grants | $ | - |
| | | |
| | | |
| | | |
| Other | $ | - |
| **Total Project Funding** | $ | **1,013,420** |
| **Funding Not Yet Identified** | **$** | **-** |

# CABRILLO PARK SEWER REPLACEMENT PROJECT — PH. I

| | |
|---|---|
| CAPITOLA | |
| DISTRICT 1 | |
| DISTRICT 2 | X |
| CITY OF SANTA CRUZ | |






| | | | |
|---|---|---|---|
| **PROJECT TYPE:** | SYSTEM UPGRADE | **PROJECT STATUS:** | COMPLETED |
| **LOCATION:** | APTOS | **ESTIMATED CONSTRUCTION YEARS:** | 2020/21 |
| **DESCRIPTION:** | Relocate a sanitary sewer manhole away from the failing slope to the existing parking lot. Replace 136± linear feet of associated sewer main. | | |

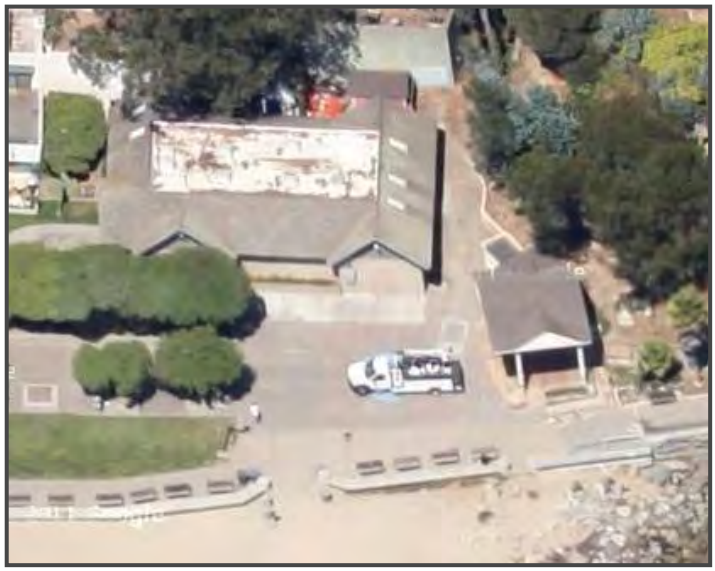
| ESTIMATED PROJECT COSTS | | |
|---|---|---|
| Land Survey | $ | 25,000 |
| Preliminary Design | $ | - |
| Environmental | $ | - |
| Geotechnical | $ | - |
| Engineering Design | $ | 100,000 |
| Acquisition | $ | 34,200 |
| Construction | $ | 275,000 |
| Construction Management | $ | 20,000 |
| Construction Inspection | $ | 100,000 |
| Other | $ | 70,000 |
| **Total Estimated Project Costs** | **$** | **624,200** |

| FUNDING SOURCES | | |
|---|---|---|
| District Funds | $ | 624,200 |
| Loans | $ | - |
| | | |
| | | |
| | | |
| Grants | $ | - |
| | | |
| | | |
| | | |
| Other | $ | - |
| **Total Project Funding** | **$** | **624,200** |
| **Funding Not Yet Identified** | **$** | **-** |

# CAPITOLA PUMP REPLACEMENTS 2020/21

| | |
|---|---|
| CAPITOLA | X |
| DISTRICT 1 | |
| DISTRICT 2 | X |
| CITY OF SANTA CRUZ | |





| | | | |
|---|---|---|---|
| **PROJECT TYPE:** | PUMP IMPROVEMENTS | **PROJECT STATUS:** | COMPLETED |
| **LOCATION:** | 110 MONTEREY AVE | **ESTIMATED CONSTRUCTION YEARS:** | 2020/21 |
| **DESCRIPTION:** | Purchase of three 75 hp pumps for Capitola Pump Station to replace existing pumps in FY 2021-22. | | |

| **ESTIMATED PROJECT COSTS** | |
|---|---|
| Land Survey | $ - |
| Preliminary Design | $ - |
| Environmental | $ - |
| Geotechnical | $ - |
| Engineering Design | $ - |
| Acquisition | $ - |
| Construction | $ - |
| Construction Management | $ - |
| Construction Inspection | $ - |
| Other | $ - |
| **Total Estimated Project Costs** | **$ 213,000** |

| **FUNDING SOURCES** | |
|---|---|
| District Funds | $ 213,000 |
| Loans | $ - |
| | |
| | |
| | |
| Grants | $ - |
| | |
| | |
| | |
| Other | $ - |
| **Total Project Funding** | **$ 213,000** |
| **Funding Not Yet Identified** | **$ -** |

# CLIFF DRIVE AREA SEWER REHABILITATION

| | |
|---|---|
| CAPITOLA | |
| DISTRICT 1 | |
| DISTRICT 2 | X |
| CITY OF SANTA CRUZ | |





| | | | |
|---|---|---|---|
| **PROJECT TYPE:** | SYSTEM UPGRADE | **PROJECT STATUS:** | COMPLETED |
| **LOCATION:** | APTOS | **ESTIMATED CONSTRUCTION YEARS:** | 2020/21 |
| **DESCRIPTION:** | Replace or repair 2,735± linear feet of deteriorating gravity sewer mains and manholes located near Cliff Drive. The sewer lines are old, deteriorating and at the end of their design life. Recompact an additional 3,365± linear feet of sewer trench contributing to settling pavement and sink holes. | | |

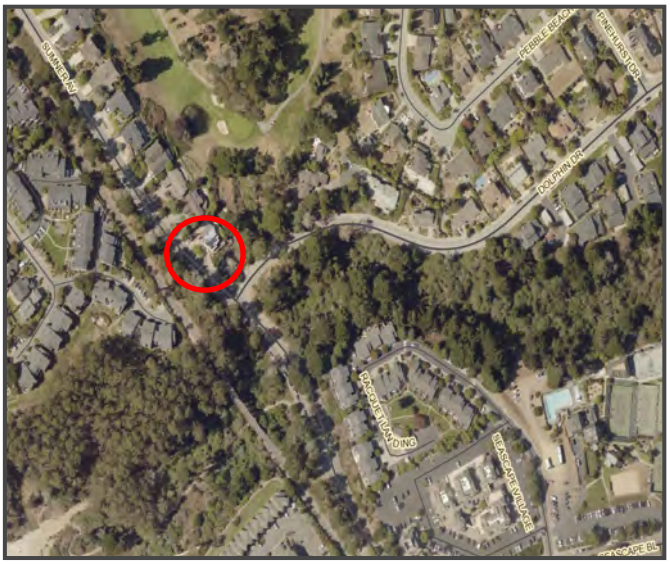
| ESTIMATED PROJECT COSTS | | |
|---|---|---|
| Land Survey | $ | 10,000 |
| Preliminary Design | $ | - |
| Environmental | $ | 1,200 |
| Geotechnical | $ | - |
| Engineering Design | $ | 40,000 |
| Acquisition | $ | - |
| Construction | $ | 988,000 |
| Construction Management | $ | 30,000 |
| Construction Inspection | $ | 167,000 |
| Other | $ | 246,000 |
| **Total Estimated Project Costs** | **$** | **1,482,200** |

| FUNDING SOURCES | | |
|---|---|---|
| District Funds | $ | 1,482,200 |
| Loans | $ | - |
| | | |
| | | |
| | | |
| Grants | $ | - |
| | | |
| | | |
| | | |
| Other | $ | - |
| **Total Project Funding** | **$** | **1,482,200** |
| **Funding Not Yet Identified** | **$** | **-** |

# DOLPHIN PUMP STATION IMPROVEMENTS

| | |
|---|---|
| CAPITOLA | |
| DISTRICT 1 | |
| DISTRICT 2 | X |
| CITY OF SANTA CRUZ | |






| | | | |
|---|---|---|---|
| **PROJECT TYPE:** | SYSTEM/PUMP UPGRADE | **PROJECT STATUS:** | COMPLETED |
| **LOCATION:** | SUMMER AVE AND DOLPHIN DR | **ESTIMATED CONSTRUCTION YEARS:** | 2020/21 |
| **DESCRIPTION:** | Pump and system improvements include replacing hydraulic grinder with an electric grinder and construction of a bathroom facility for Sanitation Operations staff. | | |

| ESTIMATED PROJECT COSTS | | |
|---|---|---|
| Land Survey | $ | - |
| Preliminary Design | $ | - |
| Environmental | $ | - |
| Geotechnical | $ | - |
| Engineering Design | $ | - |
| Acquisition | $ | - |
| Construction | $ | - |
| Construction Management | $ | - |
| Construction Inspection | $ | - |
| Other | $ | - |
| **Total Estimated Project Costs** | **$** | **50,000** |

| FUNDING SOURCES | | |
|---|---|---|
| District Funds | $ | 50,000 |
| Loans | $ | - |
| | | |
| | | |
| | | |
| Grants | $ | - |
| | | |
| | | |
| | | |
| Other | $ | - |
| **Total Project Funding** | **$** | **50,000** |
| **Funding Not Yet Identified** | **$** | **-** |

# PLC UPGRADES 2020/21

| | |
|---|---|
| CAPITOLA | |
| DISTRICT 1 | X |
| DISTRICT 2 | X |
| CITY OF SANTA CRUZ | |

| PROJECT | LOCATION | EXISTING PLC MODEL |
|---|---|---|
| A1 | 201 STATE PARK DRIVE | Compact Logix L23E |
| BROMMER | 960 BROMMER STREET | MicroLogix 1500 |
| DOLPHIN | DOLPHIN AND SUMNER AVENUE | MicroLogix 1500 |
| RODEO | 1400 BLOCK OF RICHMOND | MicroLogix 1500 |
| SPRECKLES | 211 FOREST DRIVE | Compact Logix L23E |




| | | | |
|---|---|---|---|
| **PROJECT TYPE:** | OPERATIONS AND MAINTENANCE | **PROJECT STATUS:** | IN PROGRESS |
| **LOCATION:** | VARIOUS LOCATIONS | **ESTIMATED CONSTRUCTION YEARS:** | 2020/21 |
| **DESCRIPTION:** | Replace and upgrade older Programmable Logic Controllers (PLCs) at five pump stations. | | |

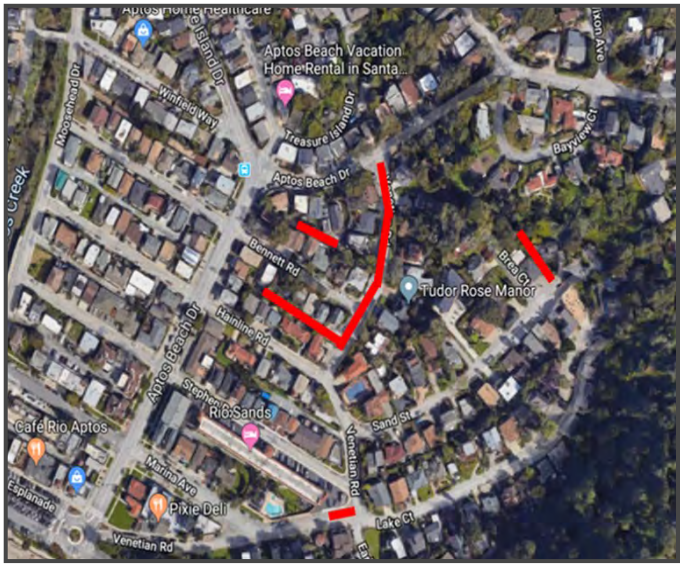
| ESTIMATED PROJECT COSTS | |
|---|---|
| Land Survey | $ - |
| Preliminary Design | $ - |
| Environmental | $ - |
| Geotechnical | $ - |
| Engineering Design | $ - |
| Acquisition | $ - |
| Construction | $ - |
| Construction Management | $ - |
| Construction Inspection | $ - |
| Other | $ - |
| **Total Estimated Project Costs** | **$ 200,000** |

| FUNDING SOURCES | |
|---|---|
| District Funds | $ 200,000 |
| Loans | $ - |
| | |
| | |
| | |
| Grants | $ - |
| | |
| | |
| | |
| Other | $ - |
| **Total Project Funding** | **$ 200,000** |
| **Funding Not Yet Identified** | **$ -** |

# RIO DEL MAR SEWER REHABILITATION

| | |
|---|---|
| CAPITOLA | ☐ |
| DISTRICT 1 | ☐ |
| DISTRICT 2 | X |
| CITY OF SANTA CRUZ | ☐ |




| | | | |
|---|---|---|---|
| **PROJECT TYPE:** | SYSTEM UPGRADE | **PROJECT STATUS:** | COMPLETED |
| **LOCATION:** | RIO DEL MAR | **ESTIMATED CONSTRUCTION YEARS:** | 2020/21 |
| **DESCRIPTION:** | Replace or repair 1,070± linear feet of deteriorating gravity sewer mains and manholes located in Rio Del Mar. The sewer lines are old, deteriorating and at the end of their design life. | | |

| **ESTIMATED PROJECT COSTS** | | |
|---|---|---|
| Land Survey | $ | 15,000 |
| Preliminary Design | $ | - |
| Environmental | $ | 1,500 |
| Geotechnical | $ | - |
| Engineering Design | $ | 50,000 |
| Acquisition | $ | |
| Construction | $ | 488,000 |
| Construction Management | $ | 30,000 |
| Construction Inspection | $ | 126,000 |
| Other | $ | 122,000 |
| **Total Estimated Project Costs** | **$** | **$832,500** |

| **FUNDING SOURCES** | | |
|---|---|---|
| District Funds | $ | **$832,500** |
| Loans | $ | - |
| | | |
| | | |
| | | |
| Grants | $ | - |
| | | |
| | | |
| | | |
| Other | $ | - |
| **Total Project Funding** | **$** | **$832,500** |
| **Funding Not Yet Identified** | **$** | **-** |

# SOQUEL PUMP STATION FORCE MAIN REPLACEMENT PROJECT

| | |
|---|---|
| CAPITOLA | X |
| DISTRICT 1 | X |
| DISTRICT 2 | X |
| CITY OF SANTA CRUZ | |






| | | | |
|---|---|---|---|
| PROJECT TYPE: | SYSTEM UPGRADE | PROJECT STATUS: | COMPLETED |
| LOCATION: | CAPITOLA | ESTIMATED CONSTRUCTION YEARS: | 2020/21 |
| DESCRIPTION: | Replace force main from Soquel Pump Station to Soquel Wharf Road. 24-year-old crossing is at the end of its useful life. | | |

| ESTIMATED PROJECT COSTS | | |
|---|---|---|
| Land Survey | $ | 8,000 |
| Preliminary Design | $ | 33,000 |
| Environmental | $ | 405,000 |
| Geotechnical | $ | 90,000 |
| Engineering Design | $ | 555,000 |
| Acquisition | $ | 156,600 |
| Construction | $ | 5,700,000 |
| Construction Management | $ | 322,000 |
| Construction Inspection | $ | 220,000 |
| Other (District-Purchased Equipment/ | $ | 685,000 |
| **Total Estimated Project Costs** | **$** | **8,174,600** |

| FUNDING SOURCES | | |
|---|---|---|
| District Funds | $ | 1,197,869 |
| Loans | $ | 5,000,000 |
| | | |
| | | |
| | | |
| Grants | $ | 1,976,731 |
| | | |
| | | |
| | | |
| Other | $ | - |
| **Total Project Funding** | **$** | **8,174,600** |
| **Funding Not Yet Identified** | **$** | **-** |

# VFD REPLACEMENTS 2020/21

# (RODEO PUMP STATION AND SOQUEL PUMP STATION)

| | |
|---|---|
| CAPITOLA | ☐ |
| DISTRICT 1 | X |
| DISTRICT 2 | ☐ |
| CITY OF SANTA CRUZ | ☐ |





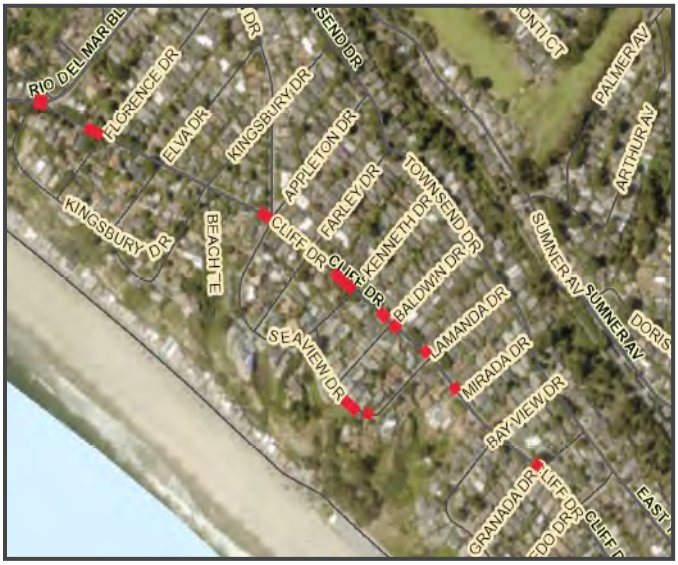

| | | | |
|---|---|---|---|
| **PROJECT TYPE:** | SYSTEM IMPROVEMENTS | **PROJECT STATUS:** | IN PROGRESS |
| **LOCATION:** | VARIOUS LOCATIONS | **ESTIMATED CONSTRUCTION YEARS:** | 2020/21 |
| **DESCRIPTION:** | Variable Frequency Drive (VFD) replacements at Soquel Pump Station and Rodeo Pump Station. | | |

| **ESTIMATED PROJECT COSTS** | |
|---|---|
| Land Survey | $ - |
| Preliminary Design | $ - |
| Environmental | $ - |
| Geotechnical | $ - |
| Engineering Design | $ - |
| Acquisition | $ - |
| Construction | $ - |
| Construction Management | $ - |
| Construction Inspection | $ - |
| Other | $ - |
| **Total Estimated Project Costs** | **$ 165,000** |

| **FUNDING SOURCES** | |
|---|---|
| District Funds | $ 165,000 |
| Loans | $ - |
| | |
| | |
| | |
| Grants | $ - |
| | |
| | |
| | |
| Other | $ - |
| **Total Project Funding** | **$ 165,000** |
| **Funding Not Yet Identified** | **$ -** |

# CLIFF DRIVE SEWER TRENCH REPAIR

| | |
|---|---|
| CAPITOLA | ☐ |
| DISTRICT 1 | ☐ |
| DISTRICT 2 | ☒ |
| CITY OF SANTA CRUZ | ☐ |






| | | | |
|---|---|---|---|
| **PROJECT TYPE:** | SYSTEM UPGRADE | **PROJECT STATUS:** | COMPLETED |
| **LOCATION:** | APTOS | **ESTIMATED CONSTRUCTION YEARS:** | 2021/22 |
| **DESCRIPTION:** | Rehabilitation of sewer main trenches; sealing pipe-manhole connections; and lining existing manholes in Rio Del Mar near Cliff Drive. | | |

| ESTIMATED PROJECT COSTS | | |
|---|---|---|
| Land Survey | $ | - |
| Preliminary Design | $ | - |
| Environmental | $ | 500 |
| Geotechnical | $ | 10,460 |
| Engineering Design | $ | 40,000 |
| Acquisition | $ | - |
| Construction | $ | 407,200 |
| Construction Management | $ | 20,000 |
| Construction Inspection | $ | 88,240 |
| Other | $ | 40,000 |
| **Total Estimated Project Costs** | **$** | **606,400** |

| FUNDING SOURCES | | |
|---|---|---|
| District Funds | $ | 606,400 |
| Loans | $ | - |
| | | |
| | | |
| | | |
| Grants | $ | - |
| | | |
| | | |
| | | |
| Other | $ | - |
| **Total Project Funding** | **$** | **606,400** |
| **Funding Not Yet Identified** | **$** | |

# VALVE REPLACEMENTS 2021/22

# (PURCHASE ONLY)

| | |
|---|---|
| CAPITOLA | |
| DISTRICT 1 | X |
| DISTRICT 2 | |
| CITY OF SANTA CRUZ | |






| | | | |
|---|---|---|---|
| **PROJECT TYPE:** | SYSTEM IMPROVEMENTS | **PROJECT STATUS:** | COMPLETED |
| **LOCATION:** | VARIOUS LOCATIONS | **ESTIMATED CONSTRUCTION YEARS:** | 2021/22 |
| **DESCRIPTION:** | Purchase of valves for D.A. Porath Pump Station to replace suction gate valves in the pump room and valves for the Capitola Pump Station. | | |

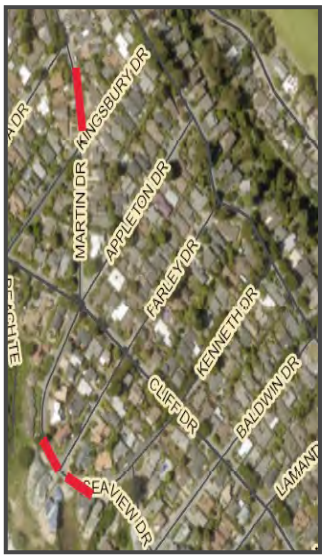
| **ESTIMATED PROJECT COSTS** | |
|---|---|
| Land Survey | $ - |
| Preliminary Design | $ - |
| Environmental | $ - |
| Geotechnical | $ - |
| Engineering Design | $ - |
| Acquisition | $ - |
| Construction | $ - |
| Construction Management | $ - |
| Construction Inspection | $ - |
| Other | $ - |
| **Total Estimated Project Costs** | **$ 251,000** |

| **FUNDING SOURCES** | |
|---|---|
| District Funds | $ 251,000 |
| Loans | $ - |
| | |
| | |
| | |
| Grants | $ - |
| | |
| | |
| | |
| Other | $ - |
| **Total Project Funding** | **$ 251,000** |
| **Funding Not Yet Identified** | **$ -** |

# 2021 SEWER PIPE REHABILITATION

| | |
|---|---|
| CAPITOLA | |
| DISTRICT 1 | X |
| DISTRICT 2 | X |
| CITY OF SANTA CRUZ | |










| | | | |
|---|---|---|---|
| **PROJECT TYPE:** | SYSTEM UPGRADE | **PROJECT STATUS:** | IN CONSTRUCTION |
| **LOCATION:** | SCCSD/ALL | **ESTIMATED CONSTRUCTION YEARS:** | 2021/22 |
| **DESCRIPTION:** | Replace or repair deteriorating gravity sewer mains and manholes located throughout the Santa Cruz County Sanitation District. The sewer lines are old, deteriorating and at the end of their design life. | | |

| **ESTIMATED PROJECT COSTS** | | |
|---|---|---|
| Land Survey | $ | 4,000 |
| Preliminary Design | $ | - |
| Environmental | $ | - |
| Geotechnical | $ | - |
| Engineering Design | $ | - |
| Acquisition | $ | - |
| Construction | $ | 766,000 |
| Construction Management | $ | 80,000 |
| Construction Inspection | $ | 108,200 |
| Other | $ | 177,700 |
| **Total Estimated Project Costs** | **$** | **1,135,900** |

| **FUNDING SOURCES** | | |
|---|---|---|
| District Funds | $ | $1,135,900 |
| Loans | $ | - |
| | | |
| | | |
| | | |
| Grants | $ | - |
| | | |
| | | |
| | | |
| Other | $ | - |
| **Total Project Funding** | **$** | $1,135,900 |
| **Funding Not Yet Identified** | **$** | |

# ARANA TRUNKLINE REPLACEMENT

| | |
|---|---|
| CAPITOLA | |
| DISTRICT 1 | X |
| DISTRICT 2 | |
| CITY OF SANTA CRUZ | X |






| | | | |
|---|---|---|---|
| **PROJECT TYPE:** | SYSTEM UPGRADE | **PROJECT STATUS:** | IN DESIGN |
| **LOCATION:** | CITY OF SANTA CRUZ & LIVE OAK | **ESTIMATED CONSTRUCTION YEARS:** | 2021/22—2022/23 |
| **DESCRIPTION:** | Replace/rehabilitate 3,000± linear feet of sewer line. Line is old and deteriorating. | | |

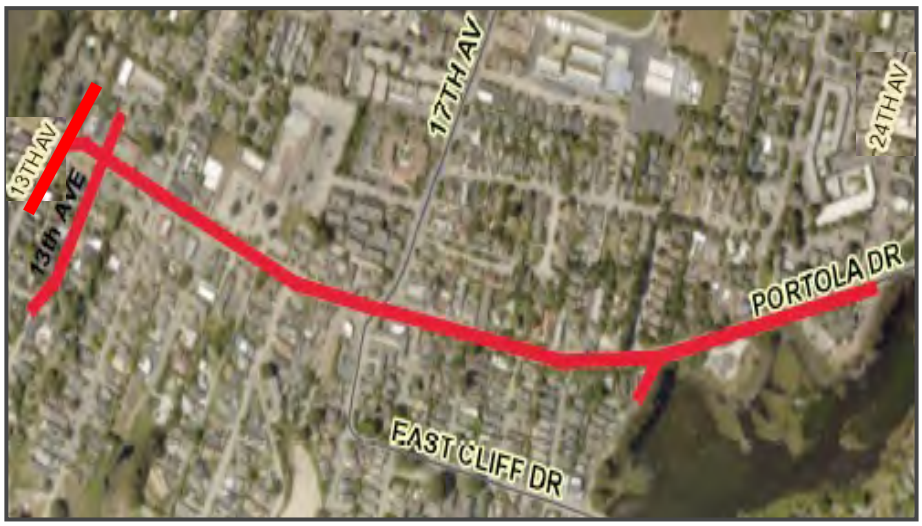
| ESTIMATED PROJECT COSTS | | |
|---|---|---|
| Land Survey | $ | 40,000 |
| Preliminary Design | $ | - |
| Environmental | $ | 144,200 |
| Geotechnical | $ | 75,000 |
| Engineering Design | $ | 400,000 |
| Acquisition | $ | 60,000 |
| Construction | $ | 2,000,000 |
| Construction Management | $ | 80,000 |
| Construction Inspection | $ | 250,000 |
| Other | $ | 425,000 |
| **Total Estimated Project Costs** | **$** | **3,474,200** |

| FUNDING SOURCES | | |
|---|---|---|
| District Funds | $ | 374,200 |
| Loans | $ | - |
| | | |
| | | |
| | | |
| Grants | $ | - |
| | | |
| | | |
| | | |
| Other (Bonds) | $ | 3,100,000 |
| **Total Project Funding** | **$** | **3,474,200** |
| **Funding Not Yet Identified** | **$** | **-** |

# EAST CLIFF, PORTOLA, & RICHMOND DRIVES SEWER REPLACEMENTS

| | |
|---|---|
| CAPITOLA | |
| DISTRICT 1 | X |
| DISTRICT 2 | |
| CITY OF SANTA CRUZ | |






| | | | |
|---|---|---|---|
| **PROJECT TYPE:** | SYSTEM UPGRADE | **PROJECT STATUS:** | IN DESIGN |
| **LOCATION:** | LIVE OAK | **ESTIMATED CONSTRUCTION YEARS:** | 2021/22—2022/23 |
| **DESCRIPTION:** | Replace 6,300 ± linear feet of sewer line that is old and deteriorating. | | |

| ESTIMATED PROJECT COSTS | | |
|---|---|---|
| Land Survey | $ | 50,000 |
| Preliminary Design | $ | - |
| Environmental | $ | 50,000 |
| Geotechnical | $ | 40,000 |
| Engineering Design | $ | 100,000 |
| Acquisition | $ | - |
| Construction | $ | 6,000,000 |
| Construction Management | $ | 100,000 |
| Construction Inspection | $ | 300,000 |
| Other | $ | 599,000 |
| **Total Estimated Project Costs** | **$** | **7,239,000** |

| FUNDING SOURCES | | |
|---|---|---|
| District Funds | $ | 339,000 |
| Loans | $ | - |
| | | |
| | | |
| | | |
| Grants | $ | - |
| | | |
| | | |
| | | |
| Other (Bonds) | $ | 6,900,000 |
| **Total Project Funding** | **$** | **7,239,000** |
| **Funding Not Yet Identified** | **$** | **-** |

# EAST CLIFF TRANSMISSION MAIN RELOCATION AT MURRAY STREET BRIDGE

| | |
|---|---|
| CAPITOLA | |
| DISTRICT 1 | |
| DISTRICT 2 | |
| CITY OF SANTA CRUZ | X |






| | | | |
|---|---|---|---|
| **PROJECT TYPE:** | SYSTEM UPGRADE | **PROJECT STATUS:** | IN DESIGN |
| **LOCATION:** | CITY OF SANTA CRUZ | **ESTIMATED CONSTRUCTION YEARS:** | 2021/22—2022/23 |
| **DESCRIPTION:** | Relocate approximately 700 linear feet of transmission main out of the harbor and attach to the bridge in coordination with the City of Santa Cruz's Murray Street Bridge Project. Line is in a sensitive area and is near the end of its useful life. | | |

| ESTIMATED PROJECT COSTS | | |
|---|---|---|
| Land Survey | $ | 40,060 |
| Preliminary Design | $ | 105,850 |
| Environmental | $ | 17,070 |
| Geotechnical | $ | 38,880 |
| Engineering Design | $ | 721,780 |
| Acquisition | $ | - |
| Construction | $ | 5,200,000 |
| Construction Management | $ | 250,000 |
| Construction Inspection | $ | 40,000 |
| Other | $ | 936,760 |
| **Total Estimated Project Costs** | **$** | **7,350,400** |

| FUNDING SOURCES | | |
|---|---|---|
| District Funds | $ | 1,766,010 |
| Loans | $ | - |
| | | |
| | | |
| | | |
| Grants | $ | 5,584,390 |
| | | |
| | | |
| | | |
| Other | $ | - |
| **Total Project Funding** | **$** | **7,350,400** |
| **Funding Not Yet Identified** | **$** | **-** |

# PLC UPGRADES 2021/22

| | |
|---|---|
| CAPITOLA | |
| DISTRICT 1 | X |
| DISTRICT 2 | X |
| CITY OF SANTA CRUZ | |

| PROJECT | LOCATION | EXISTING PLC MODEL |
|---|---|---|
| 15TH AVE | 262 15TH AVENUE | Compact Logix L23E |
| APTOS BLUE | 3200 APTOS RANCH | Compact Logix L23E |
| CHAMINADE | 3700 BLOCK OF PAUL SWEET ROAD | MicroLogix 1500 |
| MORAN | 2750 LODE STREET | Compact Logix L23E |
| SEACLIFF | 837 SEACLIFF DRIVE | MicroLogix 1500 |
| SEARS CIRCLE | 18 SEARS CIRCLE | Compact Logix L23E |
| WAUGH | 407 WAUGH AVENUE | Compact Logix L23E |
| WILSHIRE | WILSHIRE DRIVE | Compact Logix L23E |



| | | | |
|---|---|---|---|
| **PROJECT TYPE:** | OPERATIONS AND MAINTENANCE | **PROJECT STATUS:** | FUTURE DESIGN |
| **LOCATION:** | VARIOUS LOCATIONS | **ESTIMATED CONSTRUCTION YEARS:** | 2021/22 |
| **DESCRIPTION:** | Replace and upgrade older Programmable Logic Controllers (PLCs) at eight pump stations. | | |

| ESTIMATED PROJECT COSTS | | |
|---|---|---|
| Land Survey | $ | - |
| Preliminary Design | $ | - |
| Environmental | $ | - |
| Geotechnical | $ | - |
| Engineering Design | $ | - |
| Acquisition | $ | - |
| Construction | $ | - |
| Construction Management | $ | - |
| Construction Inspection | $ | - |
| Other | $ | - |
| **Total Estimated Project Costs** | **$** | **200,000** |

| FUNDING SOURCES | | |
|---|---|---|
| District Funds | $ | 200,000 |
| Loans | $ | - |
| | | |
| | | |
| | | |
| Grants | $ | - |
| | | |
| | | |
| | | |
| Other | $ | - |
| **Total Project Funding** | **$** | **200,000** |
| **Funding Not Yet Identified** | **$** | **-** |

# VALENCIA CREEK SEWER RELOCATION

| | |
|---|---|
| CAPITOLA | ☐ |
| DISTRICT 1 | ☐ |
| DISTRICT 2 | X |
| CITY OF SANTA CRUZ | ☐ |






| | | | |
|---|---|---|---|
| **PROJECT TYPE:** | SYSTEM UPGRADE | **PROJECT STATUS:** | IN DESIGN |
| **LOCATION:** | APTOS | **ESTIMATED CONSTRUCTION YEARS:** | 2021/22—2022/23 |
| **DESCRIPTION:** | Replace 730+ linear feet of 10-inch pipeline beneath Highway 1, east of the existing 10-inch sewer main and away from Valencia Creek. Replace a temporary repair. | | |

| **ESTIMATED PROJECT COSTS** | | |
|---|---|---|
| Land Survey | $ | 20,000 |
| Preliminary Design | $ | - |
| Environmental | $ | 53,500 |
| Geotechnical | $ | 480,000 |
| Engineering Design | $ | 104,000 |
| Acquisition | $ | 75,000 |
| Construction | $ | 1,100,000 |
| Construction Management | $ | 100,000 |
| Construction Inspection | $ | 200,000 |
| Other | $ | 218,900 |
| **Total Estimated Project Costs** | **$** | **2,351,400** |

| **FUNDING SOURCES** | | |
|---|---|---|
| District Funds | $ | 958,400 |
| Loans | $ | 1,393,000 |
| | | |
| | | |
| | | |
| Grants | $ | - |
| | | |
| | | |
| | | |
| Other | $ | - |
| **Total Project Funding** | **$** | **2,351,400** |
| **Funding Not Yet Identified** | **$** | **-** |

# VFD REPLACEMENTS 2021/22

# (CAPITOLA PUMP STATION AND D.A. PORATH PUMP STATION)

| | |
|---|---|
| CAPITOLA | X |
| DISTRICT 1 | X |
| DISTRICT 2 | X |
| CITY OF SANTA CRUZ | |






| | | | |
|---|---|---|---|
| **PROJECT TYPE:** | SYSTEM IMPROVEMENTS | **PROJECT STATUS:** | FUTURE DESIGN |
| **LOCATION:** | VARIOUS LOCATIONS | **ESTIMATED CONSTRUCTION YEARS:** | 2021/22 |
| **DESCRIPTION:** | Variable Frequency Drive (VFD) replacements at Capitola Pump Station and D.A. Porath Pump Station. | | |

| ESTIMATED PROJECT COSTS | | |
|---|---|---|
| Land Survey | $ | - |
| Preliminary Design | $ | - |
| Environmental | $ | - |
| Geotechnical | $ | - |
| Engineering Design | $ | - |
| Acquisition | $ | - |
| Construction | $ | - |
| Construction Management | $ | - |
| Construction Inspection | $ | - |
| Other | $ | - |
| **Total Estimated Project Costs** | **$** | **150,000** |

| FUNDING SOURCES | | |
|---|---|---|
| District Funds | $ | 150,000 |
| Loans | $ | - |
| | | |
| | | |
| | | |
| Grants | $ | - |
| | | |
| | | |
| | | |
| Other | $ | - |
| **Total Project Funding** | **$** | **150,000** |
| **Funding Not Yet Identified** | **$** | **-** |

# CAPITOLA PUMP STATION PUMP REPLACEMENT

| | |
|---|---|
| CAPITOLA | X |
| DISTRICT 1 | |
| DISTRICT 2 | X |
| CITY OF SANTA CRUZ | |





| | | | |
|---|---|---|---|
| **PROJECT TYPE:** | SYSTEM UPGRADE | **PROJECT STATUS:** | IN DESIGN |
| **LOCATION:** | CAPITOLA | **ESTIMATED CONSTRUCTION YEARS:** | 2022/23 |
| **DESCRIPTION:** | Replace three 75 HP aging pumps with Flygt pumps. The existing pumps were installed in 2006. The new Flygt pumps were purchased in 2020-21, and will be installed in 2022/23. The valves purchased in 2021-22 would be installed at this time as well. | | |

| ESTIMATED PROJECT COSTS | | |
|---|---|---|
| Land Survey | $ | - |
| Preliminary Design | $ | - |
| Environmental | $ | - |
| Geotechnical | $ | - |
| Engineering Design | $ | - |
| Acquisition | $ | - |
| Construction/Installation | $ | 300,000 |
| Construction Management | $ | - |
| Construction Inspection | $ | - |
| Other | $ | |
| **Total Estimated Project Costs** | **$** | **300,000** |

| FUNDING SOURCES | | |
|---|---|---|
| District Funds | $ | 300,000 |
| Loans | $ | - |
| | | |
| | | |
| | | |
| Grants | $ | - |
| | | |
| | | |
| | | |
| Other | $ | - |
| **Total Project Funding** | **$** | **300,000** |
| **Funding Not Yet Identified** | **$** | **-** |

# D.A. PORATH PUMP STATION ACCESS HATCHES

| | |
|---|---|
| CAPITOLA | ☐ |
| DISTRICT 1 | X |
| DISTRICT 2 | ☐ |
| CITY OF SANTA CRUZ | ☐ |





| | | | |
|---|---|---|---|
| **PROJECT TYPE:** | SYSTEM IMPROVEMENTS | **PROJECT STATUS:** | FUTURE DESIGN |
| **LOCATION:** | D.A. PORATH PUMP STATION | **ESTIMATED CONSTRUCTION YEARS:** | 2022/23 |
| **DESCRIPTION:** | Installation of two access hatches on the wet well at the D.A. Porath Pump Station and associated improvements. | | |

| ESTIMATED PROJECT COSTS | | |
|---|---|---|
| Land Survey | $ | - |
| Preliminary Design | $ | - |
| Environmental | $ | - |
| Geotechnical | $ | - |
| Engineering Design | $ | 80,000 |
| Acquisition | $ | - |
| Construction | $ | 240,000 |
| Construction Management | $ | 10,000 |
| Construction Inspection | $ | 50,000 |
| Other | $ | 56,000 |
| **Total Estimated Project Costs** | **$** | **436,000** |

| FUNDING SOURCES | | |
|---|---|---|
| District Funds | $ | 436,000 |
| Loans | $ | - |
| | | |
| | | |
| | | |
| Grants | $ | - |
| | | |
| | | |
| | | |
| Other | $ | - |
| **Total Project Funding** | **$** | **436,000** |
| **Funding Not Yet Identified** | **$** | **-** |

# D.A. PORATH FACILITY PARKING IMPROVEMENTS

| | |
|---|---|
| CAPITOLA | ☐ |
| DISTRICT 1 | X |
| DISTRICT 2 | ☐ |
| CITY OF SANTA CRUZ | ☐ |





| | | | |
|---|---|---|---|
| **PROJECT TYPE:** | SYSTEM IMPROVEMENTS | **PROJECT STATUS:** | IN DESIGN |
| **LOCATION:** | D.A. PORATH PUMP STATION | **ESTIMATED CONSTRUCTION YEARS:** | 2022/23 |
| **DESCRIPTION:** | Construction of new paved parking area for District maintenance vehicles. | | |

| ESTIMATED PROJECT COSTS | | |
|---|---|---|
| Land Survey | $ | 5,000 |
| Preliminary Design | $ | - |
| Environmental | $ | 7,000 |
| Geotechnical | $ | 15,000 |
| Engineering Design | $ | 10,000 |
| Acquisition | $ | - |
| Construction | $ | 100,000 |
| Construction Management | $ | 10,000 |
| Construction Inspection | $ | 30,000 |
| Other | $ | 80,000 |
| **Total Estimated Project Costs** | **$** | **257,000** |

| FUNDING SOURCES | | |
|---|---|---|
| District Funds | $ | 257,000 |
| Loans | $ | - |
| | | |
| | | |
| | | |
| Grants | $ | - |
| | | |
| | | |
| | | |
| Other | $ | - |
| **Total Project Funding** | **$** | **257,000** |
| **Funding Not Yet Identified** | **$** | **-** |

# D.A. PORATH VALVE REPLACEMENT AND EMERGENCY BYPASS

| | |
|---|---|
| CAPITOLA | |
| DISTRICT 1 | X |
| DISTRICT 2 | |
| CITY OF SANTA CRUZ | |





| | | | |
|---|---|---|---|
| **PROJECT TYPE:** | SYSTEM IMPROVEMENTS | **PROJECT STATUS:** | FUTURE DESIGN |
| **LOCATION:** | D.A. PORATH PUMP STATION | **ESTIMATED CONSTRUCTION YEARS:** | 2022/23 |
| **DESCRIPTION:** | The existing gate valve on the force main leaving the station is deteriorated and will be replaced. Improvements to install an emergency bypass will be installed as part of the project and used to facilitate the valve replacement. | | |

| **ESTIMATED PROJECT COSTS** | | |
|---|---|---|
| Land Survey | $ | 7,000 |
| Preliminary Design | $ | - |
| Environmental | $ | 7,000 |
| Geotechnical | $ | 35,000 |
| Engineering Design | $ | 70,000 |
| Acquisition | $ | - |
| Construction | $ | 700,000 |
| Construction Management | $ | 40,000 |
| Construction Inspection | $ | 175,000 |
| Other | $ | 165,000 |
| **Total Estimated Project Costs** | **$** | **1,199,000** |

| **FUNDING SOURCES** | | |
|---|---|---|
| District Funds | $ | 1,199,000 |
| Loans | $ | - |
| | | |
| | | |
| | | |
| Grants | $ | - |
| | | |
| | | |
| | | |
| Other | $ | - |
| **Total Project Funding** | **$** | **1,199,000** |
| **Funding Not Yet Identified** | **$** | **-** |

# EDDY LANE SEWER RELOCATION

| | |
|---|---|
| CAPITOLA | |
| DISTRICT 1 | X |
| DISTRICT 2 | |
| CITY OF SANTA CRUZ | |






| | | | |
|---|---|---|---|
| **PROJECT TYPE:** | SYSTEM UPGRADE | **PROJECT STATUS:** | IN DESIGN |
| **LOCATION:** | LIVE OAK | **ESTIMATED CONSTRUCTION YEARS:** | 2022/23 |
| **DESCRIPTION:** | Replace 800± linear feet of deteriorating public gravity sewer mains and manholes located on Eddy Lane and private property. This portion of main is deteriorated and beyond its design life. The new sewer mains will be aligned to avoid the building foundation that is over the exiting sewer main. This project will serve to reduce the risk of sanitary sewer overflows in Leona Creek. | | |

| **ESTIMATED PROJECT COSTS** | | |
|---|---|---|
| Land Survey | $ | 10,000 |
| Preliminary Design | $ | |
| Environmental | $ | 5,000 |
| Geotechnical | $ | |
| Engineering Design | $ | 50,000 |
| Acquisition/Appraisal | $ | 25,000 |
| Construction | $ | 550,000 |
| Construction Management | $ | 50,000 |
| Construction Inspection | $ | 90,000 |
| Other | $ | 150,000 |
| **Total Estimated Project Costs** | **$** | **930,000** |

| **FUNDING SOURCES** | | |
|---|---|---|
| District Funds | $ | 930,000 |
| Loans | $ | - |
| | | |
| | | |
| | | |
| Grants | $ | - |
| | | |
| | | |
| | | |
| Other | $ | - |
| **Total Project Funding** | **$** | **930,000** |
| **Funding Not Yet Identified** | **$** | **-** |

# LOWER RODEO TRUNKLINE REPLACEMENT

| | |
|---|---|
| CAPITOLA | |
| DISTRICT 1 | X |
| DISTRICT 2 | |
| CITY OF SANTA CRUZ | |





| | | | |
|---|---|---|---|
| **PROJECT TYPE:** | SYSTEM UPSIZE | **PROJECT STATUS:** | IN DESIGN |
| **LOCATION:** | TWIN LAKES | **ESTIMATED CONSTRUCTION YEARS:** | 2022/23 |
| **DESCRIPTION:** | Replace 1,100 ± linear feet of gravity sewer mains and manholes. The sewer line is undersized for the existing flows, therefore a moratorium is restricting new development. Completion of this project (along with the Rodeo Pump Station Capacity Upgrade and Upper Rodeo Gulch Trunkline & Soquel Bridge Sewer Replacement projects) will allow the District to lift a long-standing moratorium for the Rodeo Gulch Sewer Basin. | | |

| ESTIMATED PROJECT COSTS | | |
|---|---|---|
| Land Survey | $ | 20,000 |
| Preliminary Design | $ | - |
| Environmental | $ | - |
| Geotechnical | $ | - |
| Engineering Design | $ | 63,000 |
| Acquisition/Appraisal | $ | 50,000 |
| Construction | $ | 1,150,000 |
| Construction Management | $ | 35,000 |
| Construction Inspection | $ | 120,000 |
| Other | $ | 300,000 |
| **Total Estimated Project Costs** | **$** | **1,738,000** |

| FUNDING SOURCES | | |
|---|---|---|
| District Funds | $ | 238,000 |
| Loans | $ | - |
| | | |
| | | |
| | | |
| Grants | $ | - |
| | | |
| | | |
| | | |
| Other (Bond) | $ | 1,500,000 |
| **Total Project Funding** | **$** | **1,738,000** |
| **Funding Not Yet Identified** | **$** | **-** |

# PLC UPGRADE 2022/23

| | |
|---|---|
| CAPITOLA | X |
| DISTRICT 1 | X |
| DISTRICT 2 | X |
| CITY OF SANTA CRUZ | |

| PROJECT | LOCATION | EXISTING PLC MODEL |
|---|---|---|
| A3 | 440 BEACH DRIVE | MicroLogix 1500 |
| CHERYL | 1829 CHERYL WAY | MicroLogix 1500 |
| CORY | 4035 CORY STREET | MicroLogix 1500 |
| GROVE | 100 GROVE LANE | MicroLogix 1500 |
| HARBOR VIEW | CAPITOLA AND HARBOR VIEW | MicroLogix 1500 |
| PEARSON CT. | 4146 PEARSON COURT | MicroLogix 1500 |
| POTBELLY BEACH | 23 POTBELLY BEACH ROAD | Compact Logix L23E |



| | | | |
|---|---|---|---|
| **PROJECT TYPE:** | OPERATIONS AND MAINTENANCE | **PROJECT STATUS:** | FUTURE DESIGN |
| **LOCATION:** | VARIOUS LOCATIONS | **ESTIMATED CONSTRUCTION YEARS:** | 2022/23 |
| **DESCRIPTION:** | Replace and upgrade older Programmable Logic Controllers (PLCs) at seven pump stations. | | |

| ESTIMATED PROJECT COSTS | |
|---|---|
| Land Survey | $ - |
| Preliminary Design | $ - |
| Environmental | $ - |
| Geotechnical | $ - |
| Engineering Design | $ - |
| Acquisition | $ - |
| Construction | $ - |
| Construction Management | $ - |
| Construction Inspection | $ - |
| Other | $ - |
| **Total Estimated Project Costs** | **$ 300,000** |

| FUNDING SOURCES | |
|---|---|
| District Funds | $ 300,000 |
| Loans | $ - |
| | |
| | |
| | |
| Grants | $ - |
| | |
| | |
| | |
| Other | $ - |
| **Total Project Funding** | **$ 300,000** |
| **Funding Not Yet Identified** | **$ -** |

# RIO SANDS SEWER REHABILITATION

| | |
|---|---|
| CAPITOLA | ☐ |
| DISTRICT 1 | ☐ |
| DISTRICT 2 | X |
| CITY OF SANTA CRUZ | ☐ |








| | | | |
|---|---|---|---|
| **PROJECT TYPE:** | SYSTEM UPGRADE | **PROJECT STATUS:** | IN DESIGN |
| **LOCATION:** | RIO DEL MAR | **ESTIMATED CONSTRUCTION YEARS:** | 2022/23 |
| **DESCRIPTION:** | Replace or 500± linear feet of deteriorating public gravity sewer mains and manholes located on the Rio Sands Hotel property. This portion of sewer main becomes plugged with roots and has become too deteriorated to apply traditional flushing techniques to clear the blockages. | | |

| ESTIMATED PROJECT COSTS | | |
|---|---|---|
| Land Survey | $ | 4,000 |
| Preliminary Design | $ | - |
| Environmental | $ | 1,000 |
| Geotechnical | $ | - |
| Engineering Design | $ | 50,000 |
| Acquisition/Appraisal | $ | 20,000 |
| Construction | $ | 400,000 |
| Construction Management | $ | 20,000 |
| Construction Inspection | $ | 100,000 |
| Other | $ | 120,000 |
| **Total Estimated Project Costs** | **$** | **715,000** |

| FUNDING SOURCES | | |
|---|---|---|
| District Funds | $ | 715,000 |
| Loans | $ | - |
| | | |
| | | |
| | | |
| Grants | $ | - |
| | | |
| | | |
| | | |
| Other | $ | - |
| **Total Project Funding** | **$** | **715,000** |
| **Funding Not Yet Identified** | **$** | **-** |

# RODEO PUMP STATION CAPACITY UPGRADE

| | |
|---|---|
| CAPITOLA | |
| DISTRICT 1 | X |
| DISTRICT 2 | |
| CITY OF SANTA CRUZ | |





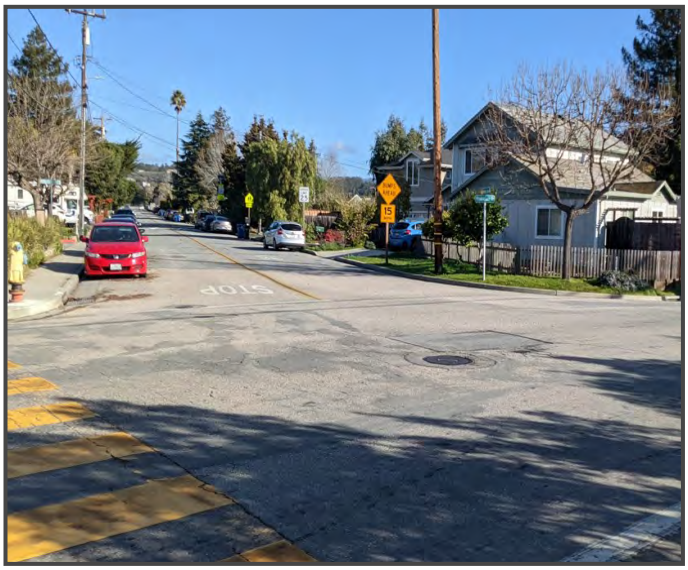

| | | | |
|---|---|---|---|
| **PROJECT TYPE:** | SYSTEM UPGRADE | **PROJECT STATUS:** | IN DESIGN |
| **LOCATION:** | LIVE OAK | **ESTIMATED CONSTRUCTION YEARS:** | 2022/23 |
| **DESCRIPTION:** | Construct an auxiliary wet well for additional storage of current and projected sewer flows during wet weather storm events. Completion of this project (along with the Lower Rodeo Trunkline Replacement and Upper Rodeo Gulch Trunkline & Soquel Bridge Sewer Replacement projects) will allow the District to lift a long-standing moratorium for the Rodeo Gulch Sewer Basin. | | |

| **ESTIMATED PROJECT COSTS** | | |
|---|---|---|
| Land Survey | $ | 15,000 |
| Preliminary Design | $ | 87,500 |
| Environmental | $ | - |
| Geotechnical | $ | 51,600 |
| Engineering Design | $ | 330,900 |
| Acquisition | $ | - |
| Construction | $ | 1,000,000 |
| Construction Management | $ | 80,000 |
| Construction Inspection | $ | 150,000 |
| Other | $ | 200,000 |
| **Total Estimated Project Costs** | **$** | **1,915,000** |

| **FUNDING SOURCES** | | |
|---|---|---|
| District Funds | $ | 515,000 |
| Loans | $ | - |
| | | |
| | | |
| | | |
| Grants | $ | - |
| | | |
| | | |
| | | |
| Other (Bonds) | $ | 1,400,000 |
| **Total Project Funding** | **$** | **1,915,000** |
| **Funding Not Yet Identified** | **$** | **-** |

# RODRIGUEZ STREET SEWER REHABILITATION

| | |
|---|---|
| CAPITOLA | |
| DISTRICT 1 | X |
| DISTRICT 2 | |
| CITY OF SANTA CRUZ | |





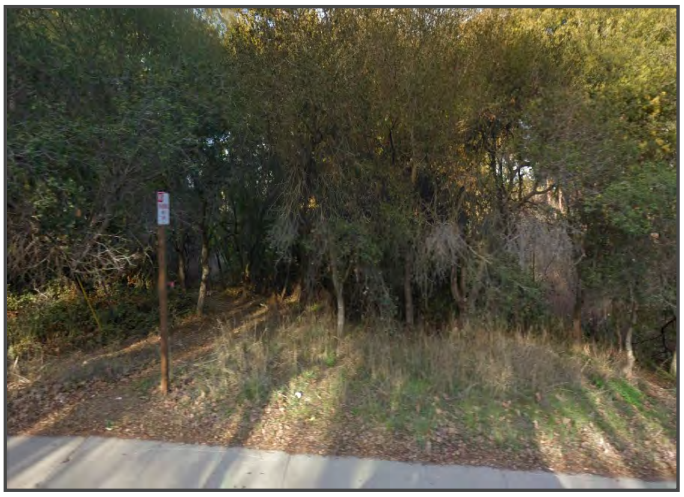

| | | | |
|---|---|---|---|
| **PROJECT TYPE:** | SYSTEM UPGRADE | **PROJECT STATUS:** | IN DESIGN |
| **LOCATION:** | LIVE OAK | **ESTIMATED CONSTRUCTION YEARS:** | 2022/23 |
| **DESCRIPTION:** | Replace or 600± linear feet of deteriorating gravity sewer mains and repair associate manholes. The sewer lines are old, deteriorating and at the end of their design life. | | |

| **ESTIMATED PROJECT COSTS** | | |
|---|---|---|
| Land Survey | $ | 10,000 |
| Preliminary Design | $ | |
| Environmental | $ | 2,000 |
| Geotechnical | $ | |
| Engineering Design | $ | 50,000 |
| Acquisition | $ | |
| Construction | $ | 420,000 |
| Construction Management | $ | 50,000 |
| Construction Inspection | $ | 90,000 |
| Other | $ | 108,000 |
| **Total Estimated Project Costs** | **$** | **$730,000** |

| **FUNDING SOURCES** | | |
|---|---|---|
| District Funds | $ | **$730,000** |
| Loans | $ | - |
| | | |
| | | |
| | | |
| Grants | $ | - |
| | | |
| | | |
| | | |
| Other | $ | - |
| **Total Project Funding** | **$** | **$730,000** |
| **Funding Not Yet Identified** | **$** | **-** |

# UPPER RODEO GULCH TRUNKLINE & SOQUEL BRIDGE SEWER REPLACEMENT

| | |
|---|---|
| CAPITOLA | |
| DISTRICT 1 | X |
| DISTRICT 2 | |
| CITY OF SANTA CRUZ | |






| | | | |
|---|---|---|---|
| **PROJECT TYPE:** | SYSTEM UPGRADE/ INCREASE CAPACITY | **PROJECT STATUS:** | IN DESIGN |
| **LOCATION:** | LIVE OAK | **ESTIMATED CONSTRUCTION YEARS:** | 2022/23 |
| **DESCRIPTION:** | Replace 4,900± linear feet of sewer line. Lines are deteriorating and allow for ground water infiltration that cause the sewer mains to operate over capacity. Pipe under bridge has lost some of its supports and is an exposed asbestos cement pipe. Completion of this project (along with the Lower Rodeo Trunkline Replacement and Rodeo Pump Station Capacity Upgrade projects) will allow the District to lift a long-standing moratorium for the Rodeo Gulch Sewer Basin. | | |

| ESTIMATED PROJECT COSTS | | |
|---|---|---|
| Land Survey | $ | 50,000 |
| Preliminary Design | $ | 250,000 |
| Environmental | $ | 190,000 |
| Geotechnical | $ | 80,000 |
| Engineering Design | $ | 400,000 |
| Acquisition/Appraisal | $ | 40,000 |
| Construction | $ | 3,400,000 |
| Construction Management | $ | 60,000 |
| Construction Inspection | $ | 300,000 |
| Other | $ | 650,000 |
| **Total Estimated Project Costs** | **$** | **5,420,000** |

| FUNDING SOURCES | | |
|---|---|---|
| District Funds | $ | 1,320,000 |
| Loans | $ | - |
| | | |
| | | |
| | | |
| Grants | $ | - |
| | | |
| | | |
| | | |
| Other (Bonds) | $ | 4,100,000 |
| **Total Project Funding** | **$** | **5,420,000** |
| **Funding Not Yet Identified** | **$** | **-** |

# HIDDEN BEACH—SEWER TRUNKLINE REHABILITATION

| | |
|---|---|
| CAPITOLA | |
| DISTRICT 1 | |
| DISTRICT 2 | X |
| CITY OF SANTA CRUZ | |






| | | | |
|---|---|---|---|
| **PROJECT TYPE:** | SYSTEM UPGRADE | **PROJECT STATUS:** | FUTURE DESIGN |
| **LOCATION:** | HIDDEN BEACH, APTOS | **ESTIMATED CONSTRUCTION YEARS:** | 2023/24 |
| **DESCRIPTION:** | Rehabilitate 900± linear feet of sewer trunk line to prevent root infiltration and install an emergency bypass. | | |

| ESTIMATED PROJECT COSTS | | |
|---|---|---|
| Land Survey | $ | 5,000 |
| Preliminary Design | $ | - |
| Environmental | $ | 10,000 |
| Geotechnical | $ | - |
| Engineering Design | $ | 20,000 |
| Acquisition | $ | - |
| Construction | $ | 700,000 |
| Construction Management | $ | 30,000 |
| Construction Inspection | $ | 75,000 |
| Other | $ | 163,000 |
| **Total Estimated Project Costs** | **$** | **1,003,000** |

| FUNDING SOURCES | | |
|---|---|---|
| District Funds | $ | 1,003,000 |
| Loans | $ | - |
| | | |
| | | |
| | | |
| Grants | $ | - |
| | | |
| | | |
| | | |
| Other | $ | - |
| **Total Project Funding** | **$** | **1,003,000** |
| **Funding Not Yet Identified** | **$** | **-** |

# PLC UPGRADE 2023/24

| | |
|---|---|
| CAPITOLA | |
| DISTRICT 1 | X |
| DISTRICT 2 | X |
| CITY OF SANTA CRUZ | |

| PROJECT | LOCATION | EXISTING PLC MODEL |
|---|---|---|
| APTOS ESPLANADE GENEROX | 104 MARINA AVENUE | Compact Logix L23E |
| ARANA | 2001 SOQUEL DRIVE | Compact Logix L23E |
| COURTSIDE | 7848 TANIAS COURT | MicroLogix 1500 |
| EAST CLIFF HYDROFLOW | 2750 LODE STREET | MicroLogix 1500 |
| MAR VISTA | 100 MAR VISTA | MicroLogix 1500 |
| PINE KNOLL | 2546 CAPITOLA ROAD | MicroLogix 1500 |
| UPLANDS #1 | 102 ZANZIBAR DRIVE | MicroLogix 1500 |
| UPLANDS #2 | 162 ZANZIBAR DRIVE | MicroLogix 1500 |
| UPLANDS #3 | 144 CASTILLO COURT | MicroLogix 1500 |

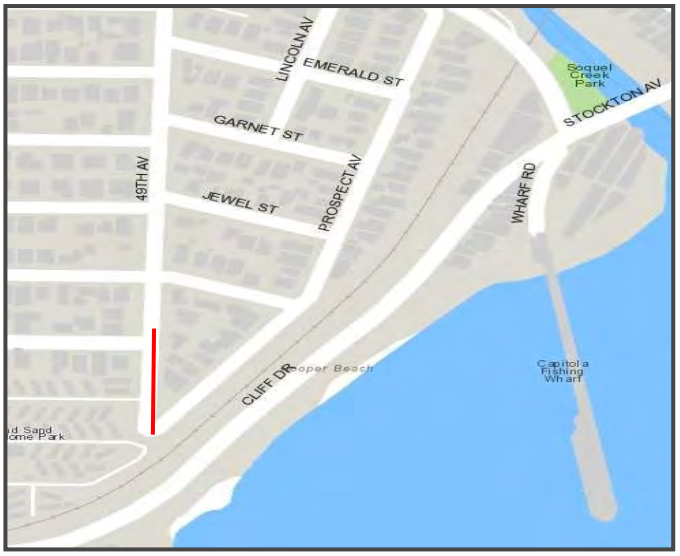
| | | | |
|---|---|---|---|
| **PROJECT TYPE:** | OPERATIONS AND MAINTENACE | **PROJECT STATUS:** | FUTURE DESIGN |
| **LOCATION:** | VARIOUS LOCATIONS | **ESTIMATED CONSTRUCTION YEARS:** | 2023/24 |
| **DESCRIPTION:** | Replace and upgrade older Programmable Logic Controllers (PLCs) at nine pump stations. | | |

| ESTIMATED PROJECT COSTS | |
|---|---|
| Land Survey | $ - |
| Preliminary Design | $ - |
| Environmental | $ - |
| Geotechnical | $ - |
| Engineering Design | $ - |
| Acquisition | $ - |
| Construction | $ - |
| Construction Management | $ - |
| Construction Inspection | $ - |
| Other | $ - |
| **Total Estimated Project Costs** | **$ 350,000** |

| FUNDING SOURCES | |
|---|---|
| District Funds | $ 350,000 |
| Loans | $ - |
| | |
| | |
| | |
| Grants | $ - |
| | |
| | |
| | |
| Other | $ - |
| **Total Project Funding** | **$ 350,000** |
| **Funding Not Yet Identified** | **$ -** |

# CAPITOLA VILLAGE SEWER REHABILITATION

| | |
|---|---|
| CAPITOLA | X |
| DISTRICT 1 | |
| DISTRICT 2 | X |
| CITY OF SANTA CRUZ | |







| | | | |
|---|---|---|---|
| **PROJECT TYPE:** | SYSTEM UPGRADE | **PROJECT STATUS:** | FUTURE DESIGN |
| **LOCATION:** | CAPITOLA VILLAGE | **ESTIMATED CONSTRUCTION YEARS:** | 2024/25 |
| **DESCRIPTION:** | Rehabilitate 8,750± linear feet of deteriorating sewer mains. Perform pre-design flow monitoring to determine if some sewer mains are undersized as indicated by 2019 regional flow monitoring. Upsize required sewer mains if required. | | |

| ESTIMATED PROJECT COSTS | | |
|---|---|---|
| Land Survey | $ | 20,000 |
| Preliminary Design | $ | 50,000 |
| Environmental | $ | 70,000 |
| Geotechnical | $ | |
| Engineering Design | $ | 60,000 |
| Acquisition | $ | 40,000 |
| Construction | $ | 4,800,000 |
| Construction Management | $ | 80,000 |
| Construction Inspection | $ | 200,000 |
| Other | $ | 851,200 |
| **Total Estimated Project Costs** | **$** | **6,171,200** |

| FUNDING SOURCES | | |
|---|---|---|
| District Funds | $ | 671,200 |
| Loans | $ | - |
| | | |
| | | |
| | | |
| Grants | $ | - |
| | | |
| | | |
| | | |
| Other | $ | - |
| **Total Project Funding** | **$** | **671,200** |
| **Funding Not Yet Identified** | **$** | **5,500,000** |

# EAST CLIFF TRANSMISSION MAIN INSPECTION

| | |
|---|---|
| CAPITOLA | |
| DISTRICT 1 | X |
| DISTRICT 2 | |
| CITY OF SANTA CRUZ | X |







| | | | |
|---|---|---|---|
| **PROJECT TYPE:** | SYSTEM UPGRADE | **PROJECT STATUS:** | FUTURE |
| **LOCATION:** | CITY OF SANTA CRUZ & LIVE OAK | **ESTIMATED CONSTRUCTION YEARS:** | 2024/25 |
| **DESCRIPTION:** | The force main from the D.A Porath Facility to the City of Santa Cruz was inspected by Pure Technologies in 2014. The District plans to inspect the force main every 10 years. | | |

| ESTIMATED PROJECT COSTS | | |
|---|---|---|
| Land Survey | $ | - |
| Preliminary Design | $ | - |
| Environmental | $ | - |
| Geotechnical | $ | - |
| Engineering Design | $ | - |
| Acquisition | $ | - |
| Construction | $ | - |
| Construction Management | $ | - |
| Construction Inspection | $ | - |
| Other | $ | 100,000 |
| **Total Estimated Project Costs** | **$** | **100,000** |

| FUNDING SOURCES | | |
|---|---|---|
| District Funds | $ | 100,000 |
| Loans | $ | - |
| | | |
| | | |
| | | |
| Grants | $ | - |
| | | |
| | | |
| | | |
| Other | $ | - |
| **Total Project Funding** | **$** | **100,000** |
| **Funding Not Yet Identified** | **$** | **-** |

# PLC UPGRADES 2024/25

| | |
|---|---|
| CAPITOLA | |
| DISTRICT 1 | X |
| DISTRICT 2 | X |
| CITY OF SANTA CRUZ | |

| PROJECT | LOCATION | PLC MODEL |
|---|---|---|
| APTOS ESPLANADE | 104 MARINA AVENUE | Compact Logix L23E |
| APTOS ESPLANADE REPEATER & GENERATOR | 104 MARINA AVENUE | DeviceNet |
| D.A PORATH GENERATOR | 2750 LODE STREET | MicroLogix 1400 |
| HIDDEN BEACH GENERATOR | 770 CLIFF DRIVE | MicroLogix 1400 |
| VIA PALO ALTO | 1096 VIA PALO ALTO | Compact Logix L23E |



| | | | |
|---|---|---|---|
| **PROJECT TYPE:** | OPERATIONS AND MAINTENACE | **PROJECT STATUS:** | FUTURE DESIGN |
| **LOCATION:** | VARIOUS LOCATIONS | **ESTIMATED CONSTRUCTION YEARS:** | 2024/25 |
| **DESCRIPTION:** | Replace and upgrade older Programmable Logic Controllers (PLCs) at five locations in the District. | | |

| ESTIMATED PROJECT COSTS | |
|---|---|
| Land Survey | $ - |
| Preliminary Design | $ - |
| Environmental | $ - |
| Geotechnical | $ - |
| Engineering Design | $ - |
| Acquisition | $ - |
| Construction | $ - |
| Construction Management | $ - |
| Construction Inspection | $ - |
| Other | $ |
| **Total Estimated Project Costs** | **$ 200,000** |

| FUNDING SOURCES | |
|---|---|
| P53357 PLC Upgrades | $ 200,000 |
| Loans | $ - |
| | |
| | |
| | |
| Grants | $ - |
| | |
| | |
| | |
| Other | $ - |
| **Total Project Funding** | **$ 200,000** |
| **Funding Not Yet Identified** | **$ -** |

# RIO DEL MAR SEWER REHABILITATION—PHASE 2

| | |
|---|---|
| CAPITOLA | |
| DISTRICT 1 | |
| DISTRICT 2 | X |
| CITY OF SANTA CRUZ | |







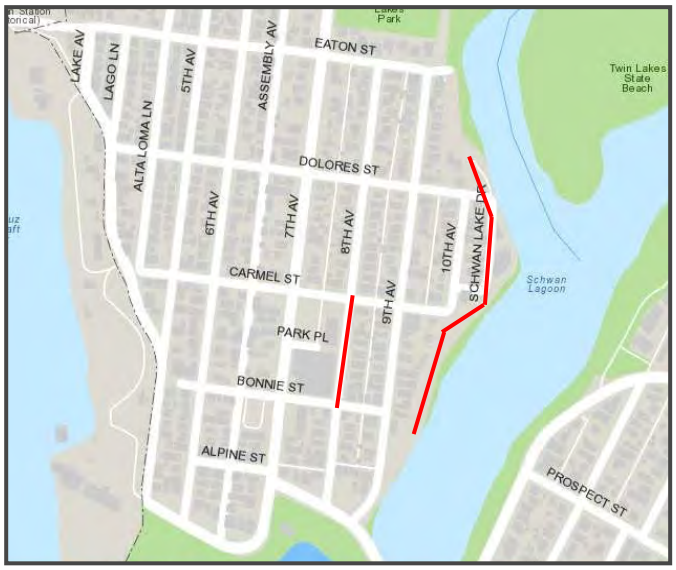
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|---|---|---|---|
| **PROJECT TYPE:** | SYSTEM UPGRADE | **PROJECT STATUS:** | FUTURE DESIGN |
| **LOCATION:** | RIO DEL MAR | **ESTIMATED CONSTRUCTION YEARS:** | 2024/25 |
| **DESCRIPTION:** | Rehabilitate 2,700± linear feet of sewer mains that are frequently clogged with roots, which required frequent maintenance and can lead to sewer overflows. This project will eliminate the need for Smart Cover monitoring on two manholes. | | |

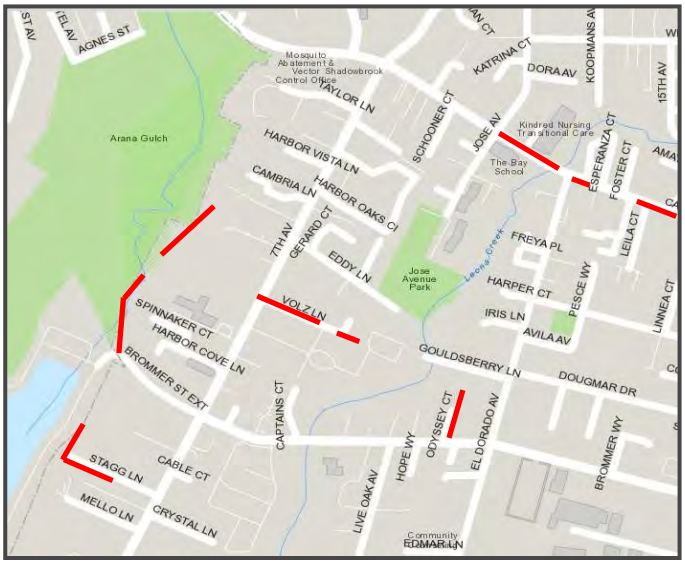
| ESTIMATED PROJECT COSTS | | |
|---|---|---|
| Land Survey | $ | 20,000 |
| Preliminary Design | $ | - |
| Environmental | $ | 20,000 |
| Geotechnical | $ | - |
| Engineering Design | $ | 50,000 |
| Acquisition | $ | 30,000 |
| Construction | $ | 1,400,000 |
| Construction Management | $ | 50,000 |
| Construction Inspection | $ | 125,000 |
| Other | $ | 324,800 |
| **Total Estimated Project Costs** | **$** | **2,019,800** |

| FUNDING SOURCES | | |
|---|---|---|
| District Funds | $ | 2,019,800 |
| Loans | $ | - |
| | | |
| | | |
| | | |
| Grants | $ | - |
| | | |
| | | |
| | | |
| Other | $ | - |
| **Total Project Funding** | **$** | **2,019,800** |
| **Funding Not Yet Identified** | **$** | |

# SANTA CRUZ HARBOR AREA SEWER REHABILITATION—PHASE 2

| | |
|---|---|
| CAPITOLA | |
| DISTRICT 1 | X |
| DISTRICT 2 | |
| CITY OF SANTA CRUZ | |




| | | | |
|---|---|---|---|
| **PROJECT TYPE:** | SYSTEM UPGRADE | **PROJECT STATUS:** | FUTURE DESIGN |
| **LOCATION:** | TWIN LAKES | **ESTIMATED CONSTRUCTION YEARS:** | 2024/25 |
| **DESCRIPTION:** | Replace or repair 4,400± linear feet of deteriorating gravity sewer mains and manholes located throughout the east Santa Cruz Harbor area. The sewer lines are old, deteriorating and at the end of their design life. | | |

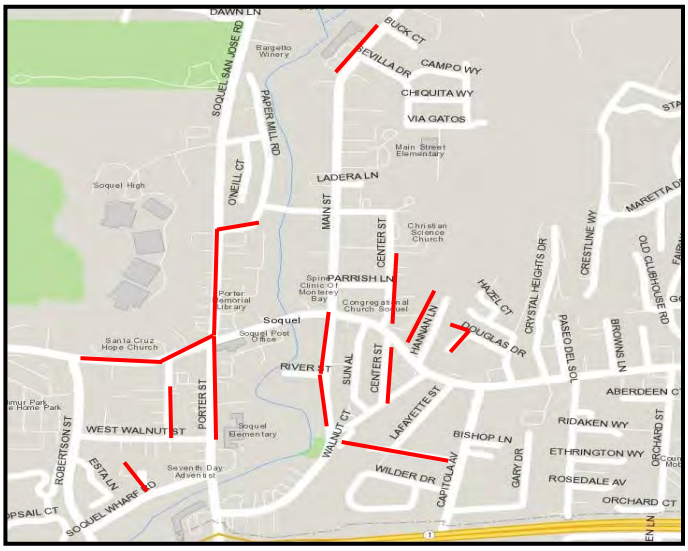
| ESTIMATED PROJECT COSTS | | |
|---|---|---|
| Land Survey | $ | 30,000 |
| Preliminary Design | $ | - |
| Environmental | $ | 70,000 |
| Geotechnical | $ | - |
| Engineering Design | $ | 60,000 |
| Acquisition | $ | 70,000 |
| Construction | $ | 2,900,000 |
| Construction Management | $ | 75,000 |
| Construction Inspection | $ | 175,000 |
| Other | $ | 545,200 |
| **Total Estimated Project Costs** | **$** | **3,925,200** |

| FUNDING SOURCES | | |
|---|---|---|
| District Funds | $ | 1,225,200 |
| Loans | $ | - |
| | | |
| | | |
| | | |
| Grants | $ | - |
| | | |
| | | |
| | | |
| Other | $ | - |
| **Total Project Funding** | **$** | **1,225,200** |
| **Funding Not Yet Identified** | **$** | **2,700,000** |

# SOQUEL VILLAGE SEWER REHABILITATION—PHASE 2

| | |
|---|---|
| CAPITOLA | |
| DISTRICT 1 | X |
| DISTRICT 2 | |
| CITY OF SANTA CRUZ | |




| | | | |
|---|---|---|---|
| **PROJECT TYPE:** | SYSTEM UPGRADE | **PROJECT STATUS:** | FUTURE DESIGN |
| **LOCATION:** | SOQUEL VILLAGE | **ESTIMATED CONSTRUCTION YEARS:** | 2024/25 |
| **DESCRIPTION:** | Rehabilitate 7,400± linear feet of deteriorating sewer mains. Perform pre-design flow monitoring to determine if some sewer mains are undersized as indicated by 2019 regional flow monitoring. Upsize required sewer mains if required. The sewer lines are old, deteriorating and at the end of their design life. | | |

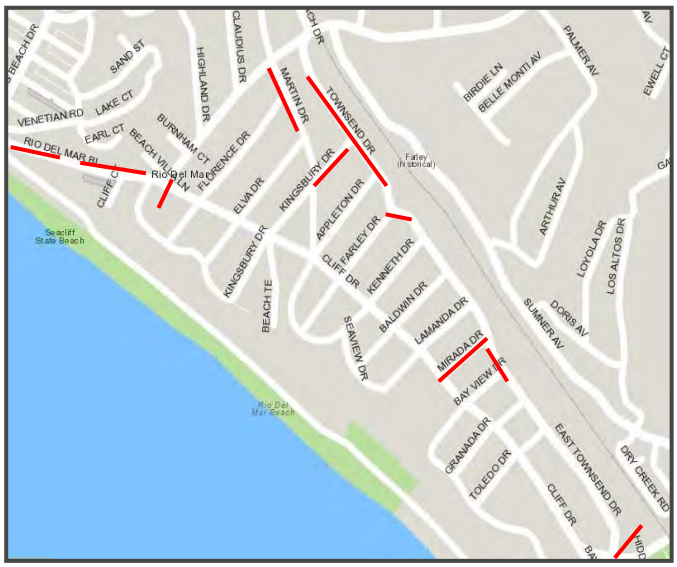
| ESTIMATED PROJECT COSTS | | |
|---|---|---|
| Land Survey | $ | 20,000 |
| Preliminary Design | $ | 50,000 |
| Environmental | $ | 7,000 |
| Geotechnical | $ | |
| Engineering Design | $ | 60,000 |
| Acquisition | $ | |
| Construction | $ | 3,600,000 |
| Construction Management | $ | 100,000 |
| Construction Inspection | $ | 200,000 |
| Other | $ | 800,000 |
| **Total Estimated Project Costs** | **$** | **4,837,000** |

| FUNDING SOURCES | | |
|---|---|---|
| District Funds | $ | 337,000 |
| Loans | $ | - |
| | | |
| | | |
| | | |
| Grants | $ | - |
| | | |
| | | |
| | | |
| Other | $ | - |
| **Total Project Funding** | **$** | **337,000** |
| **Funding Not Yet Identified** | **$** | **4,500,000** |

# TOWNSEND AREA SEWER REHABILITATION

| | |
|---|---|
| CAPITOLA | |
| DISTRICT 1 | |
| DISTRICT 2 | X |
| CITY OF SANTA CRUZ | |




| | | | |
|---|---|---|---|
| **PROJECT TYPE:** | SYSTEM UPGRADE | **PROJECT STATUS:** | FUTURE DESIGN |
| **LOCATION:** | RIO DEL MAR | **ESTIMATED CONSTRUCTION YEARS:** | 2024/25 |
| **DESCRIPTION:** | Rehabilitate 2,800± linear feet of deteriorating sewer mains and manholes. The sewer lines are old, deteriorating and at the end of their design life. | | |

| ESTIMATED PROJECT COSTS | | |
|---|---|---|
| Land Survey | $ | 8,000 |
| Preliminary Design | $ | - |
| Environmental | $ | 7,000 |
| Geotechnical | $ | |
| Engineering Design | $ | 40,000 |
| Acquisition | $ | |
| Construction | $ | 1,600,000 |
| Construction Management | $ | 50,000 |
| Construction Inspection | $ | 125,000 |
| Other | $ | 318,400 |
| **Total Estimated Project Costs** | **$** | **2,148,400** |

| FUNDING SOURCES | | |
|---|---|---|
| District Funds | $ | 448,400 |
| Loans | $ | - |
| | | |
| | | |
| | | |
| Grants | $ | - |
| | | |
| | | |
| | | |
| Other | $ | - |
| **Total Project Funding** | **$** | **448,400** |
| **Funding Not Yet Identified** | **$** | **1,700,000** |

# ARANA PUMP STATION REHABILITATION

| | |
|---|---|
| CAPITOLA | |
| DISTRICT 1 | X |
| DISTRICT 2 | |
| CITY OF SANTA CRUZ | X |






| | | | |
|---|---|---|---|
| **PROJECT TYPE:** | PUMP STATION RELOCATION AND FORCEMAIN REPLACEMENT | **PROJECT STATUS:** | IN DESIGN |
| **LOCATION:** | CITY OF SANTA CRUZ/COUNTY OF SANTA CRUZ | **ESTIMATED CONSTRUCTION YEARS:** | 2025/26 |
| **DESCRIPTION:** | Abandon existing pump station located at drainage low point which is susceptible to flooding and build new pump station within the existing parking lot. Maintaining and operating the station in its current location is very difficult. The station is at risk for sanitary sewer overflows. 750± linear feet of 8" sanitary sewer force main from the lift station will be replaced. | | |

| **ESTIMATED PROJECT COSTS** | | |
|---|---|---|
| Land Survey | $ | 35,000 |
| Preliminary Design | $ | |
| Environmental | $ | 20,000 |
| Geotechnical | $ | 60,000 |
| Engineering Design | $ | 300,000 |
| Acquisition | $ | 10,000 |
| Construction | $ | 3,500,000 |
| Construction Management | $ | 50,000 |
| Construction Inspection | $ | 200,000 |
| Other | $ | 1,000,000 |
| **Total Estimated Project Costs** | **$** | **5,175,000** |

| **FUNDING SOURCES** | | |
|---|---|---|
| District Funds | $ | 1,475,000 |
| Loans | $ | - |
| | | |
| | | |
| | | |
| Grants | $ | - |
| | | |
| | | |
| | | |
| Other | $ | - |
| **Total Project Funding** | **$** | 1,475,000 |
| **Funding Not Yet Identified** | **$** | **3,700,000** |

# EAST CLIFF TRANSMISSION MAIN REPAIRS

| | |
|---|---|
| CAPITOLA | |
| DISTRICT 1 | X |
| DISTRICT 2 | |
| CITY OF SANTA CRUZ | X |







| | | | |
|---|---|---|---|
| **PROJECT TYPE:** | ASSET MANAGEMENT | **PROJECT STATUS:** | FUTURE DESIGN |
| **LOCATION:** | CITY OF SANTA CRUZ & LIVE OAK | **ESTIMATED CONSTRUCTION YEARS:** | 2025/26 |
| **DESCRIPTION:** | Complete repairs identified in the 2024/25 inspection of the force main. | | |

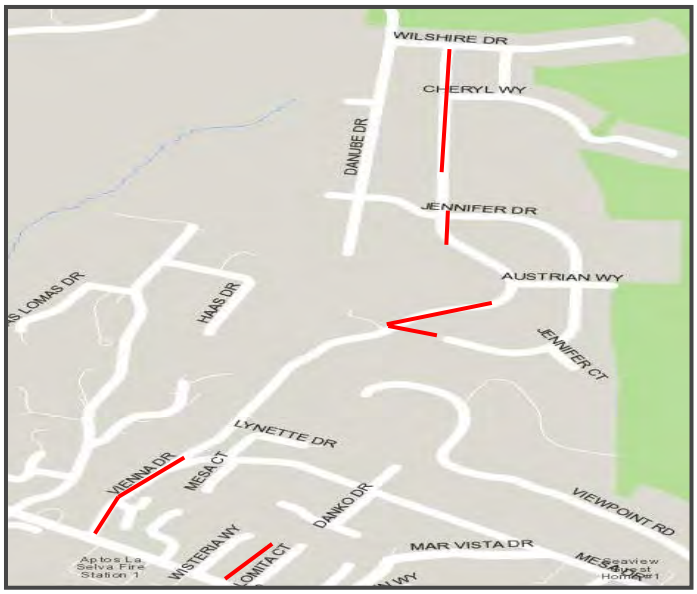
| **ESTIMATED PROJECT COSTS** | | |
|---|---|---|
| Land Survey | $ | 10,000 |
| Preliminary Design | $ | - |
| Environmental | $ | 10,000 |
| Geotechnical | $ | 40,000 |
| Engineering Design | $ | 60,000 |
| Acquisition | $ | - |
| Construction | $ | 470,000 |
| Construction Management | $ | 60,000 |
| Construction Inspection | $ | 140,000 |
| Other | $ | 110,000 |
| **Total Estimated Project Costs** | **$** | **900,000** |

| **FUNDING SOURCES** | | |
|---|---|---|
| District Funds | $ | 900,000 |
| Loans | $ | - |
| | | |
| | | |
| | | |
| Grants | $ | - |
| | | |
| | | |
| | | |
| Other | $ | - |
| **Total Project Funding** | **$** | **900,000** |
| **Funding Not Yet Identified** | **$** | **-** |

# VIENNA WOODS SEWER REHABILITATION—PHASE 1

| | |
|---|---|
| CAPITOLA | ☐ |
| DISTRICT 1 | ☐ |
| DISTRICT 2 | X |
| CITY OF SANTA CRUZ | ☐ |




| | | | |
|---|---|---|---|
| **PROJECT TYPE:** | SYSTEM UPGRADE | **PROJECT STATUS:** | FUTURE DESIGN |
| **LOCATION:** | APTOS | **ESTIMATED CONSTRUCTION YEARS:** | 2025/26 |
| **DESCRIPTION:** | Rehabilitate 2,800± linear feet of deteriorating sewer mains and manholes. The sewer lines are old, deteriorating and at the end of their design life. | | |

| ESTIMATED PROJECT COSTS | | |
|---|---|---|
| Land Survey | $ | 8,000 |
| Preliminary Design | $ | - |
| Environmental | $ | 7,000 |
| Geotechnical | $ | - |
| Engineering Design | $ | 40,000 |
| Acquisition | $ | - |
| Construction | $ | 1,200,000 |
| Construction Management | $ | 50,000 |
| Construction Inspection | $ | 125,000 |
| Other | $ | 240,000 |
| **Total Estimated Project Costs** | **$** | **1,670,000** |

| FUNDING SOURCES | | |
|---|---|---|
| District Funds | $ | 1,670,000 |
| Loans | $ | - |
| | | |
| | | |
| | | |
| Grants | $ | - |
| | | |
| | | |
| | | |
| Other | $ | - |
| **Total Project Funding** | **$** | **1,670,000** |
| **Funding Not Yet Identified** | **$** | **-** |

# UNPROGRAMMED PROJECTS



Alley South of Bennet Sewer Project

2021/22 thru 2025/26
CAPITAL IMPROVEMENT PROGRAM

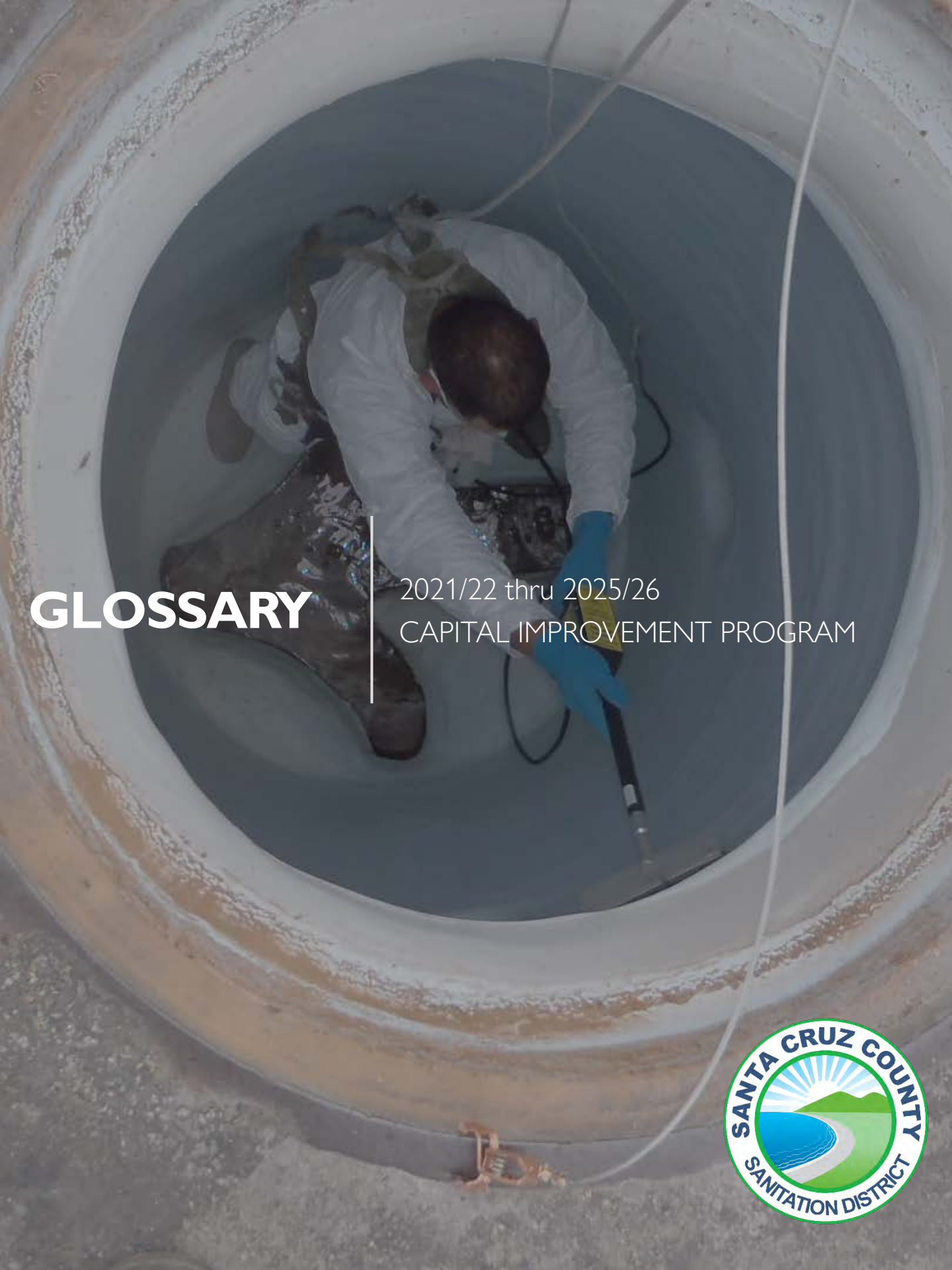
SANTA CRUZ COUNTY SANITATION DISTRICT

# UNPROGRAMMED PROJECTS 2026/27+

| DESCRIPTION | CAPITOLA | DISTRICT 1 | DISTRICT 2 | CITY OF SC | ESTIMATED COST | 2026/27 ESTIMATED COST | 2030/31 ESTIMATED COST |
|---|---|---|---|---|---|---|---|
| 35TH AVENUE SEWER REPLACEMENT—ROLAND DRIVE TO PORTOLA AVENUE | | X | | | $ 1,220,000 | $ 1,342,000 | $ 1,476,200 |
| 38TH AVENUE AREA SEWER IMPROVEMENTS | X | X | | | $ 2,500,000 | $ 2,750,000 | $ 3,025,000 |
| 42ND AVENUE SEWER REPLACEMENT—CLARES STREET TO CAPITOLA ROAD | X | X | | | $ 1,010,000 | $ 1,111,000 | $ 1,222,100 |
| BEACH DRIVE SEWER REPLACEMENT | | | X | | $ 6,060,000 | $ 6,666,000 | $ 7,332,600 |
| BORREGAS GULCH TRUNKLINE REPLACEMENT—PH 1 | | | X | | $ 2,600,000 | $ 2,860,000 | $ 3,146,000 |
| BORREGAS GULCH TRUNKLINE REPLACEMENT—PH 2 | | | X | | $ 2,550,000 | $ 2,805,000 | $ 3,085,500 |
| BORREGAS GULCH TRUNKLINE REPLACEMENT—PH 3 | | | X | | $ 2,600,000 | $ 2,860,000 | $ 3,146,000 |
| CABRILLO PARK SEWER REHABILITATION—PH 2 | | | X | | $ 1,900,000 | $ 2,090,000 | $ 2,299,000 |
| CAPITOLA ROAD EXTENSION SEWER REPLACEMENT | X | | X | | $ 700,000 | $ 770,000 | $ 847,000 |
| COASTVIEW DRIVE SEWER LINE REPLACEMENT | | X | | | $ 2,020,000 | $ 2,222,000 | $ 2,444,200 |
| HILL STREET/CAPITOLA AVENUE AREA SEWER REPLACEMENT | X | | X | | $ 440,000 | $ 484,000 | $ 532,400 |
| LIVE OAK SEWER REHABILITATION — PH 1 | | X | | | $ 1,750,000 | $ 1,925,000 | $ 2,117,500 |
| LIVE OAK SEWER REHABILITATION — PH 2 | | X | | | $ 5,000,000 | $ 5,500,000 | $ 6,050,000 |

# UNPROGRAMMED PROJECTS 2026/27+

| DESCRIPTION | CAPITOLA | DISTRICT 1 | DISTRICT 2 | CITY OF SC | ESTIMATED COST | 2026/27 ESTIMATED COST | 2030/31 ESTIMATED COST |
|---|---|---|---|---|---|---|---|
| MORAN TRANSMISSION MAIN REPLACEMENT | | X | | | $ 1,320,000 | $ 1,452,000 | $ 1,597,200 |
| OPAL CLIFF DRIVE SEWER REPLACEMENT | | X | | | $ 3,340,000 | $ 3,674,000 | $ 4,041,400 |
| PAUL SWEET ROAD SEWER RELOCATION | | X | | | $ 1,320,000 | $ 1,452,000 | $ 1,597,200 |
| PORTOLA DRIVE SEWER REPLACEMENT 26TH AVENUE TO 49TH AVENUE | | X | | | $ 5,760,000 | $ 6,336,000 | $ 6,969,600 |
| RIO DEL MAR SEWER REHABILIATION — PH 3 | | | X | | $ 7,000,000 | $ 7,700,000 | $ 8,470,000 |
| SCHWAN TRANSMISSION MAIN REPLACEMENT | | | X | | $ 1,420,000 | $ 1,562,000 | $ 1,718,200 |
| SEARIDGE ROAD SEWER REPLACEMENT | | X | | | $ 800,000 | $ 880,000 | $ 968,000 |
| SEASCAPE BOULEVARD, PROVENCETOWN COURT TO SUMNER AVENUE SEWER REPLACEMENT | | | X | | $ 710,000 | $ 781,000 | $ 859,100 |
| SOQUEL DRIVE, EAST OF 41ST AVENUE TO PORTER STREET SEWER REPLACEMENT | | X | | | $ 2,120,000 | $ 2,332,000 | $ 2,565,200 |
| SOQUEL PUMP STATON AUXILARY WET WELL | | X | | | $ 3,920,000 | $ 4,312,000 | $ 4,743,200 |
| UPPER HARBOR SEWER REPLACEMENT | | X | | | $ 2,830,000 | $ 3,113,000 | $ 3,424,300 |
| **TOTAL ESTIMATED COST** | | | | | **$ 60,890,000** | **$ 66,979,000** | **$ 73,676,900** |



# GLOSSARY

2021/22 thru 2025/26
CAPITAL IMPROVEMENT PROGRAM

SANTA CRUZ COUNTY SANITATION DISTRICT

# GLOSSARY of TERMS

| | |
|---|---|
| ACP: | Asbestos Cement Pipe |
| ARV: | Air Relief Valve |
| Asbestos Cement Pipe: | Asbestos is a set of six naturally occurring silicate minerals used commercially for their desirable physical properties. The inhalation of asbestos fibers can cause serious illnesses. Asbestos was mixed into cement for cement pipes because of its sound absorption, average tensile strength, and resistance to heat, electrical, and chemical damage. As long as the cement remains whole and in good condition, the mineral is not a serious problem. When the pipes are cut and removed from the ground, however, asbestos fibers can be released into the air and inhaled by workers and others. |
| Asset Management: | The managing of assets to achieve the greatest return. The process of monitoring and maintaining facility systems and public infrastructure, with the goal of providing the best possible service to users. |
| CIPP: | Cast in Place Pipe. CIPP is made of Portland cement concrete and is cast in one piece in a prepared trench using specifically designed equipment. The trench is dug with a round bottom bucket and the earthen trench is the outside form. |
| Directional Boring/Drilling: | Directional boring (or drilling or HDD) is a steerable trenchless method of installing underground pipes, conduits and cables in a shallow arc along a prescribed bore path using a surface-launched drilling rig, with minimal impact on the surrounding area.<br>For more information, see the end of this section. |
| Drive Shafts: | Also known as a jacking shaft and describes the excavated pit into which the jacking equipment is placed in order to carry out trenchless construction or rehabilitation activities. Jacking of new pipes or replacement pipes into the bore is done from the drive shaft. When the pipe reached the receiving shaft, the installation is complete. |
| Effluent: | Sewer water consisting of human waste, wash water, food preparation waste, laundry water and other wastes which is transported from residences and institutions to a treatment plant. |
| Electrical Panel: | The part of an electricity supply system which distributes electrical current to various circuits in a pump station, while providing a protective fuse or circuit breaker for each circuit, in a common enclosure. |

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| Force main: | A pressurized main sewer pipeline, used where gravity will not work, such as in low-lying areas. The pipe is pressurized to force the sewage along in a particular direction. An entire length of pipe may be a force main, or the pipeline may alternate between force and gravity. |
| Generator: | A gas- or diesel-powered engine which provides temporary electrical power. The engine turns a small turbine, which then creates usable electricity. |
| Gravity Sewer: | Allows gravity to move the sewage. Functions when there is no power, is easy to maintain, and is designed so that the contents flow in a certain direction. To ensure that untreated sewage does not back up and pose a public health risk, gravity sewer lines are designed so the pressure of water entering the inflow pipes, combines with the flow of the gravity-fed outflow pipes, preventing backflow. |
| Hatch: | A ground level access door used at some sanitary sewer pump stations for access to wet wells, valves, pump station controls and equipment. |
| HDPE: | High Density Polyethylene Pipe. HDPE can carry potable water, wastewater, slurry, chemicals, hazardous wastes, and compressed gases. HDPE is strong, extremely tough, flexible, and very durable. Joining HDPE pipe segments requires fusing. |
| Lateral: | The part of the sewer line which connects the residence's or business's sewer to the sewer main in the street. Laterals are owned and maintained by the property owners. |
| Lift Station: | An assembly of a wet well, level controls, and pumps designed to take the flow from a gravity sewer system and transport it uphill where the use of a gravity sewer line would not be feasible. (Also called a pump station.) |
| Linear Foot: | A system of measurement in which only the length is considered. |
| Microtunneling | Microtunneling is a digging process that uses a remotely controlled microtunnel boring machine (MTBM) combined with the pipe jack-and-bore method to directly install pipes underground in a single pass. (See also "pipe jacking.") |
| Moratorium: | A suspension in allowed new sewer connections. |
| Outfall: | The place where treated effluent is discharged. |

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| Parallel Sewers: | Where two or more sewer lines are installed next to each other. These are required, at times, when an area's sewer lines need to be gravity sewered in one direction to a nearby pump station and then pumped in the opposite direction to the next pump station. Also, when upsizing an existing sewer line is not possible or cost effective, a parallel line may be installed to add capacity to the sytem. |
| Pipe Bursting: | A trenchless method of replacing buried pipelines (such as sewer, water, or natural gas pipes) without the need for a traditional construction trench. For more information, see the end of this section. |
| Pipe jacking | A microtunneling process where pipes are pushed behind the microtunneling machine. The speed of the microtunneling machine is controlled by how fast the pipe is inserted. |
| Programmable Logic Controller (PLC): | An industrial digital computer that is used for managing pump station automation. |
| Pump Station: | Pump stations (or lift stations) are designed to move raw sewage that is fed from gravity pipelines to pipelines at a higher elevation. Sewage flows into an underground pit, called a wet well. The well is equipped with electrical instrumentation to detect the level of sewage, and when the sewage level rises to a pre-set point, a pump motor creates pressure to push the sewage into a force main where it is eventually discharged into a gravity manhole. The cycle then starts over again until the sewage reaches the City Treatment Facility. The size of the pump station depends on the connections being served and the pumps are between 2hp to 230hp. Typically, large pump stations are located in above ground enclosed structures and smaller pump wet wells are located below ground in residential streets. |
| POTW | Public Owned Treatment Works. Any device of system used in the treatment (including recycling and reclamation) of municipal sewage or industrial wastes of liquid nature which is owned by a "State" or "municipality." |
| RWQCB: | Regional Water Quality Control Board |
| Riparian Corridor: | The part of a watershed adjacent to a body of water, such as a creek, river, or stream. |
| SCADA: | Supervisory Control and Data Acquisition. A computer-based control system for monitoring pump station conditions throughout the District. |

| | |
|---|---|
| Sewer Force main: | See “Force main.” |
| Sewer Lateral: | See “Lateral.” |
| Sewer Moratorium: | See “Moratorium.” |
| Shaft Driven Pumps: | Pumps that are powered by drive shafts. |
| SSFM: | Sanitary Sewer Force Main |
| Submersible Pumps: | Submersible pumps are submerged below the effluent, where the motor is cooled and overheating less likely to occur. |
| SWQCB: | State Water Quality Control Board |
| Sliplining: | Sliplining is completed by installing a smaller, "carrier pipe" into a larger "host pipe.” For more information, see article at end of this section. |
| Trenchless Sewer Technology: | Methods of pipe replacement that can be completed without continuous open trenching of the pipe alignment. For more information, see the end of this section. |
| Variable Frequency Drive (VFD): | A type of motor controller that drives an electric motor by varying the frequency and voltage supplied to the electric motor. |
| Vitrified Clay Pipe (VCP): | Pipe made from clay that has been vitrified, a process which fuses the clay particles into a hard, inert, glass-like state. This type of pipe is usually used in gravity sewer lines because it is reasonably priced and resistant to sulfuric acid which is generated by hydrogen sulfide, a common component of sewage. Hydrofluoric acid and highly-concentrated caustic wastes are the only components known to harm VCP. |
| Wet well: | A chamber which is used to lift the sewage out of the wet well when it reaches a certain level and pump it on towards a treatment plant. |

# Trenchless Technology

Trenchless technology is a type of subsurface construction work that requires few trenches or no continuous trenches. It is a rapidly growing sector of the construction and civil engineering industry. It can be defined as "a family of methods, materials, and equipment capable of being used for the installation of new or replacement or rehabilitation of existing underground infrastructure with minimal disruption to surface traffic, business, and other activities."[1]

Trenchless construction includes such construction methods as tunneling, microtunneling (MTM), horizontal directional drilling (HDD) also known as directional boring, pipe ramming (PR), pipe Jacking (PJ), moling, horizontal auger boring (HAB) and other methods for the installation of pipelines and cables below the ground with minimal excavation. Large diameter tunnels such as those constructed by a tunnel boring machine (TBM), and drilling and blasting techniques are larger versions of subsurface construction. The difference between trenchless and other subsurface construction techniques depends upon the size of the passage under construction.

The method requires considering soil characteristics and the loads applied to the surface. In cases where the soil is sandy, the water table is at shallow depth, or heavy loads such as from traffic are expected, the depth of excavation has to be at a depth such that the pressure of the load on the surface does not affect the bore, otherwise there is danger of surface caving in.

## Trenchless Rehabilitation

Trenchless rehabilitation includes such construction methods as sliplining, thermoformed pipe, pipe bursting, shotcrete, gunite, cured-in-place pipe (CIPP), grout-in-place pipe, mechanical spot repair, and other methods for the repair, rehabilitation, or replacement of existing buried pipes and structures without excavation, or at least with minimal excavation. Mechanical Spot Repair is applied where damaged pipelines require the re-instatement of structural integrity. Sliplining, CIPP, and thermoformed pipe lining involve pulling or inverting a new liner into an existing pipe, then applying heat and/or pressure to force the liner to expand to fill the pipe. CIPP technologies combine a carrier (felt or fiberglass) impregnated with heat, ultraviolet light, or ambient curable resin to form a "pipe within a pipe". Pipe bursting fractures a pipe from the inside and forces the fragments outwards while a new pipe is drawn in to replace the old.[2] The other methods are primarily for fixing spot leaks. Trenchless rehabilitation methods are generally more cost-effective than traditional exhume (dig) and replace methods.

### References (from Wikipedia)

http://www.nastt.org/ North American Society for Trenchless Technology

Simicevic, Jadranka and Sterling, Raymond L. (March 2001) (PDF). *Guidelines for Pipe Bursting,TTC Technical Report #2001.02*. U.S. Army Corps of Engineers Engineering Research and Development Center. http://www.ttc.latech.edu/publications/guidelines_pb_im_pr/bursting.pdf.

# Directional Boring

Directional boring, commonly called horizontal directional drilling or HDD, is a steerable trenchless method of installing underground pipes, conduits and cables in a shallow arc along a prescribed bore path by using a surface-launched drilling rig, with minimal impact on the surrounding area. Directional boring is used when trenching or excavating is not practical. It is suitable for a variety of soil conditions and jobs including road, landscape and river crossings. Installation lengths up to 2000m have been completed, and diameters up to 1200mm have been installed in shorter runs. Pipes can be made of materials such as PVC, polyethylene, polypropylene, Ductile iron, and steel if the pipes can be pulled through the drilled hole. Directional boring is not practical if there are voids in the rock or incomplete layers of rock. The best material is solid rock or sedimentary material. Soils with cobble stone are not recommended. There are different types of heads used in the pilot-hole process, and they depend on the geological material.

The equipment used in a horizontal directional drilling depends on the outer diameter of the pipe, length of the run, ground conditions and the surroundings above ground. For the large bores, directional drills equipped with as much as 450,000kg (or more) of thrust/pullback is used in conjunction with a mud reclaimer, excavator, and multiple pumps and hoses to supply the drilling fluid to the drillstem. The directional drilling stem is made from heat-treated high-carbon steel for strength and ships in diameters of 8 - 15cm. Drill stem sections are manufactured in 3.0 or 4.6 and also 9.1-meter lengths and have male threading on one end, and female on the other. It is common for a directional drill to carry as much as 305m of rod on board. Drilling heads come in multiple designs and depend on the rock or soil being penetrated. The drilling head has multiple water ports to allow removal of material. A talon bit involves carbide-tipped cutters. These allow for steering and cutting the material. Another head is a mud-motor that is used in rocky landscapes.

Furthermore, supporting equipment is needed to assist directional-drilling or HDD to work smoothly, such as drilling mud recycling system, shale shaker, mud cleaner, centrifugal pump, mud tanks, etc.

Directional boring is used for installing infrastructure such as telecommunications and power cable conduits, water lines, sewer lines, gas lines, oil lines, product pipelines, and environmental remediation casings. It is used for crossing waterways, roadways, shore approaches, congested areas, environmentally sensitive areas, and areas where other methods are costlier or not possible. It is used instead of other techniques to provide less traffic disruption, lower cost, deeper and/or longer installation, shorter completion times, directional capabilities, and environmental safety.

The technique has extensive use in urban areas for developing subsurface utilities as it helps in avoiding extensive open cut trenches. The use requires that the operator have complete information about existing utilities so that he can plan the alignment to avoid damaging those utilities. Since uncontrolled drilling can lead to damage, different agencies/government authorities owning the urban *right-of-way* or the utilities have rules for safe work execution. For standardization of the techniques, different trenchless technology promoting organizations have developed guidelines for this technique.

The process starts with receiving hole and entrance pits. These pits will allow the drilling fluid to be collected and reclaimed to reduce costs and prevent waste. The first stage drills a pilot hole on the designed path, and the second stage (reaming) enlarges the hole by passing a larger cutting tool known as the back reamer. The reamer's diameter depends on the size of the pipe to be pulled back through the bore hole. The driller increases the diameter according to the outer diameter or the conduit and to achieve optimal production. The third stage places the product or casing pipe in the enlarged hole by way of the drill stem; it is pulled behind the reamer to allow centering of the pipe in the newly reamed path.

Horizontal directional drilling is done with the help of a viscous fluid known as drilling fluid. It is a mixture of water and, usually, bentonite or polymer continuously pumped to the cutting head or drill bit to facilitate the removal of cuttings, stabilize the bore hole, cool the cutting head, and lubricate the passage of the product pipe. The drilling fluid is sent into a machine called a reclaimer which removes the drill cuttings and maintains the proper viscosity of the fluid. Drilling fluids hold the cuttings in suspension to prevent them from clogging the bore. A clogged bore creates back pressure on the cutting head, slowing production.

Location and guidance of the drilling is an important part of the drilling operation, as the drilling head is under the ground while drilling and, in most cases, not visible from the ground surface. Uncontrolled or unguided drilling can lead to substantial destruction, which can be eliminated by properly locating and guiding the drill head.

There are three types of locating equipment for locating the bore head: the *walk-over* locating system, the *wire-line* locating system and gyro-guided drilling, where a full inertial navigation system is located close to the drill head. In the first system, a sonde, or transmitter, behind the bore head registers angle, rotation, direction, and temperature data. This information is encoded into an electro-magnetic signal and transmitted through the ground to the surface in a walk-over system. At the surface, a receiver (usually a hand-held *locator*) is manually positioned over the sonde, the signal is decoded, and steering directions are relayed to the bore machine operator. The wire-line system is a Magnetic Guidance System. With a Magnetic Guidance System (MGS), the tool reads Inclination and Azimuth. The MGS, also has a secondary means of location verification utilizing wire grids laid on the ground surface. It is the only system that has the capability of verifying the location. This information is transmitted through the wire-line fitted within the drill string. At the surface, the Navigator in the drill cab performs the necessary calculations to confirm the parameters have been met. The MGS even without the use of the wire grid, has been accurate over a distance of 2km to within 1.5m. The gyro-based system is fully autonomously working and therefore one of the most accurate system where sufficient diameter (200mm) is available and where long distances (up to 2km) have to be performed with small deviation (less than 1m position error). All three systems have their own merits, and a particular system is chosen depending upon the site requirements.



A directional boring unit in action.

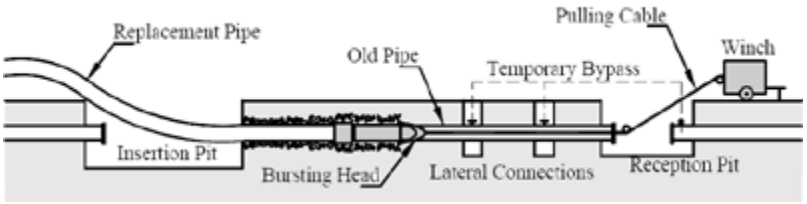



Starting pit with pilot hole and some drilling fluid in the pit.

## References (from Wikipedia)


- Willoughby, David (2005). *Horizontal Directional Drilling*, p. 1-263. Mcgraw-Hill, New York. ISBN 0-07-145473-X.
- Short, Jim (1993). *Introduction to Directional and Horizontal Drilling*, p. 1-222. PennWell Books, Tulsa, Oklahoma. ISBN 0-87814-395-5.
- v. Hinueber, Edgar (iMAR Navigation) (2006). *Most accurate drilling guidance by dead-reckoning using high precision optical gyroscopes*, Proceedings NoDig Conference of Horizontal Directional Drilling, Brisbane 2006.

# Pipe Bursting



Pipe replacement by pipe bursting

**Pipe bursting** is a trenchless method of replacing buried pipelines (such as sewer, water, or natural gas pipes) without the need for a traditional construction trench. "Launching and receiving pits" replace the trench needed by conventional pipe-laying.

There are five key pieces of equipment used in a pipe-bursting operation: the expander head, pulling rods, a pulling machine, a retaining device, and a hydraulic power pack.

Today's expander heads have a leading end much smaller in diameter than the trailing (bursting) end, small enough to fit through the pipe that will be replaced. The smaller leading end is designed to guide the expander head through the existing pipe; earlier models did not have this feature and lost course at times, resulting in incomplete pipe bursts and project failures.

The transition from the leading end to the trailing end can include "fins" that make first contact with the existing pipe. Using these fins as the primary breaking point is a very effective way to ensure that the pipe is broken along the entire circumference.

A machine is set in the receiving pit to pull the expander head and new pipe into the line. The head is pulled by heavy, interlocking links that form a chain. Each link weighs several hundred pounds.

All of the equipment used in a pipe-bursting operation is powered by one or multiple hydraulic power generators.

Pipe-bursting may also be used to expand pipeline carrying capacity by replacing smaller pipes with larger ones, or "upsizing." Extensive proving work by the gas and water industries has demonstrated the feasibility of upsizing gas mains, water mains and sewers. Upsizing from 100mm to 225mm diameter is now well established, and pipes of up to 900mm [1]diameter and greater have been replaced.

## References (From Wikipedia):

B. W. LaMay, P.E., R. E. Hutchinson, P.E., and V. H. Herrera, P.E. (2010). *Pipe Bursting Repair of the City of Tallahassee: Capital Circle 36-Inch Hobas Force Main*. American Society of Civil Engineers. http://cedb.asce.org/cgi/WWWdisplay.cgi?268408.

# Sliplining

Sliplining is one of the oldest methods for trenchless rehabilitation of existing pipelines. Sliplining is used to repair leaks or restore structural stability to an existing pipeline. Sliplining is completed by installing a smaller, "carrier pipe" into a larger "host pipe", grouting the annular space between the two pipes, and sealing the ends. Sliplining has been used since the 1940s.[1] The most common material used to slipline an existing pipe is high density polyethylene (HDPE), but fiberglass reinforced pipe (FRP) and PVC are also common.[2] Sliplining can be used to stop infiltration and restore structural integrity to an existing pipe. The most common size is 0.20m - 1.5m (8"-60"), but sliplining can occur in any size given appropriate conditions.

There are two methods used to install a slipline: continuous and segmental.

Continuous sliplining uses a long continuous pipe, such as HDPE or fusible PVC, that can be welded into continuous pieces of any length. The continuous carrier pipe is pulled through the existing host pipe starting at an insertion pit and continuing to a receiving pit. Either the insertion pit, the receiving pit, or both can be manholes or other existing access points if the size and material of the new carrier pipe can maneuver through the existing facilities.

Segmental sliplining is very similar to continuous sliplining. The difference is primarily based on the pipe material used as the new carrier pipe. When using any bell and spigot pipe such as FRP, PVC, or HDPE the individual pieces of pipe are lowered into place, pushed together, and pushed along the existing pipe corridor.

Using either method the annular space between the two pipes must be grouted. In the case of sanitary sewer lines, the service laterals must be reconnected via open-trench excavation.

Sliplining is generally a very cost effective rehabilitation method. It is also very easy to install and requires tools and equipment widely available to any pipeline contractor. Segmental sliplining may not require bypassing of the existing flow. However, the new pipe will generally have a significantly reduced cross sectional area because of the size difference between the inside diameter of the existing pipe and the outside diameter of the new pipe, as well as the wall thickness of the new pipe. Continuous sliplining generally requires bypassing the existing flow.

## References (from Wikipedia)

Mohammed Najafi, PhD, PE and Sanjov Gokhale, PhD, PE, Trenchless Technology (New York: McGraw Hill, 2004), p. 295-311. Available from Water Environment Federation at http://www.e-wef.org/timssnet/static/OM/WPM404.htm

Mohammed Najafi, PhD, PE and Sanjov Gokhale, PhD, PE, Trenchless Technology (New York: McGraw Hill, 2004), p. 295-311. Available from Water Environment Federation at http://www.e-wef.org/timssnet/static/OM/WPM404.htm

Center for Underground Infrastructure Research and Education CUIRE, Mohammed Najafi, PhD, PE and Sanjov Gokhale, PhD, PE, Trenchless Technology (New York: McGraw Hill, 2004), p. 295-311. Available from Water Environment Federation at http://www.e-wef.org/timssnet/static/OM/WPM404.htm



41st Avenue at Soquel Drive Sewer Rehabilitation Project

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# THE END OF THE (SCCSD) LINE



City of Santa Cruz Treatment Facility

2021/22 thru 2025/26
CAPITAL IMPROVEMENT PROGRAM

SANTA CRUZ COUNTY SANITATION DISTRICT

# About



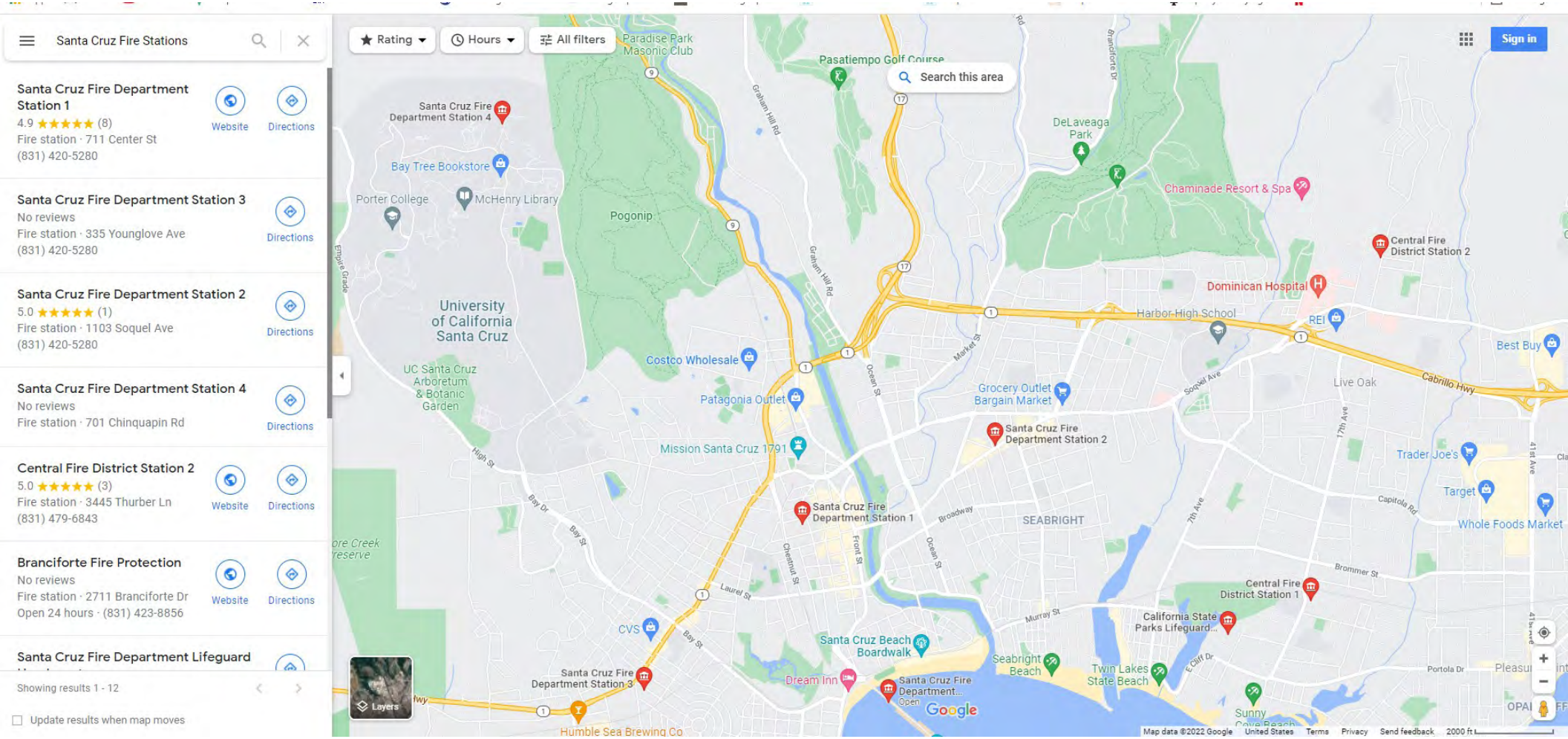
The Santa Cruz Fire Department includes four fire stations and one lifeguard headquarters. Our apparatus includes four engines, one type 3 engine and one truck. We currently have over 60 staff members which includes firefighter/paramedics, captains, battalion chiefs, fire prevention staff, training staff, and administrative staff.  Additionally we have about 70 seasonal lifeguards.

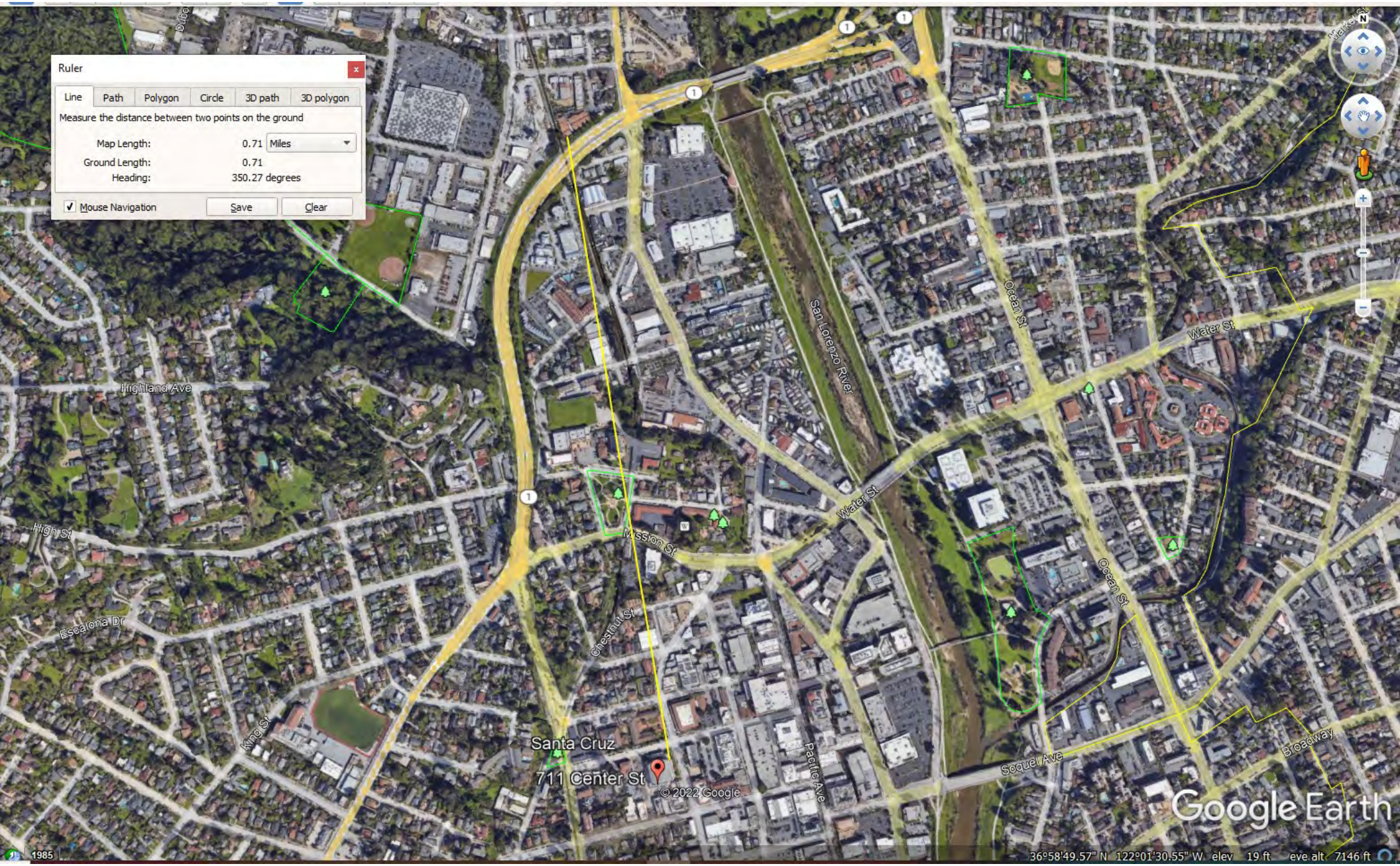
## Emergency Services Provided

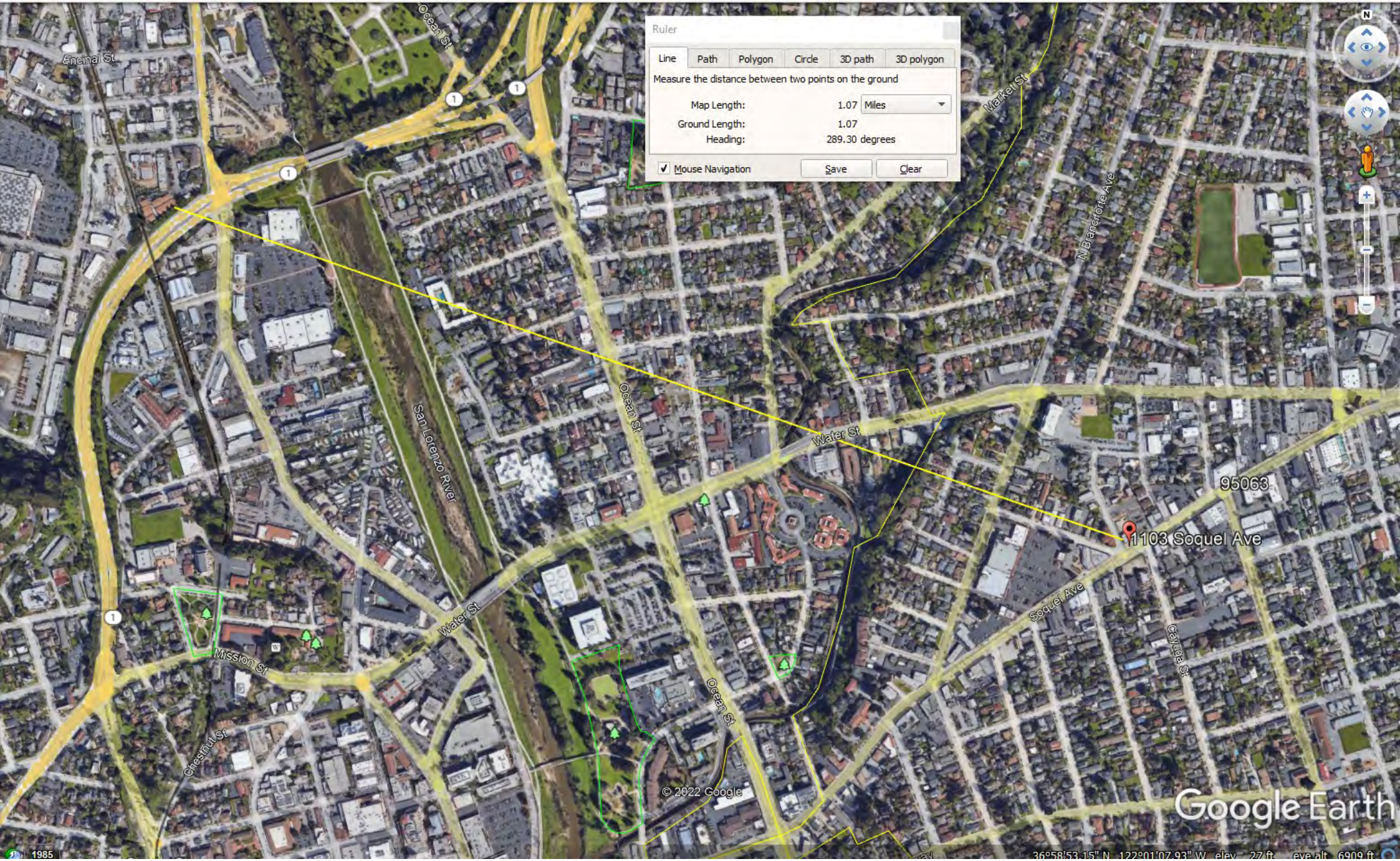
- Structure Fire Suppression
- Wildland Fire Suppression
- Emergency Medical Services (Paramedic)
- Hazardous Materials Incident Response
- Marine Rescue Services
- Technical Rescue

**Station 1** - 711 Center St (built 1940)
**Station 2** - 1103 Soquel Ave (built 1947)
**Station 3** - 335 Younglove Ave (built 1954)
**Station 4** - 701 Chinquapin Rd @ UCSC (built 1975)

Santa Cruz Fire History


Santa Cruz Fire Stations
Santa Cruz Fire Department Station 1
4.9 ★★★★★ (8)
Fire station · 711 Center St
(831) 420-5280
Website
Directions
Santa Cruz Fire Department Station 3
No reviews
Fire station · 335 Younglove Ave
(831) 420-5280
Directions
Santa Cruz Fire Department Station 2
5.0 ★★★★★ (1)
Fire station · 1103 Soquel Ave
(831) 420-5280
Directions
Santa Cruz Fire Department Station 4
No reviews
Fire station · 701 Chinquapin Rd
Directions
Central Fire District Station 2
5.0 ★★★★★ (3)
Fire station · 3445 Thurber Ln
(831) 479-6843
Website
Directions
Branciforte Fire Protection
No reviews
Fire station · 2711 Branciforte Dr
Open 24 hours · (831) 423-8856
Website
Directions
Santa Cruz Fire Department Lifeguard
Showing results 1 - 12
Update results when map moves
Rating
Hours
All filters
Search this area
Sign in
Paradise Park Masonic Club
Pasatiempo Golf Course
Santa Cruz Fire Department Station 4
Bay Tree Bookstore
Porter College
McHenry Library
Pogonip
DeLaveaga Park
Chaminade Resort & Spa
Central Fire District Station 2
Dominican Hospital
Harbor High School
REI
Best Buy
University of California Santa Cruz
UC Santa Cruz Arboretum & Botanic Garden
Costco Wholesale
Patagonia Outlet
Grocery Outlet Bargain Market
Live Oak
Cabrillo Hwy
Santa Cruz Fire Department Station 2
Mission Santa Cruz 1791
Trader Joe's
Target
Whole Foods Market
Santa Cruz Fire Department Station 1
SEABRIGHT
Central Fire District Station 1
California State Parks Lifeguard...
CVS
Santa Cruz Beach Boardwalk
Seabright Beach
Twin Lakes State Beach
Dream Inn
Santa Cruz Fire Department Station 3
Santa Cruz Fire Department... Open
Sunny Cove Beach
Humble Sea Brewing Co
Layers
Google
Map data ©2022 Google
United States
Terms
Privacy
Send feedback
2000 ft


Ruler
Line
Path
Polygon
Circle
3D path
3D polygon
Measure the distance between two points on the ground
Map Length: 0.71 Miles
Ground Length: 0.71
Heading: 350.27 degrees
Mouse Navigation
Save
Clear
Highland Ave
High St
Escalona Dr
King St
Chestnut St
Mission St
Water St
San Lorenzo River
Ocean St
Pacific Ave
Soquel Ave
Broadway
Santa Cruz
711 Center St
© 2022 Google
Google Earth
1985
36°58'49.57" N 122°01'30.55" W elev 19 ft eye alt 7146 ft


Ruler
Line
Path
Polygon
Circle
3D path
3D polygon
Measure the distance between two points on the ground
Map Length: 1.07 Miles
Ground Length: 1.07
Heading: 289.30 degrees
Mouse Navigation
Save
Clear
Encinal St
Ocean St
Market St
N Branciforte Ave
San Lorenzo River
Water St
95063
1103 Soquel Ave
Soquel Ave
Cayuga St
Mission St
Chestnut St
© 2022 Google
Google Earth
1985

Birth and Death Certificates
Childhood Lead Poisoning Prevention Program
Children's Medical Services ›
Communicable Disease Control ›
Community Health Education ›
Emergency Medical Services
Emergency Preparedness ›
Family Health Programs ›
HIV/AIDS Services ›
Immunizations and Vaccines ›
Meaningful Use and Public Health
Medical Marijuana Identification Card
Medical Reserve Corps
National Public Health Week
Public Health Accreditation
Public Health Core Functions
Public Health - Frequently Asked Questions
Syringe Services Program ›
Public Health Menu

# Emergency Medical Services

History - Status - Deployment - Web Links - Meetings/Minutes - EMS Reports

**EMT and Paramedic Certification/Recertification Information**

**EMT Application, documents and payments are due, at the latest, one (1) week prior to EMT license expiration date. Late applications are not guaranteed to be processed prior to EMT license expiration date.**

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- Field Treatment Site Plan
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## What is Emergency Medical Services (EMS)?




- **The 911 Center**– Santa Cruz Consolidated Emergency Communications Center, staffed by Emergency Medical Dispatchers. **Always dial 911 if you have an emergency!**
- **Fire First Response**– EMT Firefighters and Paramedic Firefighters respond first to emergency calls. They arrive on scene in fire engines or rescue vehicles.
- **Ambulance**– Transportation and pre-hospital care, staffed by Paramedics. Ambulance services include Advanced Life Support (ALS), in addition to other medically necessary transportation.
- **Helicopter Transport to Trauma Centers**– Patients may be transported by helicopter to the nearest Trauma Center. Helicopter transports are staffed by Registered Flight Nurses (RNs). Santa Cruz County is served by Santa Clara Valley

**Contact Information**

**Emergency Medical Services (EMS) Administration Office**

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1800 Green Hills Rd
Suite 240
Scotts Valley, CA

**(831) 454-4120**
or Send us Email

For assistance with electronic patient records software:
**Santa Cruz EMS Image Trend Help Desk Support**

**Whats New**

EMCC Meetings are now held the 3rd Monday of the month

**Information**

Having a dispute with your insurance company about the bill for ambulance services?

File a complaint against your health insurance company if you have a problem with your health

Birth and Death Certificates
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### EMS Planning and RFP

- Dual Paramedic vs. Single Paramedic Ambulances in Santa Cruz County

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### The Santa Cruz Consolidated Emergency Communications Center

The Santa Cruz Consolidated Emergency Communications Center (http://www.sccecc.org/) is a Joint Powers Authority created by, and providing public safety and 911 dispatch services for, the county of Santa Cruz and the cities of Santa Cruz, Watsonville, and Capitola. The SCCECC also provides services for nine Fire Districts, American Medical Response West (the paramedic and ambulance transport provider), and County SPCA.

### EMS System History

Santa Cruz County filed its first state EMS plan in 1986. At the time, the county was served by a mix of ambulance providers. That was to change in the late 1980s. By then, north Santa Cruz County (county territory north of Freedom Blvd.) was dominated by a single provider, Pac Med. Pac Med's sole proprietor purchased South County's then-only ambulance company, A-1 Ambulance of Watsonville. Pac Med was later pooled into American Medical Response West (AMRW).

Since 1990, AMRW has been the sole 24-hour ALS ambulance transport provider in the county.

### Current Status

Population growth in Santa Cruz County has remained relatively stable, and the number of system transports has also been stable. The number of emergency system transports (not including transports initiated outside the 9-1-1 system) are reported as follows:

- 2015 = 13,528 transports
- 2014 = 12,807 transports
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Currently, Santa Cruz County maintains an exclusive operating area, dual EMT-P, ALS system.

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The ambulance contractor maintains ten ambulance station locations. From four to eight ambulances are deployed to anticipate and match the demand with the right number of ambulances on the road by day or week and time of day:

- Boulder Creek (San Lorenzo Valley)
- Santa Cruz
- Capitola (Mid-County)
- Watsonville
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- Felton
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- Westside/Extra
- All-County

The county's ambulance contractor also deploys additional units during peak demand times, such as holidays. In addition, the county's contractor has staffed and deployed units as requested by cities or community based organizations at special events.

### Integrated Response

There are presently 14 independent fire agencies in Santa Cruz County, including two city departments. Five agencies maintain engine-based paramedic first response. The fire districts have formed the Emergency Medical Services Integration Authority, a JPA in order to centralize planning and quality assurance activities. No fire agency regularly responds with transport vehicles however three districts maintain licensed vehicles in case of disaster, and for mutual medical aid. Almost all firefighters (including volunteers) are EMT certified. The agencies represent a mix of paid and volunteer forces.

Various districts provide varying levels of first response service. For instance, valley districts provide first response on all emergency medical responses, while city districts only dispatch an engine to the more critical calls, as determined by approved emergency medical dispatch guidelines. (See Dispatch section for more detail).

### Response Zones

Santa Cruz County is presently divided into 3 response zones.

| ALS Response | Ambulance Response |
|---|---|
| 8 minutes | 12 minutes |
| 12 minutes | 18 minutes |
| 20 minutes | 30 minutes |

### Dispatch and Data Collection

Santa Cruz County has a computer aided dispatch center (NETCOM) serving all emergency agencies with the exception of one city police force, CDF and the California Highway Patrol. NetCom is a joint powers agency (JPA), of which the current ambulance contractor is a participant.

The county's EMD uses an advanced medical priority dispatch system, approved by the American Academy of Emergency Medical Dispatchers. NETCOM dispatchers query callers on priority symptoms, dispatch appropriate units at appropriate response codes and give pre-arrival and post dispatch instructions to callers.

Since 1993, Santa Cruz County has collected patient care data using a computerized system maintained by the county. Currently paramedics enter patient data from each call. Collected data is compiled from the computerized database to produce a patient

care report (PCR). The PCR is used as the contractor's medical record, and compiled data is used to maintain quality assurance.

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### Ambulance RFP

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# 4.6 PUBLIC SERVICES & UTILITIES

## 4.6.1 ENVIRONMENTAL SETTING

**IN THIS SECTION:**

- Regulatory Overview
- Fire Protection Services
- Police Protection Services
- Parks and Recreation
- Schools
- Wastewater Treatment
- Solid Waste Disposal
- Electrical & Natural Gas Utilities

This section provide the environmental setting for each of the public services and/or utilities listed above. Section 4.6.3 of this chapter provides the impact analyses for each of these services.

### REGULATORY OVERVIEW

There are a number of state laws and regulations governing the provision of specified services. These are discussed below under the applicable service topic.

Pursuant to State law (Government Code Section 54773 et seq.) a Local Agency Formation Commission (LAFCO) was established in each county to promote the orderly development of local government agencies and efficient provision of services, to guide development away from prime agricultural land and to discourage urban sprawl. Pursuant to State law, LAFCOs must adopt a Sphere of Influence (SOI) for each governmental agency (including special districts), which is the probable physical boundary and service area of a local government. LAFCO is required to review and approve or disapprove governmental boundary change proposals with regards to spheres of influence, annexation, detachment, reorganization and/or extending services of a local agency.

The California Government Code Section 56430 requires LAFCOs to conduct Municipal Services Reviews (MSRs) that describe the municipal services provided by the agencies that are subject to LAFCO authority. MSRs are comprehensive studies designed to collect and analyze information about the governance structures and efficiencies of service providers, to estimate their ability to meet current and future service needs, and to identify opportunities for greater coordination and cooperation between providers. The Santa Cruz LAFCO completed its report in August 2005, and LAFCO approved the countywide service review in December 2007 (Resolution No. 2007-9). The review is a comprehensive overview of public services within Santa

Cruz County and includes the four cities and over 80 special districts providing municipal-type services such as water, wastewater service, fire protection, police protection, recreation and parks and solid waste. Pertinent findings are provided below for each service.

## FIRE PROTECTION SERVICES

### Regulatory Setting

The Uniform Fire Code published by the International Fire Code Institute and the Uniform Building Code (adopted in California as the California Building Standards Code) published by the International Conference of Building Officials both prescribe performance characteristics and materials to be used to achieve acceptable levels of fire protection. Amendments to the California Building Standards effective in 2008 increased the requirements for defensible space and require more fire-resistant building materials and design than prior codes in areas identified as having severe fire hazards.

The Federal Disaster Mitigation Act (DMA) of 2000 (Public Law 106-390), adopted by Congress in October 2000, requires state and local governments to develop hazard mitigation plans as a condition for federal grant assistance. The City of Santa Cruz adopted its "Local Hazard Mitigation Plan" in September 2007. The detailed five-year plan identifies potential natural and man-made hazards, assesses their likely risk, and includes mitigation methods to reduce risks. The potential hazards identified in the plan include wildfires. Mitigation measures proposed to address these risks generally include prioritized actions that include hazard event planning, emergency prepardedness coordination and education, facility upgrades, monitoring actions and other actions in response to specific hazards. The mitigation plan will be reviewed and updated every five years.

### Existing Facilities, Staff and Operations

The City Fire Department provides fire protection and emergency response for all areas within the City limits and maintains mutual aid agreements with other fire districts in the County, UCSC and California Department of Forestry (CDF) to provide fire protection to areas surrounding the City. The City serves the Paradise Park subdivision through an annexation to the service area that was approved by the Local Agency Formation Commission (LAFCO) of Santa Cruz County.

The City of Santa Cruz Fire Department operates out of three fire stations and houses its administrative functions at an office downtown. The three existing City fire stations are: Fire Station #1 at 711 Center Street, Fire Station #2 at 1103 Soquel Avenue, and Fire Station #3 at 335 Younglove Avenue. All facilities meet current building codes, including seismic retrofitting, fire sprinklers, and new electrical systems. The Department also maintains a Marine Rescue Headquarters (Station Four) on the Municipal Wharf.

The Department has five fire engines, one fire truck, and other related vehicles and equipment. The Department addresses its equipment and facilities needs through its planning efforts and budgeting process. The City's Fire Department is funded through the City's General fund.

The Department currently is staffed by 18 full-time firefighters, 12 fire engineers, 13 captains, three battalion chiefs, one fire chief, one fire prevention inspector and one deputy fire marshall, two division chiefs, one EMS program manager, and two administrative staff. Each shift has 15 assigned firefighters. The current level of firefighters represents approximately 0.75 firefighter (less than one) per 1,000 residents. The Fire Department has a minimum staffing standard of 12 firefighters and one battalion chief on duty per day.

The number of service calls received by the fire department in 2009 was approximately 6,850 calls. The majority of the calls are for non-fire emergencies, with about 80% of the calls being for medical assistance. Average response times from each of the three fire stations is approximately 3 to 3½ minutes. The Department's goal is to respond to emergency medical calls in less than five minutes 90% of the time and to fire emergency calls within eight minutes 90% of the time.

The existing number of fire stations and equipment/facilities are considered adequate to provide service throughout the City, except that the Department does not have a Training Facility, the construction of which is included as a recommendation in the Department's "Three Year Strategic Plan, 2009-2011." The Plan also recommends improvements to apparatus bays at Stations One and Three to accommodate new equipment, and investigation of constructing a new fire station at the present Station Two location and relocation of Station Four (Marine Rescue Headquarters). In the long-term the Department would like to relocate its downtown station and administration facilities in a combined facility with a Training Facility (Oliver, Ramos, personal communication, April 2011).

## Wildland Fire Hazard

In addition to fires within developed City areas, the City is subject to "wildfires" in open space preserves and parks adjacent to developed areas. Wildfires are typically caused by human activities and are affected by the type and amount of vegetation, weather, fuel and topography. Wildland fire may be defined as any unwanted fire involving outdoor vegetation. The wildland/urban interface refers to development that has occurred in or near open space areas (City of Santa Cruz, September 2007).

Wildland fires present a risk to open space areas within the City of Santa Cruz and to adjacent residential homes. There are five wildland/urban interface areas within the City, including three areas designated as mutual threat zones – Delaveaga Park, Pogonip, and the Arroyo Seco/Meder Canyon (City of Santa Cruz, September 2007). Additional areas of concern for these wildland/urban interface zones include the Arana Gulch greenbelt property and Moore Creek Preserve, as well as Lighthouse Field and other smaller wildland/urban interface areas throughout the City (Ibid.). Figure 4.6-1[1] identifies areas of the City that pose serious wildfire hazards due to vegetation type, vegetation build-up and topographic conditions.

Mutual threat zones are defined as areas where a wildfire would threaten property within the City of Santa Cruz fire service area, as well as property covered by another fire protection

[1] All EIR figures are included in Chapter 7.0 at the end of the EIR (before appendices) for ease of reference as some figures are referenced in several sections.

service. For major emergencies that require more resources than can be provided by a single agency, the City of Santa Cruz, Santa Cruz County, the University of California at Santa Cruz and the State of California have an extensive mutual aid and emergency coordination system. The mutual threat zones are delineated in the Wildland Pre-Suppression Plan, which is used to identify non-State responsibility areas in which any fire is considered a threat to adjacent State responsibility areas. These geographic areas are designated because of the urban development that has occurred along their canyons and the vegetation types that are considered to pose a significant wildfire hazard (City of Santa Cruz, September 2007).

Recent wildland fires in the City of Santa Cruz include the Meder Canyon Fire in 1990, which covered several acres and was consumed in 20 minutes. A number of other wildland fires in the Santa Cruz area including the Santa Cruz Mountains have been a long-standing concern to the City of Santa Cruz. Priorities in the event of a wildfire are life safety, preservation of property and resource conservation (City of Santa Cruz, September 2007). Despite the fact that there has not been a recent wildland fire within the city limits, areas targeted in the City's Hazard Reduction Plan as "likely" to have a wildland fire include the Arroyo Seco/Meder Canyon, DeLaveaga, Pogonip, Moore Creek area and Arana Gulch (Ibid.), although wildland fires can occur in other areas. Increasing use of these areas by residents, transient encampments with fires and young adults exacerbates the risks (Ibid.).

Most wildland fire areas are adjacent to residential or open space areas. Only a few public buildings are immediately threatened by wildland fires. Public buildings that are in threatened areas are the historic Pogonip clubhouse, DeLaveaga Golf Club and associated buildings, 35 schools and day care centers and some park structures. There are eight commercial or industrial structures in the threat zone (City of Santa Cruz, September 2007).

## POLICE PROTECTION SERVICES

The City of Santa Cruz Police Department provides crime protection and prevention activities throughout the City, including patrols, response to calls, education and community outreach. Its range of services include patrol, investigations, traffic, parks unit, street crimes unit, gang unit, dive team, hostage negotiation team, tactical team and School Resource office. The Department recently initiated an application for mobile phones/IPADs that allows citizens to download Crime Alerts and crime tips. The City has mutual aid agreements with county law enforcement (Sheriff's Office, Capitola, Scotts Valley, Watsonville, California Highway Patrol, State Parks and UCSC Police Departments).

The Police Department operates out of one police station/headquarters, located in downtown Santa Cruz. The Department is currently staffed by 94 authorized sworn officer positions, of which 88 are filled, 24 non-sworn (civilian) positions, including four community service officers, and three administrative staff. The current staff level represents a per capita ratio of approximately 1.57 sworn police officers per 1,000 city residents. A ratio of 1.5 officers per 1,000 population has been a national accepted minimum standard (Vogel, personal communication, April 2011). The Department has lost approximately ten sworn officers since 2000, and currently is understaffed by at least six officers (Ibid.).

The Department has divided the City into five main beats, and handled 78,132 calls in 2008 and 85,774 calls in 2009. The average response time is four minutes, 22 seconds, which is under the Department's target of four minutes, 30 seconds. Dispatching services are provided through the Santa Cruz Consolidated Emergency Communications Center.

The City of Santa Cruz funds its Police Department through the City's General Fund, grants, fees and service charges. The City also has a special revenue fund to account for state and federal grants received for police programs. The Department' existing facility and vehicles are adequate for the existing population; major capital improvements including replacing the building HVAC with an energy efficient system (Vogel, personal communication, April 2011).

## PARKS AND RECREATION

Santa Cruz offers residents and visitors a wide range of parks, open space, beaches, trails, and recreational opportunities. The City has responsibility for management, maintenance and operation of over 1,700 acres of parks and open space lands, and various community/recreational facilities, and oversees development of new parks and improvements within City-owned parks, open space, and community facilities. The City also manages the Heritage Tree Program, Urban Forest Program, as well as maintains street and median landscaping in public rights-of-way.[2] Within the City limits, open space and beaches are also provided on State-owned lands, including three State Park units and the University of California campus. Maintenance operations of existing City-owned parks and recreational facilities are funded from the City's General Fund.

### Regulatory Setting

#### STATE REGULATIONS

The Quimby Act (California Government Code §66477) was passed in 1975 and authorizes cities and counties to pass ordinances requiring developers to set aside land, donate conservation easements, or pay fees for park improvements. This provision of the State Subdivision Map Act enables cities and counties to require the dedication of land and/or payment of in-lieu fees for parks and recreation purposes as a condition of approval of a tentative map or parcel map subdivision. AB 1600 amended the Quimby Act in 1982 to hold local governments more accountable for imposing park development fees. The AB 1600 amendment requires agencies to clearly show a reasonable relationship between the public need for the recreation facility or park land and the type of development project upon which the fee is imposed. Cities and counties are required to show a strong direct relationship, or nexus, between the park fee exactions and the proposed project. Local ordinances must include definite standards for determining the proportion of the subdivision to be dedicated and the amount of the fee to be paid by the developer. AB 2936 was adopted as an amendment to

[2] Heritage trees and urban forest policies and actions are addressed in the BIOLOGICAL RESOURCES (Chapter 4.8) and AGRICULTURAL, FOREST AND MINERAL RESOURCES (Chapter 4.15) sections of this EIR.

the Quimby Act in 2002, and allows counties and cities to spend up to 10% of their Quimby Act fees to prepare master plans for park and recreation facilities every three years.

### LOCAL REGULATIONS

**Parks and Recreation Facilities Tax**. The City imposes a "Parks and Recreation Facilities Tax" (pursuant to Chapter 5.72 of the Municipal Code) on new residential development (including mobile homes) within the City, payable at the time of issuance of a building permit. The collected taxes collected are placed into a special fund, and "shall be used and expended solely for the acquisition, improvement and expansion of public park, playground and recreational facilities in the city" (section 5.72.100). The current fee is $3.00 per square foot of residential building. Projects that have dedicated land or fees in accordance with Municipal Code Chapter 23.28 (described below) are exempt from this tax.

**Public Dedications Pursuant to the California Subdivision Map Act**. Chapter 23.28 regulates public dedications, including parks and open space, enacted pursuant to the authority granted by the California Subdivision Map Act in accordance with the City General Plan. Land dedication shall be based on two acres/1,000 population for neighborhood parks and 2.5 acres/1,000 population for community parks. The current in-lieu fee is $3.00/square foot for each residential dwelling unit to be constructed in the subdivision. Where the residential dwelling unit square footage is not specified as part of the plans for the project, a fee of $4,780.00 per residential lot is required under the current regulations. Payment shall be at the time of the filing of the final subdivision or parcel map.

Pursuant to section 23.28.020.1 of the City's Municipal Code, dedication of land or payment of fee in lieu thereof, or both, may be a condition of approval of a final subdivision map or parcel map for park or recreational purposes. (Condominium conversions are exempt from dedication requirements.) The dedication shall be for usable open space that is composed of land that offers natural advantages for the type of facilities to serve the subdivision. A fee in lieu of such dedication shall be required, when no portion of the proposed usable open space is planned to be located within the limits of the subdivision. Only the payment of a fee may be required in the case of a subdivision of fifty or fewer parcels. Section 23.28.020.4 requires establishment of a permanent maintenance program for usable open space lands dedicated under these provisions of this title.

Pursuant to section 23.28.020.3, natural ravines and natural waterways or other natural areas within the boundaries of a subdivision shall be reserved for public purposes, such as recreation, stormwater disposal, etc., as provided by the General Plan and Coastal Land Use Plan through dedications or easements for public use. Pursuant to section 23.28.040 and in accordance with, the provisions of Article 3.5 of the Subdivision Map Act, the General Plan, and Coastal Land Use Plan, the city shall increase public access to the public natural resources in conjunction with the review of subdivisions of land.

## Parks, Community Facilities, and Recreational Programs

The City of Santa Cruz offers a range of neighborhood parks, community/regional parks, community facilities, and recreational programs. Most of these parks, facilities and programs are operated and maintained by the City Parks and Recreation Department. Some facilities

and programs are operated and organized in partnership with community organizations. These parks, facilities and programs provide recreational opportunities for residents and visitors of all ages and interests.

### NEIGHBORHOOD AND COMMUNITY/REGIONAL PARKS

**Neighborhood Parks**. Neighborhood parks serve the recreational needs of those living within the City's primarily residential neighborhood areas. Neighborhood parks provide recreational facilities such as children's play areas, playing fields, basketball and tennis courts, and picnic areas. Some of the City's community garden plots are also located within neighborhood parks. Community garden provide residents with a space to grow small scale vegetable gardens.

The City's standard is to provide neighborhood parks at a ratio of 2.0 acres per 1,000 people. The location of neighborhood parks is ideally within approximately one-half[3] mile of neighborhood areas. There are 23 existing neighborhood parks, as summarized on Table 4.6-1and shown on Figure 4.6-2, which total approximately 57 acres. There are approximately 45 acres of school playing fields, for a total of approximately 102 acres of neighborhood parks within the City. In accordance with the City's existing General Plan, neighborhood park acreages include both City and non-City managed lands such as public school playing fields. The City of Santa Cruz and City School Districts entered into a joint use agreement in 1963 that allow use of selected school playground facilities and indoor facilities to the City and use of City facilities by the school districts..

To meet increasing demand for off-leash dog use, the Parks and Recreation Department has also designated off-leash areas within neighborhood parks throughout the City. These areas may be fenced or designated through signage. The City has designated the following parks as being available to off-leash dog use:

- DeLaveaga Park (service road into Lower DeLaveaga Park): sunrise to sunset.
- Frederick Street Park: off-leash area from sunrise to sunset.
- Grant Street Park: within off-leash area from sunrise to sunset.
- Mitchell's Cove Beach: before 10AM and after 4PM.
- Pacheco Dog off-leash area: fenced area from sunrise to sunset.
- University Terrace Park: fenced off-leash area from sunrise to sunset.

**Community Parks**. Community Parks are designed to serve the entire community. They are generally larger than neighborhood parks and offer facilities such as athletic fields, group picnic areas, bike and skateboard parks, lawn bowling, bocce ball, community meeting/event facilities, swimming pools, and locations for outdoor special events. The City's standard for community/regional parks is 2.5 acres per 1,000 people. Ideally these parks are located within 1.5 miles of neighborhood areas.

[3] The draft General Plan 2030 indicates neighborhood parks should be within one-half of a mile (about five blocks).

There are six existing community parks, totaling approximately 366 acres within the City as summarized below and on Table 4.6-1, and shown on Figure 4.6-2.

- Depot Park (8.5 acres), which opened in 2005, presently features a full-size soccer field, a plaza/public art area, a wood ramp bike park, picnic areas, children's' play features, the rehabilitated historic Depot building used for community and recreational programs, a trail connection through the park to the beach area, restrooms, and parking lots. The Monterey Bay Marine Sanctuary Visitor Center will be developed within the southern portion of Depot Park, across the street from Monterey Bay and the Municipal Wharf. The Depot Park Master Plan also includes a future site for the Natural History Museum.
- Harvey West Park (55 acres) presently features ball fields, group picnic areas, a children's playground, two outdoor swimming pools, the Clubhouse/Scouthouse, Wagner and Kids cottages, a Park Rangers' facility, restrooms, and parking areas. The park also features trails through the woodlands, including a trail connection to the adjacent Pogonip trail system. In recent years the pool has been closed seasonally due to City budget constraints and most recently has been operated by a private entity on a limited basis.
- Lower DeLaveaga Park (35 acres) presently features two soft ball fields, a large turf area, a bocce ball court, a volleyball court, a children's playground, individual and group picnic areas, restrooms and parking lots. Branciforte Creek flows along the western edge of the park, with the forested hillsides of the DeLaveaga greenbelt property rising along the eastern boundary of the developed park. Trail entrances at the edges of the park connect to the trail system within the DeLaveaga greenbelt.
- DeLaveaga Golf Course (250 acres) is part of DeLaveaga Park and includes a golf course, clubhouse and other open space land used for passive recreation.
- San Lorenzo Park (13 acres) presently features an open turf area along the San Lorenzo River, a duck pond and stage, a lawn bowling facility, a children's' playground, paved trails, and a restroom. The turf area often serves as a location for outdoor special events.
- Ken Wormhoudt Skate Park AY Mike Fox Park (4 acres), located along the San Lorenzo River further to the south, features the Ken Wormhoudt Skate Park and a roller-hockey practice area. The 15,000 square foot concrete skate park includes a full pipe, bowls and street skating features.

**Regional Parks**. Regional parks serve the recreational needs of a regional population and are 150 acres in size or larger. They offer active and passive recreation with activities and amenities not found in neighborhood and community parks, such as large areas of open space, large picnic facilities, golf courses, lake boating, ball fields, multi-use trails. An accepted national standard for regional parks is 20 acres per 1,000 people. City residents are in close proximity to a number of regional parks, each offering an array of activities. These parks include: DeLaveaga Park (upper) and greenbelt preserves within the City, and nearby Henry Cowell and Wilder Ranch State Parks (see Figure 1-2). State and municipal beaches and the Yacht Harbor also offer recreational opportunities serving the regional community as further discussed below.

**TABLE 4.6-1: City Parks and Open Space Lands**

| TYPE | FACILITY | SIZE (in acres) |
|---|---|---|
| **Neighborhood Parks** | | |
| | ▪ Beach Flats Park – 122 Raymond St. | 0.3 |
| | ▪ Bethany Curve Greenbelt – Delaware to West Cliff | 2.6 |
| | ▪ Central Park – 301 Dakota St. | 0.2 |
| | ▪ Derby Park – 509 Woodland Way | 3.8 |
| | ▪ Frederick Street Park – 168 Frederick Street | 4 |
| | ▪ Garfield Park – 624 Almar Ave. | 1.8 |
| | ▪ Grant Park – 150 Grant St. | 2.4 |
| | ▪ John Franks Park – Marnell St. | 0.3 |
| | ▪ Laurel Park – 301 Center St. | 1 |
| | ▪ Lighthouse Neighborhood Park – Lighthouse Ave. | 1.7 |
| | ▪ Mission Plaza – 103 Emmet St. | 1 |
| | ▪ Moore Creek Overlook – Cypress St. | 0.12 |
| | ▪ Lower Ocean Street Park – 258-262 San Lorenzo Blvd. | 0.5 |
| | ▪ Ocean View Park – 102 Ocean View Ave. | 2.5 |
| | ▪ Rincon Park – 601 Chestnut St. | 0.1 |
| | ▪ Poets Park – 200 Raymond St. | 0.13 |
| | ▪ Rincon Park – 601 Chestnut St. | 0.1 |
| | ▪ Round Tree Park – 205 Nobel | 0.13 |
| | ▪ Star of the Sea – Frederick St. & Darwin St. | 2.1 |
| | ▪ Trescony – Trescony St. | 2 |
| | ▪ Tyrell Park – Santa Cruz Museum | 1.5 |
| | ▪ University Terrace – Meder Street | 8.5 |
| | ▪ West Cliff | 14.5 |
| | ▪ Westlake Park – Bradley Dr. @ Spring St. | 6 |
| | ▪ School Playing Fields [1] | 44.6 |
| | TOTAL ACRES (rounded) | 102 |
| **Community Parks** [2] | | |
| | ▪ Depot Park | 8.5 |
| | ▪ Harvey West Park | 55 |
| | ▪ DeLaveaga Park – Lower | 35 |
| | ▪ DeLaveaga Golf Course | 250 |
| | ▪ San Lorenzo Park – 137 Dakota St. | 13 |
| | ▪ Ken Wormhoudt Skate Park at Mike Fox Park | 4 |
| | TOTAL ACRES (rounded) | 366 |
| **Greenbelts & Open Space Lands with Recreational Uses** | | |
| | ❑ Arana Gulch – Agnes St. | 68.9 |
| | ❑ Arroyo Seco Canyon – Meder St. | N/A |
| | ❑ DeLaveaga Park – Upper (minus Golf Course) | 275 |
| | ❑ Jessie Street Marsh | 2.29 |
| | ❑ Moore Creek Preserve | 246 |
| | ❑ Neary Lagoon – 100 California St. | 44 |
| | ❑ Pogonip – 333 Golf Club Drive | 640 |
| | TOTAL ACRES (rounded) | 1,276 |

**CONTINUED ON NEXT PAGE**

**TABLE 4.6-1: City Parks and Open Space Lands**

| TYPE | FACILITY | SIZE (in acres) |
|---|---|---|
| **City-Owned Beaches** | | |
| | ❑ Main Street Beach | 26.4 |
| | ❑ Cowell Beach | 4.9 |
| | ❑ Wharf | 8.2 |
| | ❑ Mitchell's Cove | 0.4 |
| | ❑ Its Beach (west portions) | N/A |
| | TOTAL ACRES (rounded) | 40 |
| [1] School sites are given credit for ¾ of their field acreage at: Santa Cruz & Harbor High Schools; Branciforte and Mission Hill Middle Schools; Bay View, DeLaveaga, Loma Prieta, Gault, Branciforte & Westlake Elementary Schools; Pacific Collegiate School; Holy Cross<br>[2] Loch Lomond Park (100 Loch Lomond Way, Felton) provides recreational opportunities outside City limits. | | |

**Existing Park Deficiencies**. The City's desired ratio for neighborhood parks is to provide 2.0 acres of parkland per 1,000 people. Given an estimated current population of 58,982 (California Department of Finance, May 2010), a total of 118 acres of neighborhood parkland would be required to meet this level of service. Presently the City has approximately 102 acres of neighborhood parkland (including school play grounds). Thus, the City would require 16 additional acres of neighborhood parkland to meet the current desired level of neighborhood parks. According to the Parks and Recreation Department, recreational programming of services currently meets the community's demand. However, like many local jurisdictions, Santa Cruz experiences a shortage of athletic fields. At this point, no plans or funding exists to increase the number of facilities. Currently one one-half acre neighborhood park (Lower Ocean) is scheduled for construction. No others are currently programmed.

The City's desired ratio for community parks is to provide 2.5 acres of parkland per 1,000 people. Given the current population, a total of 148 acres of community parkland would be required to meet this level of service. The City presently has approximately 366 acres of community parklands, which exceeds the City's desired ratio.

The City of Santa Cruz is not a regional park agency; therefore, the City does not have a desired ratio for regional parks. The City also does not have a desired ratio for open space, but City does, however, provide a substantial level of open space parkland. Together, Pogonip, Arana Gulch, Upper DeLaveaga, Moore Creek Preserve, and Neary Lagoon total approximately 1,500 acres. This represents a ratio of 27 acres of open space per 1,000 people. (Open space and greenbelt lands are discussed further below.)

### COMMUNITY FACILITIES, RECREATIONAL PROGRAMS, AND EVENTS

Community facilities, recreational programs, and special events serve the needs and interests of individuals, neighborhoods, groups, and the community of Santa Cruz. Events, held at community facilities and park, attract both residents and visitors.

**Community Facilities**. Community Facilities provide locales for public events and reservable spaces for concerts, meetings, classes, and other events. In recent years, the City has

coordinated with community organizations regarding operation of some facilities due to City budget constraints. The City owns and maintains a number of community facilities that support social, recreational and special event programs as described below.

- The Civic Auditorium, dedicated in 1940, is located within downtown Santa Cruz. The auditorium provides space for concerts, expos, and meetings.
- Louden Nelson Community Center, located to the south of downtown adjacent to Laurel Park, serves as a multi-cultural center for classes, theatre, events, and recreational programs. The community center was originally constructed as an elementary school, but was later reopened as a City facility in the 1970s.
- The Beach Flats Community Center, presently operated by a community organization, provides programs and services for residents.
- The Harvey West Park Facilities include a community swimming pool and Clubhouse that offer reservable space for community and private events.
- The City-owned Natural History Museum in located within the Seabright neighborhood, on the edge of Tyrell Park overlooking Monterey Bay. The exhibits and programs are housed in the modified 1915 Carnegie library building. The Natural History Museum is presently operated by the Museum Association. A proposed new location for the museum is included in the Depot Park Master Plan.
- The Surfing Museum, also presently operated by the Santa Cruz Surfing Club Preservation Society, is located within the memorial lighthouse at Lighthouse Point.

A community/environmental education center is proposed for the historic Clubhouse in the Pogonip Master Plan but is presently unfunded.

**Recreational Programs**. Recreational Programs offered by the City Parks and Recreation Department are designed to be affordable and available to residents and nonresidents of all ages and interests. Activities include a variety of classes and outings, sports leagues, and programs for older adults. Classes and programs are held at various City parks, beaches, and community centers, and at other locations such as schools.

**Community Events**. Community Events offered by the City include a variety of cultural and recreational events attracting residents and visitors. Events sponsored by the City are often held in cooperation with organizations and private entities. Some of the events which have been sponsored by the Parks and Recreation Department over the years include music/art festivals, chowder cook-offs, and outrigger canoe races. The City Parks and Recreation Department also hosts cultural events in coordination with the Sister Cities Committee.

**Community Gardens**. Community gardens are public and privately owned lands used for small scale flower and vegetable gardens. These gardens—a specialized type of park—provide the community with food, greenery, and therapeutic and relaxing recreation. The gardens can be created on small, undevelopable parcels of land or as temporary uses on other parcels.

## Greenbelt and Open Space Lands

Open space lands provide wildlife habitat, protect natural resources, and offer opportunities for recreation, scenic views, and outdoor/environmental education. The City owns and manages over 1,500 acres of greenbelt and open space lands. The greenbelt properties (Arana Gulch, DeLaveaga, Moore Creek Preserve, and Pogonip) provide large acreages of open space and natural areas encircling the City's urban core. Open space and wetland areas within the City's central area include the San Lorenzo River corridor, Neary Lagoon, and Jessie Street Marsh. Moore Creek (east branch) and Arroyo Seco feature undeveloped canyons within the northwestern area of the City.

Within the City limits, State-owned lands also provide open space and protect natural resources. State Park units featuring open space include Natural Bridges State Beach (SB) and Lighthouse Field SB. Beyond the City limits to the west and north, Wilder Ranch State Park and Henry Cowell Redwoods State Park provide vast areas of open space. State parks are described in the following "Coastal Recreation" subsection. The University of California campus lands also feature areas of undeveloped open space. Antonelli Pond, a wetland area within the Moore Creek corridor, is owned and managed by the Land Trust of Santa Cruz County.

Management of natural resources and public use within the City's open space areas is guided by master or management plans. These plans provide a long-term vision for each open space area, including guidelines for protecting and enhancing natural and historic resources, and developing trails and other recreational uses.

### CITY-OWNED GREENBELT LANDS

In 1979, the City of Santa Cruz identified six properties along the City's boundaries as Greenbelt lands, totaling approximately 1,500 acres. With only DeLaveaga under City ownership at that time, the City embarked on an effort to acquire and protect 1,000 acres over the next 20 years. Today, the City-owned Greenbelt lands include DeLaveaga, Pogonip, Arana Gulch and Moore Creek Preserve. These sites and other natural areas are further described below.

***DeLaveaga,*** located on the City's northeastern boundary, was donated to the City and County as a public park in the late 1800s by Jose Vicente DeLaveaga. Today, the 525-acre upper DeLaveaga is owned and managed by the City of Santa Cruz. (Some parcels, however, are under state ownership as part of the State Armory). Habitat areas within DeLaveaga include oak woodlands, redwood groves, grasslands, coastal prairie, and the west branch of Arana Gulch creek. A Park Master Plan was prepared for DeLaveaga in 1960, which includes a broad range of proposed uses. The plan was not been updated.

Upper DeLaveaga features the municipal DeLaveaga Golf Course and Clubhouse, a disc golf course, an archery range, an approximately 8-mile network of multi-use trails, and parking areas. A gun range, which had been in existence for approximately 50 years, was closed to public use, and the site was remediated after lead contamination was identified. A Golf Course Master Plan was adopted by the City Council in 2003 and identifies improvements to upgrade the existing golf course, including improvements to the golf course, drainage system, and landscaping, and future construction of a new clubhouse.

***Pogonip*** is located approximately one mile north of downtown Santa Cruz between the University of California campus and the San Lorenzo River corridor. This 614-acre greenbelt was acquired by the City in 1989, and features coastal prairie, woodlands, creeks, springs and a reach of the San Lorenzo River known as Sycamore Grove. An adjacent 25-acre parcel, known as the Wavecrest "greenbelt" parcel, was later purchased by the City in 1997. Pogonip, once part of the Cowell Ranch landholdings, was extensively logged and features historic resources associated with the lime production industry (mid-to-late 18th century). The property also includes a rustic clubhouse, constructed in 1911 as part of the Casa del Rey Golf Course. The two-story Craftsman Bungalow style structure and meadow area were later used for polo grounds. Prior to City ownership, the clubhouse was also used as a private social club, but due to its deteriorated condition, the building has been closed since 1993.

The *Pogonip Master Plan,* adopted by City Council in 1998, addresses public access, recreational uses, historic resource rehabilitation and preservation, and natural resource management and protection. The Master Plan includes a trail system, rehabilitation of the historic clubhouse as a community facility, a permanent agricultural garden site for the Homeless Garden Project, and outdoor education areas. Limited parking within the lower and main meadow areas, minimal improvements to the one-lane access road to the clubhouse, and a Ranger facility are also addressed in the Master Plan. Dogs on-leash are allowed, but off-leash dog and off-trail use is prohibited. Specific uses identified in the plan include:

- A 9-mile trail system featuring both unpaved service roads and single-track trails open primarily to pedestrians.
- A multi-use trail (pedestrians, bicycles, horses) connector trail linking Henry Cowell Redwoods State Park, Pogonip and the University of California property.
- Rehabilitation of the historic clubhouse to serve as a staging area for educational programs, a meeting and retreat center, and a site for special events.
- Preservation and interpretation of the historic limekilns, roads and associated features.
- An outdoor education camp in the lower meadow and a nature/education area within Sycamore Grove.
- A permanent garden site for the Homeless Garden Project.

To date, the trail system has been implemented including a multi-use regional trail connection linking State Park lands, Pogonip, and the UC campus open space. Limited rehabilitation of the historic Clubhouse has occurred, but it remains closed to public access and complete rehabilitation for public use is presently unfunded. At present, the parking lots, outdoor education areas, and Homeless Garden agricultural garden have not yet been implemented.

***Arana Gulch,*** totaling 67.7 acres, is situated along the City's eastern boundary, to the north of the Santa Cruz Harbor. Acquired by the City in 1994, this greenbelt property features coastal prairie, riparian and oak woodland, seasonal wetlands, and the lower reaches of Arana Gulch Creek. Historically the property was used for cattle grazing and dairy operations. The current unimproved trail system, much of which existed prior to City ownership as cattle trails or unpaved access roadways, provides pedestrian, bicycle, and on-leash dog use access.

The *Arana Gulch Master Plan,* adopted by the City in 2006 and pending Coastal Commission approval, includes a trail system featuring paved multi-use trails (wheelchair accessible), a new west entrance and bridge spanning Hagemann Gulch, unpaved pedestrian trails, interpretive displays and overlooks. Most of Arana Gulch would continue to remain undeveloped, with a focus on management and protection of the sensitive habitat areas. No on-site parking or restrooms are proposed within the greenbelt property. Specific public use guidelines contained in the Master Plan are outlined below. The Master Plan also identifies three resource management areas for coastal prairie/Santa Cruz tarplant (30.2 acres), riparian and wetland areas, and Hagemann Gulch riparian woodland; resource management guidelines are included in the Master Plan for each of these areas.

- Provide multi-use wheelchair accessible interpretive trails connecting the surrounding neighborhoods to the Upper Santa Cruz harbor.
- Establish a new west entrance at Hagemann Gulch to provide a trail connection between Arana Gulch and the Seabright neighborhood. Provide a multi-use trail and bridge crossing over Hagemann Gulch, featuring an interpretive overlook.
- Provide a pedestrian-only interpretive loop trail encircling the coastal prairie.
- Improve the existing pedestrian trail along the western edge of the Arana Gulch Creek management area.
- Allow dogs on-leash on designated trails. Prohibit off-leash dog use and off-trail use to avoid impacts to tarplant populations and other plant and animal species.

***Moore Creek Preserve*** is located on the western edge of the City, north of Highway 1 and extending to the UCSC campus. This 246-acre natural area, acquired by the City in 1998, features the west branch of Moore Creek, coastal prairie, and oak woodlands. The State of California holds two conservation easements over the property. Numerous threatened and endangered plant and wildlife species have been documented within the Preserve. Historically the property was used for cattle grazing.

The *Moore Creek Preserve Interim Management Plan*, adopted by City Council in 2002, serves as a guide for management of the Moore Creek Preserve until preparation/approval of a long term Park Master Plan for the property. The State of California conservation easements include restrictions on various uses and activities. Existing interim uses include hiking trails (approximately 3 miles), cattle grazing, and study, preservation, enhancement and protection of native species and their habitat. Dogs are prohibited within the Preserve. The interim trail system is based primarily on trails and unpaved service roads which existed prior to City ownership and are largely a result of cattle grazing operations. No onsite parking, public access road, or restroom facilities are included in the Interim Plan. A coastal development permit was approved for construction of a bridge to mitigate existing trail impacts to Moore Creek. The *Interim Management Plan* also identifies three plant community resource management areas and addresses specific management of habitat areas for special status species.

### CITY-OWNED WETLANDS AND OTHER OPEN SPACE

The City owns and manages several other open space and wetland areas in the central area of the City. These include the San Lorenzo River, Branciforte Creek, Jessie Street Marsh, and Neary Lagoon. In the northwest area of the City, Arroyo Seco and Moore Creek (east branch) canyons provide undeveloped open space areas through residential areas.

***The San Lorenzo Riverway*** includes the lower reach of the River through central Santa Cruz, along the eastern edge of the downtown south to Monterey Bay. The river has been channelized since the late 1950s, with extensive native tree and shrub planting completed as part of the levee improvement project in the 1990s. Multi-use paved trails exist on the levee on both sides of the river, except for a short segment in the vicinity of the County Building north of Soquel Avenue.

Recreational opportunities include trail use, nature viewing, bird watching, and fishing. Public access is provided by a continuous paved pathway/service road, extending approximately 2.5 miles on each levee from Highway 1 southward, provides public access. A new pedestrian-bicycle path was developed that extends north from the northern edge of the western levee, under Highway 1 and connects to the Tannery Arts Project residences.

Improved public access is addressed in the *San Lorenzo Urban River Plan*. This document is the outcome of a planning process initiated by City Council in 1999 to update plans for the San Lorenzo River, Jessie Street Marsh, and Branciforte Creek. The plan serves as a guide for restoring and managing natural resources, riverfront development, and public access improvements for the lower San Lorenzo River. It includes conceptual ideas to promote river-oriented development, site specific recommendations for public areas along the river, and restoration recommendations.

***Neary Lagoon*** is a City-owned wetland and natural area situated in the central part of the City. Acquired by the City in 1967, the 14-acre lagoon and surrounding riparian and woodland habitat within the management area total 44 acres. Neary Lagoon was originally an oxbow of the San Lorenzo River that was gradually isolated from the main river channel and reduced dramatically in size over the past century.

The Neary Lagoon Management Plan, adopted by City Council in 1992, is a comprehensive guide integrating previous documents prepared. The Management Plan addresses public access and use, hydrology, water quality, vegetation management and habitat restoration, and wildlife and fishery management. Public access includes an interpretive trail system, nature observation areas, interpretive exhibits, and recreational facilities within designated areas. The access is designed to encourage pedestrian use, including wheelchair accessibility. Most of the public use components of the plan have been implemented. Public use guidelines contained in the Management Plan discourage bicycle riding except on designated through trails, and dogs are prohibited within the management area.

***Jessie Street Marsh*** is a City-owned wetland and open space located just to the north of the San Lorenzo River mouth. Historically, Jessie Street Marsh was part of a large tidal estuary open to the San Lorenzo River. After construction of the river levees, the tidal flows were blocked.

Freshwater continues to flow into the marsh area from storm water runoff and springs along the bluff.

The marsh area presently has informal unimproved pathways, with no developed site amenities. A developed trail descends down the bluff from Ocean View Park, along the southern Jessie Street marsh area, to East Cliff Drive. The *Jessie Street Marsh Management Plan*, adopted by the City Council in 1999, was prepared to provide a long-term plan to preserve and enhance the natural resources of the marsh, improve water quality, manage flood waters, and provide appropriate public access. This plan, not yet implemented due to budget constraints, includes recommendations for trails, interpretive signs, overlook and nature viewing areas and improved access to adjacent Ocean View Park to the northeast. An overview of proposed public access management actions:

- Construct a bridge over the marsh channel and a boardwalk adjacent to the marsh plain near Lemos Avenue and Jessie Street.
- Construct footpaths within the upper and lower marsh areas, including a connection to East Cliff Drive.
- Construct a new trail and steps to Ocean View Park and improve the existing trail connection to the adjacent park.
- Construct gates, fencing and install boulders to inhibit inappropriate public access.
- Install interpretive signs to create a nature walk experience.

***Branciforte Creek*** flows along the boundary of Lower DeLaveaga Park and continues southward, under Highway 1, to its confluence with the San Lorenzo River at the southern end of San Lorenzo Park. The lower one-mile reach of Branciforte creek was channelized in a concrete flood control channel in the late 1950s. From approximately Market Street northward, Branciforte Creek remains a natural channel with native riparian vegetation on the stream banks.

Public trail access is provided along sections of the service access road along the channel. The confluence of the creek and the San Lorenzo River is recognized as an important bird watching area and overlook area. Much of the natural channel is located within private residential properties, though public access is provided along the natural creek channel within Lower DeLaveaga Park. The *San Lorenzo Urban River Plan* includes recommendations for enhancing the creek corridor, improving water quality, and providing interpretive signage.

***Arroyo Seco Canyon*** extends from University Terrace Park/Meder Street southward to just north of Mission Street/Highway 1. An intermittent creek, City sewer line and utility access route extend along the bottom of the canyon. The access route, maintained by the City's Public Works Department, is also used as a trail by residents. Private residential parcels extend into the undeveloped canyon.

***Moore Creek Canyon (East Branch)*** extends from the UC campus lands southward, paralleling Western Drive, to its confluence with the west branch of Moore Creek just north of Highway 1. This corridor features an intermittent creek flowing through a steep-sided canyon bordered by residential areas. The east branch corridor includes private and public parcels.

The *Moore Creek Corridor Access and Management Plan* (1987) includes recommendations for public access, land dedication, open space easements, and resource management. The plan's goal is to provide public access in a manner compatible with private property, existing development, and the constraints of the natural setting. Presently, there is limited public access within the eastern Moore Creek Canyon.

### STATE-OWNED OPEN SPACE

Two State Park units, Lighthouse Field and Natural Bridges State Beaches, offer open space and recreational opportunities within the City limits. The UC campus also features large open space areas and trails accessible to the public. State Park General Plans are the primary management documents for State Park units.

***Lighthouse Field State Beach (SB)*** is a 36-acre open space situated along Monterey Bay, featuring coastal terrace, ocean cliffs, and Its Beach. The open space features grassland (primarily non-native), willows, Monterey cypress trees, and eucalyptus groves. The State of California acquired the field area and coastline west of Lighthouse Point in 1978. A 30-year agreement between the State/City/County regarding local management and maintenance of Lighthouse Field SB expired and has not been extended. At present, this State Park unit is managed and operated by California State Parks.

The *Lighthouse Field State Beach General Plan* (1984) identifies two zones within the property. The 32-acre Field Zone is designated as a low intensity use area, featuring trails and open space. The Coastal Zone is designated as a moderate to high-intensity use area, featuring coastal access, the Surfing Museum, a restroom and maintenance facility, picnicking, and parking areas. Use is restricted to day use only, with no overnight parking or camping. The parking lots and restroom/maintenance facility that presently exist were developed further to the south, toward Lighthouse Point, than depicted in the General Plan conceptual development diagram. A parking area along Pelton Avenue that is identified in the Plan has not been constructed. This eucalyptus/cypress grove area is now recognized as overwintering Monarch butterfly habitat.

***Natural Bridges State Beach (SB)*** is a 65-acre open space and wetland situated on Monterey Bay, on the western boundary of the City. Primary resources include the natural rock bridge, a beach, Monarch butterfly over wintering habitat, and the Moore Creek wetland. The initial state park acreage was established in 1933, with additional lands acquired later.

Public facilities identified in the *Natural Bridges State Beach General Plan* (1992) include a visitors' center, picnic areas, trails and walkways, restrooms, and day-use parking areas. The main entrance is presently located at the terminus of West Cliff Drive. The plan proposes developing a new main entrance off of Delaware Avenue, which is the location of the original entrance in the 1950s. Two preserves are designated within Natural Bridges State Beach: the Monarch Butterfly Natural Preserve and the Moore Creek Wetland Preserve.

***UCSC – the University of California Santa Cruz*** is a 2,020-acre campus, of which approximately 53% is located within city limits. The campus offers amenities for active and passive recreation on the main campus, and the north and upper campuses currently are undeveloped and in open space. Active recreation facilities include playing fields and a swimming pool. The main campus and recreational facilities are open to the public during daylight hours for walking, bicycling,

and visiting campus facilities, such as the Arboretum and Chadwick Gardens. Trails throughout the campus, designed primarily to provide access to campus facilities, also provide recreational opportunities for walking and hiking. The "Cowell Wilder Regional Trail" (open to hikers, bicyclists and equestrians) is located on the north campus (outside city limits) and provides a connection to between Wilder Ranch State Park to the west and Pogonip and Henry Cowell State Park to the east (University of California Santa Cruz, September 2006 – DEIR, Volume Two).

## Trails

Santa Cruz has an extensive trail network, featuring paved and unpaved pathways connecting open space, parks, the coast, downtown, and neighborhood areas. This network includes multi-use trails, some of which are wheelchair accessible, and hiking only trails. Together, the City-owned greenbelt lands, open spaces and coastal pathways provide over 50 miles of trails. In addition, State Parks, the UC campus lands, and the Santa Cruz Harbor offer many more miles of publicly accessible trails. The paths and trails support walking, jogging, hiking, and bicycling. The city and regional trail systems provide not only recreation, but access to and connections between various parks, recreation facilities, and natural and urban areas. Promenades and hiking trails (including those along the Beach/Boardwalk, San Lorenzo River Corridor, Downtown, and West Cliff Drive) provide opportunities to enjoy unique natural and historic areas. The network of walkways, bikeways, and trails will become increasingly important for

The Santa Cruz Circle Trail concept focuses on establishing a continuous trail route through the City's greenbelt lands, along the San Lorenzo River, the coastline and the harbor, to create a continuous pathway encircling the City and linking downtown. Santa Cruz also features several regional trail connections, including the California Coastal Trail and Henry Cowell Redwoods State Park/Pogonip/UCSC/Wilder Ranch State Park regional trail.

The Santa Cruz County Regional Transportation Commission (SCCRTC), in association with other regional agencies, envisions the planning and construction of a Monterey Bay Sanctuary Scenic Trail (MBSST). The MBSST Network will be a multi-use system of bicycle and pedestrian facilities that allows the public to enjoy and experience the Monterey Bay National Marine Sanctuary from the vantage point of the shoreline. The master planning process is in progress, and it is envisioned that some of the recent local coastal trail projects will be part of this network, such as the Wilder Ranch Bicycle and Pedestrian Path, the Watsonville Slough Trails, the Monterey Rail/Trail, and the Monterey Bay Sanctuary Scenic Trail. Specific alignments have not yet been developed in the City of Santa Cruz.

## Coastal Recreation

The City's coastline along Monterey Bay, totaling approximately 4.6 miles, is a prime recreational destination for residents and over two-million visitors a year. Coastal recreation offers opportunities for a variety of activities, including: ocean and wildlife viewing; beach/coastside walking, jogging and bicycling; surfing, bodyboarding, swimming, and standup paddling; fishing; kayaking and boating; windsurfing/kiteboarding; sunbathing; and picnicking. Coastal facilities and visitors centers also offer educational opportunities about the coastal and marine environment.

Coastal recreation within the City of Santa Cruz includes City and State beaches, coastal pathways, the Municipal Wharf, Santa Cruz Surfing Museum, Santa Cruz Harbor, and the Boardwalk Amusement Park. Coastal-oriented environmental education facilities include the Seymour Marine Discovery Center at UCSC's Long Marine Laboratory and the future Monterey Bay National Marine Sanctuary Visitors' Center.

### CITY BEACHES AND THE MUNICIPAL WHARF

City-owned and managed beaches include Main Beach, Cowells Beach, the western portion of Its Beach, and Mitchell's Cove. Main Beach is a broad expanse of sand extending from the San Lorenzo River mouth west to the Municipal Wharf. Volleyball courts are available on Main Beach. Cowells Beach lies to the west of the wharf, extending to the West Cliff Drive bluff. Both beaches are heavily used by visitors and residents during summer months for sunbathing, wading and swimming. Cowells Beach is also a popular surf break with access from the beach and a stairway along West Cliff Drive. The City of Santa Cruz provides seasonal life guard towers and service on Cowells and Main Beach. Dogs are prohibited by the City on Main Beach and Cowells Beach.

On the coastal bluff along West Cliff Drive, a pedestrian/bicycle path extends from Cowells Beach to Natural Bridges State Beach. Situated along West Cliff Drive, two smaller sandy beaches are accessible by stairways. Its Beach, located to the west of Lighthouse Point, is owned by the City and State. The access stairs are located on State Parks property. Further to the west is Mitchell's Cove, which is open to off-leash dog use during certain hours.

Stairways along the West Cliff Drive pedestrian/bicycle path also provide access to popular surfing breaks, including Steamer Lane and Mitchell's Cove. Stairs are located (east to west) at Pelton Avenue next to the Surfer Statute, Steamer Lane, Its Beach and Mitchells Cove. Other surfing breaks along West Cliff Drive are not accessible by constructed stairways.

Lighthouse Point, owned and managed by the City, features the Surfing Museum which is located within the Abbott Memorial Lighthouse. The Point offers an overlook of the Steamer Lane surfing area and opportunities for viewing sea lions, otters, migrating whales, and marine birds. A grassy area at Lighthouse Point is used for informal play and picnicking, and special events.

The Municipal Wharf, constructed in 1914, extends 2,700 feet into Monterey Bay and separates Main Beach from Cowells Beach. Popular with visitors and residents, the wharf features public walkways, overlooks, seating areas, interpretive exhibits, restaurants, shops, kayak and boat rentals, and parking areas. Nature viewing and fishing are also popular activities.

### STATE BEACHES

Seabright Beach is part of the Twin Lakes State Beach park unit. This wide beach extends from San Lorenzo Point southward to the west jetty of the Santa Cruz Harbor. Access to the beach is provided at the end of Cypress Avenue, a stairway at Third Avenue, and from the Harbor. A restroom is located at the Cypress Avenue entrance. Portable lifeguard towers are installed seasonally. The *Twin Lakes State Beach General Plan* (1992) plan proposes a year-round lifeguard facility and a new restroom between Third Avenue and the jetty. Popular activities include sunbathing, wading and swimming, beach walking/jogging, picnicking, and fires within designated rings. Dogs are restricted to on-leash use only.

A sandy cove beach located within Natural Bridges State Beach is popular for sunbathing, wading and swimming, tide pool visitation and surfing. Its Beach (eastern portion) is part of Lighthouse Field State Beach. This small pocket beach varies in size depending on the season and tides. Popular activities include sunbathing, wading and bodyboarding. Dogs are restricted on on-leash use only. The sandy beach area along the Santa Cruz Boat Harbor is owned and managed by the Port District. To the east within the County, the Twin Lakes State Beach also includes smaller sand beaches.

## SCHOOLS

### Regulatory Setting

Local school districts are empowered under state law to impose school impact fees, which are collected by local governments at the time of building permit issuance. In 1998, the California State Legislature enacted SB 50, which made significant amendments to existing State law governing school fees. SB 50 prohibited state or local agencies from imposing school impact mitigation fees, dedications, or other requirements in excess of those provided in the statute. Government Code Section 65995(e) provides that where payment has been made to a school district in accordance with the school fee program that payment is considered full mitigation for school impacts. The legislation also prohibits local agencies from denying or conditioning any project (including a general plan) based on the inadequacy of school facilities.

Section 23.28.030 of the City's Municipal Code regulates dedication of land as a condition of approval of a final subdivision map in accordance with the provisions of Section 66478 of the Map Act.

### Schools and Enrollments

Schools and educational services are provided to City residents by the Santa Cruz City Schools District (SCSD), as well as a number of private schools, for grades K through 12. SCSD is composed of two separate districts: the Elementary District (K-6) and the High School District (7-12), governed by a common board and administration. The Elementary District draws students from the city of Santa Cruz and includes four K-5 schools, one K-6 school and two 6-8 schools serving 2,624 students in grades K-6 (City of Santa Cruz Elementary and High School District, June 2010).

The High School District encompasses much of the northern portion of Santa Cruz County drawing its student population from the communities of: Davenport, Bonny Doon, Scotts Valley, Santa Cruz, Live Oak, Soquel and Capitola. The secondary District includes two middle schools (grades 6-8), three comprehensive schools, a continuation school, an independent studies program and a K-12 home study program with a combined enrollment of 4,217 students (City of Santa Cruz Elementary and High School District, June 2010).

Table 4.6-2 identifies school capacities and projected enrollments. It should be noted that Soquel High School and Delta Charter School are not located within the City. The Branciforte Small Schools campus includes the Alternative Family Education, Ark Independent Studies, Costanoa Continuation School, and Monarch Elementary School. The existing combined

enrollment for the Santa Cruz City Schools is 6,841 students based on data in the District's annual budget (Santa Cruz City Schools, June 2010). Delta Charter Show (grades 9-12, located outside City limits) serves 190 students (Ibid.). The enrollment numbers in Table 4.6-2 were provided by the School District during the preparation of this EIR.

**TABLE 4.6-2**
**School Capacities & Projected Enrollments**

| School | Capacity | Projected Enrollment |
|---|---|---|
| ***Elementary Schools*** | | |
| ▪ Bay View Elementary | 604 | *547* |
| ▪ Delaveaga Elementary | 641 | 633 |
| ▪ Gault Elementary | 480 | 450 |
| ▪ Westlake Elementary | 604 | 584 |
| *SUBTOTAL* | *2,329* | *2,214* |
| ***Middle Schools*** | | |
| ▪ Branciforte Middle | 651 | 471 |
| ▪ Mission Hill Middle | 690 | 606 |
| *SUBTOTAL* | *1,341* | 1,077 |
| ***High Schools*** | | |
| ▪ Harbor High | 1,155 | 995 |
| ▪ Santa Cruz High | 1,362 | 1,137 |
| ▪ Soquel High | 1,447 | 997 |
| *SUBTOTAL* | *3,964* | *3,129* |
| ***Branciforte Small Schools*** | *517* | 469 |
| **TOTAL ALL GRADES** | **8,151** | **6,889** |

**SOURCE:** Santa Cruz City Schools

The Santa Cruz City Elementary and High School Districts currently charge school impact fees. In justification studies conducted in 2006, it was indicated that enrollment in the Elementary School District had exceeded its facility capacity of 2,028 students for K-6 grades and would continue to exceed facility capacity through the 2015-16 school year. Similarly, the High School District also had exceeded its facility capacity of 4,638 students for 7-12 grades.

## WASTEWATER TREATMENT AND COLLECTION

### Regulatory Setting

#### FEDERAL AND STATE REGULATIONS/REQUIREMENTS

The Clean Water Act (CWA) regulates the discharge of pollutants to waters of the United States from any point source, enacted in 1972. The California State Water Resources Control Board (State Board) and the nine Regional Water Quality Control Boards (RWQCB) have the authority in California to protect and enhance water quality, including administration of the National Pollutant Discharge Elimination System (NPDES) permit program for discharges, storm water and construction site runoff. The discharge of treated wastewater is included in the NPDES program. Wastewater systems are closely regulated for health and environmental

concerns. The RWQCB regulates operations and discharges from sewage systems through the NPDES permit.

Federal, state and local regulations are enforced by the City of Santa Cruz through permitting, monitoring and inspections of Significant Industrial Users (SIU). SIUs are defined in accordance with the Code of Federal Regulations 40 CFR 403.3 (t) as:

- All industrial users subject to Categorical Pretreatment Standards, or
- Any other user that has any one or more of the following characteristics:
  - An average discharge flow of equal to or greater than 25,000 gallons per day of process wastewater to the wastewater treatment facility (WWTF),
  - Contributes a process wastestream which is 5% or more of the average dry weather hydraulic or organic capacity of the WWTF,
  - Has a reasonable potential to adversely affect WWTF operations, or
  - Violates any pretreatment standard or requirement (in accordance with 40 CFR 403.8 (f) (6)) (City of Santa Cruz website: "Industrial Waste Discharge Program").

#### LOCAL REGULATIONS/REQUIREMENTS

Chapter 16.08 ("Sewer System Ordinance") of the City of Santa Cruz Municipal Code regulates discharge to sanitary sewer and requires that all wastewater be discharged to public sewers, with the exception of graywater as allowed by Municipal Code Chapter 16.08. Septic tanks and cesspools are not allowed within city boundaries except as specified for limited conditions in Chapter 6.20 of the Municipal Code.

The Monterey Bay Unified Air Pollution Control District's Rule 216 requires any entity seeking to obtain an Authority to Construct or a Permit to Operate for a Wastewater or Sewage Treatment facility to obtain a permit from the District. The purpose of this Rule is to ensure that the projected served population of a Wastewater or Sewage Treatment facility is consistent with the Air Quality Plan as approved by the Monterey Bay Unified Air Pollution Control District for addressing the current State Implementation Plan requirements for maintaining federal and state ambient air quality standards.

## Wastewater Treatment

#### OVERVIEW

The City of Santa Cruz owns and operates a regional wastewater treatment facility (WWTF), located on California Street adjacent to Neary Lagoon, that provides secondary level of treatment. The City treats sewage from domestic and industrial sources and discharges the treated effluent into the Pacific Ocean under the provisions of a waste discharge permit (NPDES No. CA0048194) issued by the California RWQCB, Central Coast Region (Order No. R3 - 2005 - 0003). Monterey Bay, into which the region's treated wastewater is disposed, was designated in 1992 as a National Marine Sanctuary. Wastewater influent and effluent characteristics are carefully monitored for compliance with state water quality requirements. The City also participates in a regional receiving water monitoring program with other dischargers in the Monterey Bay area (City of Santa Cruz Water Department, February 2006).

### SERVICE AREA

The City of Santa Cruz WWTF serves a population of approximately 130,000 in the cities of Santa Cruz and Capitola and parts of unincorporated Santa Cruz County (see Figure 4.6-3). In addition to the City of Santa Cruz, the WWTF also serves the Santa Cruz County Sanitation District and Community Service Areas (CSA) 10 and 57 as further described below. The City also provides capacity for the City of Scotts Valley to discharge its treated wastewater into the Pacific Ocean via the City's discharge. The City of Santa Cruz accounts for its wastewater system as an enterprise activity, primarily relying on service charges for funding (Local Agency Formation Commission of Santa Cruz County, June 2005).

The Santa Cruz County Sanitation District provides wastewater collection service for the City of Capitola and the unincorporated communities of Aptos, Soquel and Live Oak. The District receives periodic inquiries regarding sewer service in the La Selva Beach area due to septic problems in that area, but that area lies outside its current sphere of influence (Local Agency Formation Commission of Santa Cruz County, June 2005).

County Service Areas 10 and 57 (Rolling Woods and Graham Hill) are also served by the City's WWTP. CSA 57 serves the Woods Cove subdivision off Graham Hill Road; the service area encompasses 0.1 square miles and has a current service population of 14 (7 connections). The area is expected to reach a population of 120 by 2015 as a result of buildout of the approved 60-lot Woods Cove subdivision.[4] CSA 10 serves a portion of the developed Rolling Woods subdivision also located off Graham Hill Road (Local Agency Formation Commission of Santa Cruz County, June 2005).

### TREATMENT LEVELS AND PLANT CAPACITY

**Treatment Process.** The City's WWTF was upgraded in 1998 to provide secondary treatment in order to meet state and federal waste discharge requirements. The City's treatment plant currently produces wastewater of a quality that would be classified as Disinfected Secondary-23. The treatment process consists of a series of steps, including screening, aerated grit removal, primary sedimentation, trickling filter treatment, solids contact, secondary clarification, and ultraviolet disinfection.

The City's treated wastewater is potentially suitable for some agricultural applications and for limited public access irrigation. However, the level of treatment is not sufficient for general irrigation or unrestricted use on playgrounds, parks, schoolyards, etc. Additional treatment above that currently provided would be needed to meet the state public health and safety requirements for these uses. In addition to the treatment upgrades, a distribution system, including pumps, meters, storage facilities, and separate piping would be required to convey the recycled water to customers (City of Santa Cruz Water Department, February 2006).

[4] The Board of Supervisors approved the Tentative Map on November 27, 1996. Subsequent to that, the County did supplemental environmental review to consider the developer's request to change from onsite sewage treatment to a transmission main to the City of Santa Cruz. In September 1998, the County filed a negative declaration and the County approved the revised sewer option on October 20, 1998 (County Application Number 98-0121) (McCormick, Santa Cruz LAFCO, personal communication, October 2009).

**Treatment Capacity.** The WWTF has a permitted wastewater treatment capacity of 17.0 million gallons per day (mgd) (City of Santa Cruz, 2009). In 2009, the WWTP treated 2.84 billion gallons of wastewater effluent at an average daily rate of 9.2 mgd (Ibid.). Daily dry weather flow averaged 8.5 mgd for June, July and August. With the closure of businesses within the city over the last 10 years (including, Lipton, Wrigley, Salz Tannery, and Texas Instruments), the amount of wastewater treated at the facility has decreased over that time period. Approximately 150 acre-feet per year (0.2 mgd) of treated water is retained for use at the treatment plant (Local Agency Formation Commission of Santa Cruz County, June 2005). The plant also treats excess dry weather flow of approximately ½ mgd from Neary Lagoon, typically from April through October.

The Santa Cruz County Sanitation District has treatment capacity rights of 8 mgd at the City of Santa Cruz WWTF. The City contributes approximately 5.0 mgd with a remaining capacity of 4.0 mgd. The Sanitation District contributes 5.5 mgd with a remaining capacity of 2.5 mgd. Approximately 50% of the wastewater treated at the plant is generated within the City of Santa Cruz. The total remaining treatment plant capacity, therefore, is 7.5 mgd.

#### WWTF MAINTENANCE & IMPROVEMENTS

The agreement between the Sanitation District and the City stipulates that the District shall pay 8/17 (47%) of the project costs for treatment modifications, while operational and maintenance costs are split in proportion to the total flow, Biological Oxygen Demand (BOD) and Suspended Solids (SS) actually discharged[5] by each agency (Local Agency Formation Commission of Santa Cruz County, June 2005).

The WWTF has been upgraded several times since 1928 when the plant began operations (City of Santa Cruz, 2007-Annual Report). The WWTF was upgraded in 1998 to provide a secondary biological treatment system consisting of trickling filters/solids contact tanks to improve effluent quality and satisfy federal requirements and the California Ocean Plan. According to the City's website[6], other major accomplishments at the WWTF in the last five years include:

- Completion of a photovoltaic system.
- Integration of a 1.3-megawatt cogeneration system into the facility power grid.
- Completion of a Carbon Absorption Odor Control System.
- Implementation of staffing reorganization to optimize plant efficiency.

## Treated Effluent Disposal

The treated effluent is disposed into the Monterey Bay via a deep ocean outfall constructed in 1987. The outfall extends 12,250 feet on the ocean bottom and terminates one mile offshore at a depth of approximately 110 feet below sea level. A 1,200-foot diffuser at the end of the

[5] Flows are measured daily and monthly averages are prepared. SS are measured daily and BOD is measured weekly.

[6] http://www.ci.santa-cruz.ca.us/pw/index.html, "Wastewater Treatment Facility."

pipe provides an initial dilution of greater than 139 parts seawater to one part wastewater (City of Santa Cruz Water Department, February 2006).

As previously indicated, the City of Scotts Valley discharges its treated effluent via the City's ocean outfall. The Scotts Valley Wastewater Treatment Plant has a permitted capacity of 1.5 million gpd and treats water to secondary and tertiary levels. Secondarily treated effluent that is not used for recycled water is transmitted via a main to Santa Cruz and discharged to the ocean through the outfall shared with the City of Santa Cruz.

### Wastewater Collection

The City of Santa Cruz wastewater collection system serves approximately 15,000 connections. The collection system includes 23. The City maintains over 160 miles of sewer pipeline ranging in size from 6 to 54 inches in diameter. The City has a hydraulic model for the sewer system, and continues to focus on collections system projects that reduce infiltration and inflow into the system (Wolfman, personal communication, April 2011).

The City addresses infrastructure needs during the annual budgeting process. The City's proposed 2011-2012 Capital Improvement Program includes a number of projects for improvements to the wastewater system. In addition to rehabilitation and replacement projects, the CIP includes a number of projects where closed circuit TV will be used to identify problem areas and improve maintenance and repairs. The CIP also includes funding for replacing worn and obsolete equipment, and improving automation at the wastewater treatment plant. The CIP is reviewed and adopted annually (Local Agency Formation Commission of Santa Cruz County, June 2005).

## SOLID WASTE DISPOSAL

### Regulatory Setting

The City's landfill operation is required to comply with the regulations, plans, and permits required by the California Integrated Waste Management Board and California Regional Water Quality Control Board, California Air Resources Board, and the Monterey Bay Unified Air Pollution Control District.

The California Integrated Waste Management Act of 1989 (AB 939) (Chapter 1095, Statutes of 1989, et seq.) was adopted in an effort to improve planning for solid waste facilities and reduce the volume and toxicity of solid waste that is disposed. The act requires each of the cities and unincorporated portions of counties throughout the State of California to divert 25% by 1995 and 50% by the year 2000 of the solid waste tonnage that was disposed in 1990. It also requires local governments to prepare and implement plans that would improve waste resource management by integrating solid waste management with source reduction, reuse, recycling, and composting measures.

## City of Santa Cruz Solid Waste Collection and Disposal

Solid waste collection and disposal, including recycling services, are provided by the City of Santa Cruz to residents, businesses and institutions within the City's boundaries, is provided at the Resource Recovery Facility (RRF), which includes a sanitary landfill, recycling center, greenwaste drop-off area, and Household Hazardous Waste Drop-Off Facility. The City owns and operates this facility, including a Class III sanitary landfill, which is located approximately three miles west of the City off Highway 1 on Dimeo Lane. The site covers 100 acres with 67 acres available for disposal use (Local Agency Formation Commission of Santa Cruz County, June 2005). The City's Resource Recovery Facility (RRF) and Recycling Center is located at the landfill site. The RRF only accepts municipal solid waste and serves as a sorting facility to remove any recyclable or composting materials. The Recycling Center accepts a variety of recyclable materials.

The City's solid waste operations are in full compliance with federal, state, and local air, water and waste regulations for collection vehicles, processing operations, and landfill disposal operations. The City has implemented several best management practices to improve its solid waste services, including a landfill gas collection system that is used to run an engine to produce electricity and use of bio-diesel for collection and landfill equipment to reduce CHG emissions (Local Agency Formation Commission of Santa Cruz County, June 2005).

In the mid-1990s the permitted disposal area of the landfill increased from 40 to 67 acres. The additional acreage was designed with a liner system that meets EPA requirements for new municipal solid waste landfills. The new area replaced the former leachate evaporation ponds, which were cleaned and closed in 1997. The expansion increased the life of the landfill by approximately 30 years at that time, (City of Santa Cruz Department of Planning and Community Development, April 2004), but the lifespan has been increased through additional waste reduction as discussed further below.

Since 1990 the Public Works Refuse Division has focused on maximizing the capacity of the RRF, waste diversion, and implementing environmental improvements to minimize the impacts of the facility to public health and the surrounding environment (City of Santa Cruz Department of Planning and Community Development, April 2004). Major capital improvement projects that have been implemented at the RRF to minimize its impact to the environment include the following:

- Construction of two triple lined leachate collection impoundments.
- Construction of a three-mile leachate pipeline from the landfill to the City's sanitary sewer system.
- Construction of a groundwater cutoff wall downgradient of the landfill's lowest elevation.
- Construction of a freshwater bypass tunnel system to reroute two streams around the landfill.
- Construction of two of the four lined cells planned for the 27-acre expansion area.
- Expansion of the recycling processing facility and conversion to an automated, single-stream processing line.
- Construction of a gas trench wall to prevent offsite migration of landfill gas.

- Improvement of the landfill gas collection and power generation system.
- Improvement of leachate containment and erosion control methods.
- Expansion of environmental monitoring network, including groundwater, soil pore gas, surface water and air quality (City of Santa Cruz Department of Planning and Community Development, April 2004).

The City of Santa Cruz met has met the state-mandated waste diversion goals of 25% of their 1990 waste-streams from landfill disposal by 1995 and 50% by 2000 through community education regarding the three "R"s (i.e. reduce, reuse and recycle) and the implementation of expanded curbside recycling programs. The programs included the collection of most forms of clean paper (e.g. office, junk mail, newspaper, magazines, paper board, and card board), containers (e.g. glass, metal, aluminum, and plastic nos. 1-7), and yard waste materials. The programs also included the diversion and reuse of construction and demolition debris (e.g. concrete rubble, asphalt, and wood) and wastewater treatment plant sludge. In the year 2000, the City established a Zero-Waste goal with the ultimate intention of eliminating the City's need for a landfill (City of Santa Cruz Department of Planning and Community Development, April 2004). As of 2009, the City had achieved a diversion rate of 63-65%, which exceeds the state requirements.

Assuming growth trends similar to the past 10-15 years in the City of Santa Cruz, the RRF has more than adequate capacity to accommodate all municipal solid waste generated by City residents, visitors and businesses. Based on continued waste reduction, annual aerial surveys, and calculations, the landfill is estimated to have capacity through the year 2058 (Arman, personal communication, April 2011). State law requires that facilities begin planning for future waste disposal/reuse facilities at least 15 years in advance of existing landfill closure dates, which would be after the year 2030 and the proposed *General Plan 2030* planning horizon.

Planned programs and improvements include the following as outlined in the *General Plan 2030* Background Report City of Santa Cruz Department of Planning and Community Development, April 2004 include expansion of the waste diversion programs and continued pursuit of operational improvements and efficiencies to increase the life of the landfill. Several capital improvement projects are planned to promote waste diversion, improve the environment, and maintain the landfill's capacity. These include two additional lined landfill cells and improvements at the wastewater treatment plant to enable food wastes to be added to the digesters to generate gas for energy generation. The City recently acquired a 5.5-acre parcel adjacent to the landfill on the south, which will be used for support uses ancillary to the landfill and RRF uses. Specific uses have not been identified, but the property will not be used for landfill disposal operations.

## ELECTRICAL & NATURAL GAS UTILITIES

Pacific Gas and Electric Company (PG&E) provides electrical and natural gas service to the City. Incorporated in California in 1905, PG&E is one of the largest combination natural gas and electric utilities in the United States. PG&E and other utilities in the state are regulated by the California Public Utilities Commission (Pacific Gas and Electric Company website, 2011). It currently provides service to approximately 15 million people throughout a 70,000-square-mile service area in northern and central California from Eureka in the north to Bakersfield in the

south, and from the Pacific Ocean in the west to the Sierra Nevada in the east. The service area includes 141,215 circuit miles of electric distribution lines, 18,616 circuit miles of interconnected transmission lines. 42,141 miles of natural gas distribution pipelines and 6,438 miles of transportation pipelines. PG&E and other utilities in the state are regulated by the California Public Utilities Commission (Pacific Gas and Electric Company website, 2011).

The state's per capita electrical use in 2009 was 6,691 kilowatt hour per capita, the lowest of any state in the nation (California Energy Commission website, 2011). Within PG&E's service area, electrical use is projected to increase by approximately 1.22% between 2010 and 2020, which is a lower increase than experienced between 1990 and 2000, but slightly higher than between 2000 and 2010 (California Energy Commission, December 2009). Total efficiency/conservation electricity consumption savings are projected to reach 80,000 gigawatt hours in 2020; the majority of savings from building and appliance standards (Ibid.). State projections indicated that natural gas consumption will increase only minimally during the same time period (Ibid.).

State forecasts show a similar electrical and natural gas trend for the PG&E service area with a slightly higher rate of increase in electrical consumption between 2010 and 2020 (1.27%) (California Energy Commission, December 2009). However, the per capita electricity consumption is projected to slightly decline in PG&E's service area due to continued savings from energy efficiency programs (Ibid.). Forecasts show an overall decrease in natural gas consumption over 1990 levels by the year 2020 (Ibid.).

Data developed as part of the preparation of the City's draft "Climate Action Plan" reveals that approximately 290,000,000 kilowatt hours (kWh) of electricity were consumed within the City in 2008 and approximately 18,000,000 therms of natural gas was used. This accounts for municipal, residential and commercial/industrial uses. Nearly 8,000,000 kWh of electricity was generated by renewable sources.

Studies have demonstrated the value and cost-effectiveness of weather-stripping, replacing single pane windows, old appliances and lighting, and increasing insulation in reducing energy use and saving money. Significant energy and cost savings have already been achieved through the implementation of such measures throughout the City of Santa Cruz, although further savings could be achieved (City of Santa Cruz Climate Action Program, September 2010). Over the past 15 years, the combined influences of energy efficiency rebate programs, a public education campaign, and significant increases in energy prices have led to a 22% reduction in energy use within Santa Cruz homes. While this drop in energy use is significant, home energy use in Santa Cruz is again on the rise, but still far below 1996 levels (Ibid.).

In 2007, Santa Cruz became one of the first municipalities in the nation to require new construction to include the adoption of environmentally superior building materials and designs. Builders in Santa Cruz now use best practices for their construction projects that enhance building energy efficiency and water conservation as well as to improve air quality, waste reduction and recycling, and erosion and runoff control. The Green Building Program currently includes residential and commercial development (City of Santa Cruz Climate Action Program, September 2010). Reviews conducted as part of the preparation of the City's draft "Climate Action Plan" indicates that an "award-winning" home under the City's Green Building Program

produces a home that is more efficient than standard homes built in 2008 and almost twice as efficient as homes built in 1990 (City of Santa Cruz, September 2010).

The AMBAG Energy Watch Program is a partnership between AMBAG and PG&E, which seeks to reduce energy use in the Monterey Bay region by providing the resources listed below to eligible PG&E customers.

- Energy assessments and audits;
- Direct installation of energy efficient equipment;
- Technical assistance and financial incentives for energy efficient retrofits in municipal buildings;
- Energy efficiency seminars and training courses in the region; and
- nformation on other PG&E energy efficiency programs and services

Additionally, the Monterey Bay Regional Energy Plan was prepared by AMBAG to update goals and actions Program regarding energy use in the Monterey Bay region. A draft update to the 2006 Plan reported that the Energy Watch Program tracked and reported the following energy savings in 2008 throughout the region: 5,201,582 killowatt hours (kWh) for municipalities; 17,697,292 kWh the hospitality industry; and 1,293,653 kWh for residential uses (AMBAG, 2008).

## 4.6.2 RELEVANT PROJECT ELEMENTS

### PROPOSED GOALS, POLICIES & ACTIONS

The proposed *General Plan 2030* includes goals, policies and actions that address provision of public services. In general, Policies LU1.3 and LU1.4 seek to ensure that facilities and services required by future development are available and that new development pays its proportional share. The Plan also seeks to provide community services and facilities to meet needs of the population (CC2.1) and update and replace facilities (CC2.1.1).

Goals, policies and actions in the following chapters also address specific public services.

- The CIVIC AND COMMUNITY FACILITIES chapter of the draft *General Plan 2030* includes the following four goals addressing public services:

  GOAL CC4 *A sustainable and efficient wastewater system.*

  GOAL CC6 *Minimal solid waste production.*

  GOAL CC7 *A safe and secure community.*

  GOAL CC8 *Excellent educational opportunities and resources.*

These goals address the following public services:

- Wastewater - one goal with three associated policies and eight specific actions;
- Solid Waste Management – one goal with four associated policies and 27 actions;
- Police Protection – one goal with six associated policies and 23 actions ; and
- Schools – two policies with four actions that address school sites and facilities and two additional policies and accompanying actions that address educational programs and safe access to schools.

- The HAZARDS, SAFETY & NOISE chapter of the draft *General Plan 2030* includes two policies and 13 specific actions related to fire protection and safety and provision of emergency access.

- The PARKS, RECREATION AND OPEN SPACE chapter of the draft *General Plan 2030* includes goals, policies and actions that address parks and recreational facilities, open space, trails and recreation programs. This chapter includes three goals with 16 associated policies and 38 specific actions that address parks, open space and recreational facility public services. A fourth goal with policies and actions address recreational programs, activities and events. These goals are identified below. Several policies and actions in other chapters of the proposed General Plan also seek to protect, preserve and/or manage open space and natural areas throughout the City (CD 1.1.3, LU 2.3, LU 3.11 NRC 1.1 river access]).

  GOAL PR1 *Ample, accessible, safe and well-maintained parks, open space, and active recreational facilities.*

  GOAL PR2 *High-quality, affordable recreational programs, activities, events, and services for all.*

  GOAL PR3 *Well managed, clean and convenient public access to open space lands and coastline.*

  GOAL PR4 *An integrated system of citywide and regional trails.*

  The draft plan also strives to maintain park service standards, which call for a neighborhood park at ratio of 2.0 acres per 1,000 population (PR1.3.2) and a community parks ratio of 2.5 acres per 1000 population (PR1.3.3). Service standards are not provided for other public services, although Action CC7.1.7 calls for updating and maintaining police response time standards, while Action CC9.4.2 seeks to provide emergency services at accident or disaster scenes within an average time of 4 minutes or less and within 5 minutes or less 90 percent of the time.

- The NATURAL RESOURCES AND CONSERVATION chapter of the draft *General Plan 2030* includes the following goal with four associated policies and 20 accompanying actions related to energy conservation. Its four policies and accompanying actions would promote reduction of electricity and natural gas consumption, use of renewable

energy sources, and use of energy-efficient lighting, vehicles, and water fixtures and appliances.

GOAL NRC7 *Reduction in energy use, and significant production and use of renewable energy.*

## PROPOSED IMPROVEMENTS

The draft *General Plan 2030* includes several policies and actions that address specific improvements or general types of future improvements to public service facilities. Generally, the plan calls for updating and replacing facilities as appropriate (CC2.1.1) and providing community facilities to meet the needs of the City's population (CC2.1). Specific referenced service improvements include maintenance and upgrading the sewer system (CC4.1, CC4.1.1 - CC4.1.3, CC4.1.5); monitoring the wastewater treatment plant capacity to address future needs (CC4.1.8); and exploring the potential for recycling wastewater (CC4.3). The draft Plan the development of a new countywide Emergency Operations Center facility (HZ1.1.5), but a specific location within the City or elsewhere in the county is not identified.

Policy LU4.3 encourages the development and expansion of neighborhood facilities such as parks, schools, daycare centers, and neighborhood commercial services. However, there are no specifically designated new park or school sites. A number of policies promote provision of trails and access to open space lands and the coast (PR4.1 and accompanying actions) with enhancing the recreational value of the San Lorenzo River walkway and East and West Cliff Drive pathways (PR4.1.3) and creating a continuous pathway along the coast by enhancing the physical links between West Cliff and East Cliff Drives and the Beach Promenade (PR4.1.4).

## FUTURE DEVELOPMENT POTENTIAL

The *General Plan 2030* Land Use Map and land use designations are largely unchanged from the 1990-2005 General Plan / Local Coastal Program, except for three new mixed use land designations that have been developed and applied to the following major transportation corridors: Mission Street, Ocean Street, Soquel, Avenue, and Water Street. Some of the draft *General Plan 2030* policies and actions support specific types of land uses and/or development, including new mixed-use use districts and/or intensified redevelopment, as summarized in the LAND USE (Chapter 4.1) section of this EIR.

# 4.6.3 IMPACTS AND MITIGATION MEASURES

## CRITERIA FOR DETERMINING SIGNIFICANCE

In accordance with the California Environmental Quality Act (CEQA), State CEQA Guidelines (including Appendix G), City of Santa Cruz plans, policies and/or guidelines, and agency and professional standards, a project impact would be considered significant if the project would:

6a Result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities or need for new or physical altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or other performance objectives for any of the public services:

- Fire Protection
- Police Protection
- Schools

6b Increase the use of existing neighborhood and community parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated.

6c Include recreational facilities or require the construction or expansion of recreational facilities that might have an adverse physical effect on the environment.

6d Result in wastewater flows exceed sewer line or treatment plant capacity or contribute substantial increases to flows in existing sewer lines that exceed capacity.

6e Be served by a landfill with insufficient permitted capacity to accommodate the project's solid waste disposal needs.

6f Result in the wasteful or inefficient use of energy.

## IMPACT ANALYSIS

Based on the significance criteria identified above, the following impact analyses address potential impacts to the City's fire and police services (6a); potential impacts on City park facilities (6b-c); potential impacts on school facilities (6a); potential impacts related to wastewater collection and disposal (6d); potential impacts on landfill capacity (6e); and potential impacts related to energy use (6f).

### Potential Future Development & Buildout

Adoption and implementation of the proposed General Plan 2030 would not directly result in increased new development. However, the draft General Plan includes policies and a land use map that support additional development. This potential development, as summarized in the LAND USE (Chapter 4.1) section of this EIR, could result in development of 3,350 residential units, 3,140,000 square feet of commercial, office and industrial development and 300 new hotel

rooms. This level of development could result in an increased population of 8,040 residents and 8,665 new jobs.

The proposed General Plan also includes other policies and actions that could result in development that supports year-round expanded performances, events, and/or visitors. These potential uses include:

- Supporting a downtown performing arts center or expansion of the Civic Center (HA2.2.5),
- Amending the Zoning Ordinance to allow development of arts and cultural facilities in a wide variety of districts (HA2.2.4),
- Supporting Santa Cruz as a year-round conference destination (Policy ED1.4), supporting year-round events (HA3.2.4), and promoting Santa Cruz as a year-round arts destination, and
- Promoting Santa Cruz as a principal retail, cultural, recreational, entertainment and commercial destination in the region (ED1.1).

New development accommodated under the proposed General Plan will result in the demand for public services. The proposed *General Plan 2030* includes goals, policies and actions that address provision of public services. In general, Policies LU1.3 and LU1.4 seek to ensure that facilities and services required by future development are available and that new development pays its proportional share. The Plan also seeks to provide community services and facilities to meet needs of the population (CC2.1) and update and replace facilities (CC2.1.1). The impacts associated with specific services are presented below.

**Impact 4.6-1 Fire Protection**
Adoption and implementation of the *General Plan 2030* could indirectly result in increased population associated with potential development that could be accommodated by the Plan that would result in increased fire protection and emergency service demands. However, future development and growth would not result in the need to construct new or expanded fire stations. This is considered a *less-than-significant impact*.

According to the City's Fire Department, there are adequate fire protection facilities to serve the projected growth increases associated with implementation of the proposed Draft *General Plan 2030*. No new fire stations or facilities will be needed to maintain acceptable response times and service levels (Oliver, personal communication, April 2011). New development and growth accommodated by the draft plan would not reduce response times or require new or physically altered fire protection facilities that could result in significant physical impacts.

The Department's current need for a Training Facility, however, will continue in the future, and the Department plans to investigate the possibility to consolidate administration and training facilities with future fire station improvements, including potential reconstruction of Fire Station Two and relocation of Fire Station One. No sites have been identified for potential relocation. Fire Station Two is located adjacent to a city-owned, paved, public parking lot. If future

expansion were to occur at this location, there no significant impacts are expected to occur, as the site is within a developed urban area.

The draft plan includes policies and actions that would serve to reduce impacts on the City's Fire Department. Draft Policy HZ1.2 seeks to respond to emergencies rapidly. Specific actions call for annual review of service calls (HZ1.2.1) and response times and making continuous operational improvements to arrive on emergency scenes within an average time of 4 minutes or less and within 5 minutes or less 90 percent of the time (HZ1.2.2). Additionally, Policy HZ1.4 and its five specific actions seek to continue to meet fire safety and firefighting needs with staff training and equipment maintenance (HZ1.4.1), promoting built-in fire extinguishing and alarm systems (HZ1.4.2), ensuring adequate fire flow to new uses (HZ1.4.3), and continued mutual aid services with other agencies (HZ1.4.4, HZ1.4.5). A number of actions also seek to ensure that new development is sited and designed to accommodate facility emergency access and response (HZ1.2.5, HZ1.2.6, HZ1.5.5) and that street widths are adequate to safely accommodate emergency vehicles (M3.2.3). These policies and actions (as summarized on Table 4.6-3) serve to maintain fire department operations and response time and reduce impacts on fire protection services.

**TABLE 4.6-3**
**Proposed General Plan Policies & Actions that Avoid or Reduce Fire Protection Service Impacts**

| Type of Measure / Action | Policies / Actions |
|---|---|
| PROVIDE ADEQUATE EMERGENCY RESPONSE & PREPAREDNESS | • Adequate emergency response times: HZ1.2, HZ1.2.1, HZ1.2.2<br>• Ensure emergency preparedness: HZ1.1; HZ1.1.1 (annually update the Emergency Operations Plan.); HZ1.1.2 (City staff training)<br>• New development design and access to maintain emergency response times with adequate access: HZ1.1.3, HZ1.2.5, HZ1.2.6<br>• Ensure that street widths are adequate to safely serve emergency vehicles: M3.2.3 |
| PROVIDE ADEQUATE FIRE PROTECTION | • Meet fire safety & firefighting needs: HZ1.4, HZ1.4.1 (staff training and equipment maintenance)<br>• Adequate emergency response times: HZ1.2, HZ1.2.1, HZ1.2.2<br>• Adequate fire flow: CC3.4.1, HZ1.4.3<br>• Pre-fire surveys of select buildings: HZ1.2.3<br>• Fire prevention: HZ1.4.2 (built-in extinguishing & alarm systems), HZ1.5.6 (abatement of hazardous buildings and conditions)<br>• Adequate emergency access in new development: HZ1.2.5, HZ1.2.6, HZ1.5.5<br>• Promote fire safety & prevention programs: HZ1.5.8 |
| REDUCE WILDLAND FIRE HAZARDS | • Reduce wildfire hazards: HA1.5, HZ1.5.1,<br>• Regulate development siting/design to reduce wildland fires: HZ1.5.3 (setbacks), HZ1.5.4 (fire-resistant/retardant building materials),<br>• Continued mutual aid with other agencies: HZ1.4.4, HZ1.4.5<br>• Promote fire safety & prevention programs: HZ1.5.8<br>• Maintain & update wildland interface zones: CD1.4.4 |

Future growth could result in an indirect increased risk of wildfires in the urban-rural interface and adjacent to the City's greenbelt areas. None of the major vacant sites are within identified fire hazard zones. The City does not have the resources to adequately police and protect greenbelt areas, which increases the frequency of illegal camping that can result in fires in limited access and canyon areas (City of Santa Cruz, September 2007). Despite the fact that there has not been a recent wildland fire within the city limits, residential development into or adjacent to wildland/urban interface areas increases the danger to life and property should a fire occur. Areas targeted as "likely" to have a wildland fire include the Arroyo Seco/Meder Canyon, DeLaveaga, Pogonip, Moore Creek area and Arana Gulch. Increasing use of these areas by residents, transient encampments with fires, and young adults looking for a place to gather exacerbates the risks (Ibid.).

Policy HZ1.5 seeks to reduce potential wildfire hazards through regulation of development in and adjacent to fire hazard areas (HZ1.5.2) with adequate siting, design, and emergency access provided by new development to reduce potential hazards and facilitate emergency response (HZ1.5.3, HZ1.5.4, HZ1.5.5). The City of Santa Cruz also has initiated a number of wildfire mitigation programs in recent years including vegetation management programs at DeLaveaga Park and at the Arroyo Seco Canyon areas (City of Santa Cruz, September 2007). The City continues to maintain cooperative agreements to work with the County, UCSC, the California Department of Forestry and other fire protection agencies to collaboratively avoid or minimize the threat from wild-land/urban interface fires. The City's adopted "Local Hazard Mitigation Plan" (City of Santa Cruz, September 2007) also includes the following mitigation strategy to avoid or reduce potential wildfires that have been included in the draft General Plan.

- Cooperative fire protection agreements with other agencies.
- Reduction of fire risk in wildland/urban interface areas through improved vegetation management and appropriate code enforcement.
- Promotion of built-in fire extinguishing and warning fire alarm systems.
- Creation of a proactive (not reactive) hazard abatement program.
- Land use planning to reduce incidence of human caused wildfire.
- Adequate staffing to meet needs of City population and development.
- Fire prevention programs in schools, institutions & commercial buildings.

**Conclusion**. Adoption and implementation of the proposed *General Plan 2030* would not directly result in new development, but new development accommodated by the plan would result in demands for fire protection services. However, there are adequate fire protection facilities to serve the projected growth increases associated with implementation of the proposed Draft *General Plan 2030*, and no additional equipment or facilities will be needed to maintain acceptable response times and service levels (Oliver, personal communication, April 2011). New development and growth accommodated by the draft plan would not reduce response times or require new or physically altered fire protection facilities that could result in significant physical impacts. Furthermore, the proposed *General Plan 2030* includes goals, policies and actions that set forth measures to avoid and minimize adverse impacts on fire protection services as summarized on Table 4.6-3. With implementation of these proposed policies and actions, as well as implementation of the City's "Local Hazard Mitigation Plan", the

proposed *General Plan 2030*'s indirect impact on fire protection services would be considered less-than-significant.

**Mitigation Measures**

No mitigation measures are required as a significant impact has not been identified.

**Impact 4.6-2 Police Protection**
Adoption and implementation of the *General Plan 2030* could indirectly result in increased population associated with potential development that could be accommodated by the Plan that would result in increased police protection service demands. However, future development and growth would not result in the need to construct new or expanded police stations. This is considered a *less-than-significant impact*.

According to the City's Police Department, there are adequate police protection facilities to serve the projected growth increases associated with implementation of the proposed Draft *General Plan 2030*. No additional equipment or facilities personnel will be needed to maintain acceptable response times and service levels (Vogel, personal communication, April 2011). New development and growth accommodated by the draft plan would not reduce response times or require new or physically altered police protection facilities that could result in significant physical impacts.

The draft plan includes policies and actions that would serve to reduce impacts on the City's Police Department. Policy CC7.1 and its specific accompanying actions seek to ensure adequate police training and resources. Specific actions seek to ensure appropriate police staff, stations, equipment and training to meet demands of increased population and tourism (CC7.1) and implement officer training and crime prevention programs (CC7.1.2, CC7.1.3). Additionally, the draft plan seeks to provide and rapid and timely response to emergencies (CC7.1.6, HZ1.2) with updating and maintaining police response time standards (CC7.1.7). Specific actions call for annual review of service calls (HZ1.2.1) and response times and making continuous operational improvements to arrive on emergency scenes within an average time of 4 minutes or less and within 5 minutes or less 90 percent of the time. (HZ1.2.2). A number of policies also seek to reduce police service demand through land use planning and project designs (CC72.5, CC7.2.7). Other actions promote cooperate with other County agencies on public safety and police issues (CC7.3, CC7.3.1, CC7.3.2). Taken together, these policies and actions (as summarized on Table 4.6-4) serve to ensure adequate police department operations and response time and reduce police protection service demand, and, thus, reduce potential impacts on police protection services.

**Conclusion.** Adoption and implementation of the proposed *General Plan 2030* would not directly result in new development, but new development accommodated by the plan would result in demands for police protection services. However, there are adequate police protection facilities to serve the projected growth increases associated with implementation of the proposed Draft *General Plan 2030*, and no additional

equipment or facilities will be needed to maintain acceptable response times and service levels. New development and growth accommodated by the draft plan would not reduce response times or require new or physically altered police protection facilities that could result in significant physical impacts. Furthermore, the proposed *General Plan 2030* includes goals, policies and actions that set forth measures to avoid and minimize adverse impacts on police protection services as summarized on Table 4.6-4. With implementation of these proposed policies and actions, the proposed *General Plan 2030*'s indirect impact on police protection services would be considered less-than-significant.

**Mitigation Measures**

No mitigation measures are required as a significant impact has not been identified.

**TABLE 4.6-4**
**Proposed General Plan Policies & Actions that Avoid or Reduce Police Protection Service Impacts**

| Type of Measure / Action | Policies / Actions |
|---|---|
| PROVIDE ADEQUATE EMERGENCY RESPONSE & PREPAREDNESS | • Adequate emergency response times: HZ1.2, HZ1.2.1, HZ1.2.2<br>• New development design and access to maintain emergency response times with adequate access: HZ1.1.3, HZ1.2.5, HZ1.2.6 |
| PROVIDE ADEQUATE POLICE PROECTION | • Ensure appropriate staff (including training), stations, equipment to meet population demands: CC7.1, CC7.1.1, CC7.1.2<br>• Timely response: CC7.1.6, CC7.1.7, HZ1.2, HZ1.2.1, HZ1.2.2<br>• Update police response standards: CC7.1.7<br>• Reduce demand through land use planning & project designs: CC7.2.5, CC7.2.7<br>• Participate in crime reduction & prevention programs: CC7.1.3, CC7.2.2, CC7.2.3 |

**Impact 4.3 Parks and Recreation**
Adoption and implementation of the proposed *General Plan 2030* could indirectly result in increased development and population growth that would result in an indirect demand for parks and recreational facilities. However, the estimated growth would not increase use of parks or recreational facilities such that a substantial physical deterioration would occur. With implementation of proposed policies and actions, in combined with existing regulations, impacts to parks and recreational facilities is considered a *less-than-significant impact*.

The proposed *General Plan 2030* will result in additional development and population growth, resulting in increased demands for park and recreational facilities. The Plan seeks to provide neighborhood parks at a ratio of 2.0 acres per 1,000 residents and to provide community parks at a ratio of 2.5 acres per 1,000 residents. This is the same standard included in the

City's existing General Plan. As previously discussed, the City currently does not meet the desired level of service for neighborhood parks and is deficient by approximately 16 acres. Thus, existing developed neighborhood parks could be considered at capacity use, in general, based on the City's park service standards.

The projected population increase of 8,040 new residents would result in an additional need for 16 acres of neighborhood parks and 20 acres of community parks to meet the proposed park service standard. Under existing conditions and with future growth, a total of 32 additional neighborhood park acres would be required to meet the City's service standard.[7] The City currently has sufficient community park land as summarized on Table 4.6-1.

The *General Plan 2030* does not identify any specific new park and recreation facility sites. Thus, the increased population accommodated by the proposed General Plan would result in an increased use of existing parks and recreational facilities. The largest projected increases in population would be distributed along existing transportation corridors throughout the City and in downtown. Thus, it is anticipated that the increased use of parks and recreational facilities would be distributed throughout existing neighborhood and community parks. A geographically widespread increase in use would not likely result in substantial physical deterioration of specific parks and recreational facilities, although maintenance is an ongoing requirement, including school playgrounds and joint use facilities.

The proposed *General Plan 2030* does not include any goals or policies regarding construction or expansion of a specific park or recreational facility, the construction or expansion of which may result in potentially significant impacts. The draft plan does call for developing new or expanding existing athletic fields (PR1.2.2), and coordinating with local schools to expand park and recreation opportunities. However, specific sites or locations are not identified. As specific park and recreational facility expansion projects are proposed in the future, project-specific environmental analyses will be completed as required to analyze potential significant impacts and provide the appropriate project-level mitigation as may be needed.

The proposed *General Plan 2030* includes a number of policies that serve to mitigate potential impacts to existing parks and recreation facilities as a result of new residential development and population growth accommodated by the draft *General Plan 2030*. The policies, which are summarized on Table 4.6-5, address development of new parks which would lessen the projected increased use of existing parks, as well as, maintenance of existing parks and recreational facilities. The plan seeks to update and modify park system and services to accommodate changes in the population and its recreational need (PR1.1.1). A number of policies and actions seek to provide a system of parks and recreational facilities (PR1.1.1), planning for new parks and facilities (PR1.1.2, PR1.1.4), evaluating and acquiring parks (PR1.1.3, PR3.2 [parcels that provide access to City-owned open space lands]), developing new or expanding existing athletic fields (PR1.2.2), and coordinating with local schools to expand park and recreation opportunities (PR1.2.1, PR1.2.3). To this end, the plan establishes service standards (PR1.3, PR1.3.2, PR1.3.3), seeks to ensure that adequate park land is provided in conjunction with new development (PR1.3.1), and requires park dedication or payment of in-lieu fees from new development (PR1.7, PR1.7.1). Thus, while specific new park locations are not

[7] This is based on an existing population of 58,982 in 2009 and 102 existing acres of neighborhood parks and 366 acres of community parks as summarized on Table 4.6-1.

designated in the proposed *General Plan 2030*, the policies and actions set forth a strategy to plan and acquire additional park lands in the future.

The draft plan also seeks to ensure ongoing maintenance needs are addressed in the development and funding plans for any new or expanded parks, recreational facilities, or open space areas (PR1.3.4, PR1.10). Maintenance of the City's Parks and Facilities tax also is recommended (PR1.9, PR1.91, PR1.9.2).

A number of policies and actions also promote provision of trails and access to open space lands and the coast (PR1.4) with enhancing the recreational value of the San Lorenzo River walkway and East and the West Cliff Drive pathways (PR4.1.3) and creating a continuous pathway along the coast by enhancing the physical links between West Cliff and East Cliff Drives and the Beach Promenade (PR4.1.4).

**TABLE 4.6-5**
**Proposed General Plan Policies & Actions that Reduce Parks Impacts**

| Type of Measure / Action | Policies / Actions |
|---|---|
| PLAN & PROVIDE FOR NEW PARKS | • Provide & manage parks: PR1.1<br>• Develop and maintain city Master Parks Plan: PR1.1.2, Pr1.1.4 (plan for adequate parks and recreation facilities)<br>• Level of Service standards: PR1.3, PR1.3.2, PR1.3.3<br>• Evaluate lands for small parks: PR1.1.3<br>• Coordinate with schools to expand parks: PR1.2.1, PR1.2.3<br>• Examine developing new or expanding existing athletic fields: PR1.2.2<br>• Development park dedication or in-lieu fees: PR1.7, 1.7.1<br>• Maintain a Parks and Recreation Facilities excise tax on new construction: PR1.9, PR1.9.1, PR1.9.2<br>• Acquire parcels that provide access to City-owned open space lands and coast: PR3.2 |
| ENSURE MAINTENANCE & MANAGEMENT | • Ensure ongoing maintenance: PR1.3.4<br>• Identify maintenance funding sources: PR1.10<br>• Protect & Manage open space: LU2.3 LU2.3.1, LU2.3.2, LU2.3.3, LU2.3.4 (UCSC), LU3.11<br>• Greenbelt Management: LU2.3.3, LU3.11.3, NRC6.3 |
| PROVIDE ACCESS TO OPEN SPACE LANDS & COAST | • Assure access to open space lands and coast: PR1.6.5, PR3.1<br>• Coastal access: PR3.2, PR3.3, PR3.3.5<br>• Access to river & riparian: NRC1.1, NRC1.1.2 |
| PROVIDE TRAILS | ▪ Provide and maintain Integrated trail system: PR4.1, PR4.1.1<br>▪ Provide and maintain trails in parks: PR4.2, PR4.2.1, PR4.2.2<br>▪ Require development to dedicate trails or easements along planned trail routes: PR4.2.3 |

**Conclusion.** Adoption and implementation of the proposed *General Plan 2030* would not directly result in new development, but new development and increased population accommodated by the plan would result in demands for parks and recreational facilities. Increased use of existing parks and school playgrounds is

expected to be spread out throughout the City so that no substantial deterioration would occur at any one facility. With implementation of the proposed *General Plan 2030* goals, policies and actions that set forth measures to avoid and minimize adverse impacts on parks and recreational facilities as summarized on Table 4.6-5, as well as compliance with local regulations, the proposed *General Plan 2030*'s indirect impact on parks and recreational facilities would be considered less-than-significant.

**Mitigation Measures**

No mitigation measures are required as a significant impact has not been identified.

**Impact 4.6-4 Schools**
Adoption and implementation of the proposed *General Plan 2030* could indirectly result in increased development and population growth that would generate elementary school student enrollments that could exceed capacity of existing schools. This is considered a *potentially significant impact*.

Future residential development accommodated by the proposed *General Plan 2030* could result in construction of 3,350 new residential units. Based on student generation rates per dwelling unit of 0.273 for grades K-6 and 0.207 for grades 7-12[8], future development and growth could result in the addition of 915 students in grades K-6 and approximately 695 students in grades 7-12 for a total potential increase of 1,610 students by the year 2030.

The existing combined enrollment for the Santa Cruz City Schools is 6,841 students (Santa Cruz City Schools, June 2010). The addition of additional students in the next 20+ years could increase this total by approximately 1,610 students with approximately 915 elementary school students and 695 high school students. There would be adequate high school capacity to accommodate this growth. Elementary school enrollments could exceed school facility enrolments depending on the timing of growth. Discussions with the school district indicated that the level of enrollment likely could be accommodated within existing school facilities, including using Natural Bridges Elementary School, if needed, which is currently leased as a charter school. The School District collects school impact fees that can be used for facility expansion and/or installation of classroom modules. Such expansion, if required, would be located within existing development footprints and would not be expected to result in significant physical impacts.

The proposed *General Plan 2030* includes a number of policies that serve to mitigate potential impacts to existing school facilities as a result of new residential development and population growth accommodated by the draft *General Plan 2030*. The policies, which are summarized in Table 4.5-6, address ensuring and planning for adequate school sites (CC8.2, CC8.2.2) and cooperating with the school district to monitor impacts of housing on elementary school populations (CC8.1.1). The plan also encourages joint-use facilities that combine educational and community uses (CC8.2.1).

[8] Student generation rates were determined in the School Districts' "Developer Fee Justification Study" (October 5, 2006).

**Conclusion.** Adoption and implementation of the proposed *General Plan 2030* would not directly result in new development, but increased population resulting from development accommodated by the plan could increase student enrollments in grades K-12, which could exceed existing school facility capacities depending on the timing and rate of growth as the increase would not happen all at once. With required payment of school impact fees to fund necessary facility expansion and/or additions, in conjunction with potential reuse of the former Natural Bridges Elementary School if needed, the impact would be mitigated to a less-than-significant level. Potential addition or expansion of school classroom facilities is not expected to result in significant physical impacts due to the location of existing facilities within developed footprints. Implementation of the proposed *General Plan 2030* includes goals, policies and actions also set forth measures to avoid and minimize adverse impacts on school facilities as summarized on Table 4.5-6.

**Mitigation Measures**

No mitigation measures are required beyond payment of school impact fees that will be collected at the time of issuance of a building permit.

**TABLE 4.5-6**
**Proposed General Plan Policies & Actions that Reduce School Impacts**

| Type of Measure / Action | Policies / Actions |
|---|---|
| PLAN FOR SCHOOL SITES | • Ensure and plan for adequate future sites for educational facilities: CC8.2, CC8.2.2<br>• Monitor impact of housing on elementary school populations: CC8.1.1<br>• |
| COORDINATE WITH SCHOOL DISTRICT | • Cooperate with school district : CC8.1.1 |
| MAXIMIZE OPPORTUNITIES & ENCOURAGE JOINT-USE FACILITIES | • Encourage joint-use facilities for educational and community uses: CC8.2.1<br>• Maximize educational, developmental, and recreational opportunities: CC8.3 |

**Impact 4.6-5 Wastewater Collection & Disposal**
Adoption and implementation of the proposed *General Plan 2030* could indirectly result in increased development and population growth that would result in indirect generation of wastewater that could be accommodated by the existing wastewater treatment plant and collection system improvements, as needed and supported in the General Plan. This is considered a *less-than-significant impact*.

Adoption and implementation of the proposed *General Plan 2030* would not directly result in increased population or new development. However, the draft General Plan includes policies and a land use map that support additional development. As indicated above, anticipated development accommodated by the proposed plan could result in an increase in population and employees that would result in increases in wastewater generation.

Wastewater generation can be generally estimated based on water demand. Typically, wastewater flows are derived from water demand. The City Public Works Department generally estimates wastewater flows as a percentage of water use. Based on the water demand rates identified in Table 4.5-4 in the WATER SUPPLY (Chapter 4.5) section of this EIR, this would equate to an average daily wastewater flow increase of approximately 0.55 million gallons as summarized in Table 4.6-7. This amount is well within the remaining treatment plant capacity – both the permitted capacity as well as the City's remaining portion (4.0 mgd). No major sewer line problems or constraints have been identified (Wolfman, personal communication, April 2011), and sewer line replacement would be scheduled in the future as needed.

**TABLE 4.6-7**
**Estimated Project Wastewater Flows**

| General Plan Use | Amount | Annual Water Demand (MGY) | Average Daily Water Demand (gpd) | Average Daily Wastewater flow (mgd) |
|---|---|---|---|---|
| Residential - SFD | 840 units | 60 | 165,385 | 0.124 |
| Residential - MFD | 2,510 units | 64 | 175,345 | 0.158 |
| Commercial | 1,087,983 sq. ft. | 72 | 197,260 | 0.158 |
| Hotel Rooms | 311 rooms | 11 | 30,140 | 0.024 |
| Office | 1,273,913 sq. ft. | 23 | 63,100 | 0.055 |
| Industrial | 776,926 sq. ft. | 9 | 24,660 | 0.020 |
| **TOTAL** | | **239** | **655,890** | **0.539** |

Assumes 75% of total residential units (3,350) are multi-family units.
Wastewater generation assumed as 90% of multi-family residential water use, 75% of single-family residential water use, and 80% of non-residential water use.

The Draft *General Plan 2030* includes goals, policies and actions that set forth measures to avoid provide adequate services. Goal CC4 and its three supporting policies and eight accompanying actions seek to maintain a sustainable and efficient wastewater system. These include maintenance and upgrade of the wastewater collection, treatment and disposal systems (CC4.1, CC4.1.1 and CC4.1.3). Periodic updates of wastewater master plans are supported (CC4.1.5), including monitoring treatment plant capacity and development of a plan to address future needs (CC4.1.8). The plan calls for exploring the potential for tertiary treatment and recycling wastewater (CC3.10, CC4.2, CC4.3). Table 4.6-8 summarizes policies that directly or indirectly address wastewater collection or treatment.

**Conclusion**. Adoption and implementation of the proposed *General Plan 2030* would not directly result in new development, but new development accommodated by the plan would result in increased growth with resulting increases in wastewater generation. However, the City's wastewater treatment plant has adequate capacity to

serve anticipated growth, and with implementation of proposed policies and actions, the collection system will be maintained and upgraded as needed. Thus, there would a less-than-significant impact on wastewater treatment and collection facilities.

**Mitigation Measures**

No mitigation measures are required as a significant impact has not been identified.

**TABLE 4.6-8**
**Proposed General Plan Policies & Actions that Reduce Wastewater Impacts**

| Type of Measure / Action | Policies / Actions |
|---|---|
| ENSURE ADEQUATE PROVISION OF SERVICES | ▪ Ensure that facilities and services required by a development are available: LU1.3<br>▪ Report annually on the state of City facilities and services: LU1.3.2<br>▪ Ensure that new development pays its proportional share of the costs of expanded infrastructure needed to serve new development: LU1.4 |
| WASTEWATER | ▪ Provide adequate, environmentally sound wastewater system: CC4.1<br>▪ Maintenance, upgrade & planning sewer system: CC4.1, CC4.1.1 - CC4.1.3, CC4.1.5<br>▪ Monitor wastewater treatment plant capacity to address future needs: CC4.1.8<br>▪ Explore recycling wastewater: CC3.10.1, CC4.2, CC4.3 |

**Impact 4.6-6 Solid Waste Disposal**
Adoption and implementation of the proposed *General Plan 2030* could indirectly result in increased development and population growth that would result in indirect generation of solid waste that could be accommodated within the remaining landfill capacity. This is considered a *less-than-significant impact*.

Adoption and implementation of the proposed *General Plan 2030* would not directly result in increased population or new development. However, the draft General Plan includes policies and a land use map that support additional development. As indicated above, anticipated development accommodated by the proposed plan could result in an increase in population and employees that would result in increases in solid waste generation. The City's population is estimated to increase by approximately 8,040 residents due to development and growth accommodated by the proposed plan.

Development and growth accommodated under the proposed plan is estimated to result in a solid waste generation of approximately 20 tons per day based on a per capita rate of 5.0 pounds/day provided by City staff (Arman, personal communication, April 2011). This amount of solid waste could be accommodated within the remaining capacity of the City's landfill, which is on expected to have capacity through the year 2058 (Ibid.).

The Draft *General Plan 2030* includes goals, policies and actions that set forth measures to reduce solid waste generation and promote recycling as summarized on Table 4.6-9, which would further reduce the net increase in solid waste. In particular, Policy CC6.1 seeks to achieve a "zero waste" goal. The City has also achieved a solid waste reduction of 63-65%, which exceeds the state requirement of a 50% reduction by the year 2000. With increasing waste diversion, the landfill capacity has expanded (Arman, personal communication, April 2011).

**Conclusion.** Adoption and implementation of the proposed *General Plan 2030* would not directly result in new development, but new development accommodated by the plan would result in increased growth with resulting increases in solid waste generation. However, the City's landfill has adequate capacity to serve anticipated growth. Thus, there would a less-than-significant impact on wastewater treatment and collection facilities.

**Mitigation Measures**

No mitigation measures are required as a significant impact has not been identified.

**TABLE 4.6-9**
**Proposed General Plan Policies & Actions that Reduce Solid Waste Impacts**

| Type of Measure / Action | Policies |
|---|---|
| REDUCE SOLID WASTE | • Zero Waste goal: CC6.1<br>• Reduce recyclable materials at landfill: CC6.4.4, CC6.1.13 (plastic bags), CC6.1.17 & HZ2.1.4 (ban polystyrene foam), CC6.4.4 |
| PROMOTE / SUPPORT RECYLING | • Prepare & implement recycling and reduction plans and incentives to encourage recycling: CC6.1.1, CC6.1.2, CC6.1.3, CC6.1.7 (new development), CC6.1.14<br>• Provide efficient waste & recycling service: CC6.2, CC6.2.2<br>• Encourage use of recycled materials: CC6.1.9, CC6.1.10, CC6.1.12, CC6.1.19 (industrial uses)<br>• Require commercial, industrial recycling & waste audits: CC6.1.4, CC6.1.5, CC6.1.6 (cement/asphalt recycling)<br>• Develop food waste & composting program: CC6.1.15, CC6.1.16 |
| LANDFILL MANAGEMENT & PLANNING | • Develop comprehensive operating plan for Resource Recovery Facility: CC6.3, CC6.3.1<br>• Develop waste management alternatives: CC6.1.18<br>• Efforts to extend landfill life: CC6.4, CC6.4.2 |

**Impact 4.6-7 Energy Use**
Adoption and implementation of the proposed *General Plan 2030* could indirectly result in increased development that would result in indirect energy demands, which would not be wasteful or an inefficient use with implementation of state and local regulations and proposed *General Plan 2030* policies and actions. This is considered a *less-than-significant impact*.

Future development would be accommodated by the draft *General Plan 2030* would result in consumption of electricity and natural gas lighting, heating and cooling of residences and other buildings. Energy use resulting from potential new development was factored into the greenhouse gas emissions calculations as discussed in Appendix E. The calculations show an energy demand of approximately 40,650 megawatt hours and 9,600 therms in 2030 without implementation of energy efficiency measures or standards. This estimated electrical use represents a per capita use of approximately 1,800 kwh per capita, which is below state projections for the PG & E planning area

Overall, the future consumption of electrical and natural gas resources would not represent unnecessary, inefficient, or wasteful use of resources given the implementation of proposed policies that address lighting and energy conservation measures. Several policies in the proposed General Plan promote energy conservation, which could minimize or incrementally reduce the consumption of these resources. Specifically, GOAL NRC7 seeks to reduce energy use with a significant production and use of renewable energy. Its four policies and accompanying actions would promote reduction of electricity and natural gas consumption, use of renewable energy sources, and use of energy-efficient lighting, vehicles, and water fixtures and appliances. A summary of the proposed *General Plan 2030* policies that serve to reduce energy and fossil fuel consumption is presented in Table 4.6-10.

In addition, new structures will be required to be constructed in accordance with specifications contained in Title 24 of the California Code of Regulations and the City's Green Building Regulations. Anticipated changes in state building and energy efficiency requirements to help reduce greenhouse gas emissions will also reduce the rate of energy consumption increases. Such measures have been factored into California energy forecasts which predict an overall reduction in per capita use of electricity due to energy efficiency standards and conservation.

In addition, new structures will be required to be constructed in accordance with specifications contained in Title 24 of the California Code of Regulations and the City's Green Building Regulations. Anticipated changes in state building and energy efficiency requirements to help reduce greenhouse gas emissions will also reduce the rate of energy consumption increases. However, future construction activities would result in the irretrievable commitment of nonrenewable energy resources, primarily in the form of fossil fuels (including fuel oil, natural gas, and gasoline) for automobiles and construction equipment.

**Conclusion**. Adoption and implementation of the proposed *General Plan 2030* would not directly result in new development, but new development accommodated by the plan would result in increased demand for electric and natural gas services. However, with implementation of local and state regulations, as well as proposed

*General Plan 2030* policies and actions, energy-efficient building designs, material and appliances would be incorporated into future developments and energy use would not be considered wasteful or inefficient. Thus, there would a less-than-significant impact related to energy use.

**Mitigation Measures**

No mitigation measures are required as a significant impact has not been identified.

**TABLE 4.6-10**
**Proposed General Plan Policies and Actions that Reduce Energy Use**

| Type of Measure / Action | Policies / Actions |
|---|---|
| ENERGY CONSERVATION AND EFFICIENCY | • Reduce electricity and natural gas use by 20%: NRC7.1.1<br>• Adopt Model Lighting Ordinance: NRC7.1.2<br>• Improve energy efficiency in parks: NRC7.1.10<br>• Continue to install energy efficient systems in park and recreational facilities: NRC7.1.11<br>• Install energy-efficient street lighting: MC.2.10 |
| PROMOTE RENEWABLE ENERGY | • Increase local use and production of renewable energy:NRC7.1.3<br>• Require passive heating and cooling in new development: NRC7.1.4<br>• Require City facilities to increase green electricity: NRC7.1.5 |
| PROMOTE ENERGY EFFICIENT TRANSPORTATION | • Reduce consumption of fuels: NRC7.3.1<br>• Purchase City vehicles with fuel efficient or alternative fuel systems: NRC7.3.2, NRC7.3.4<br>• Establish telecommuting for City staff: NRC7.3.3<br>• Investigate partnerships with UCSC for electric car use: NRC7.3.5<br>• SEE TABLE 4.4-4 in Chapter 4.4 for policies-actions to reduce auto use. |
| PROMOTE ENERGY EFFICIENT WATER PROVISION & USE | • Install energy and water efficient appliances: NRC7.4.1<br>• Require new development to use high efficiency fixtures: NRC7.4.2<br>• Support gray water collection and reuse: NRC7.4.2, NRC7.4.3 |
| EDUCATION & COORDINATION | • Cooperate with other agencies: NRC7.1.7<br>• Educate public: NRC7.1.8<br>• Support legislation on renewable energy: NRC7.1.9 |

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# Independent Police Auditor



Michael J. Gennaco
7142 Trask Ave
Playa Del Rey, CA 90293

Phone: 323-821-0586

Email: michael.gennaco@oirgroup.com

In January of 2003, the City Council created the Independent Police Auditor position. The auditor is charged with providing independent reviews of the citizen complaint process and reviewing and making recommendations regarding Police Department policies and practices.

Specifically, the Independent Police Auditor is responsible for the following:
• Review of Police Department Internal Affairs Investigations
• Review of Officer Involved Shootings
• Review of Police Department Policies and Procedures
• Independent Investigation of Citizen Complaints
• Reports to the City Council
• Being accessible to the Santa Cruz Community

The Public Safety Committee evaluates the activities of the Independent Police Auditor. This committee comprises three councilmembers and it is charged with the review of public safety issues.

**Initiating a Citizen's Comment or Complaint**
A comment or complaint may be filed if you have comments or concerns about specific Police conduct or actions. Any aggrieved party, friend, victim, family member or other third party who witnesses an incident thought to merit a comment or complaint can file. If a comment or complaint is filed, it is forwarded to the Professional Standards Unit and a supervisor will be assigned to conduct a formal investigation. The final investigation is forwarded to the Police Auditor for review. The investigation is reviewed for thoroughness, objectivity and to ensure that the evidence supports the finding. A citizen complaint is separate from any civil or criminal action. Once the investigation is complete, you will be notified of the results.

Comments or complaints about Police conduct or services should be submitted by mail, in person, or by fax to the Police Department using a Santa Cruz Police Department Citizen Comment Form. These forms are available at the Santa Cruz Police Department, the Independent Police Auditor's Office, or the City Clerk's Office.

The Police Auditor is available to meet with members of the public on an appointment basis by calling 323-821-0586. He can also be contacted via email at: michael.gennaco@oirgroup.com.