Chapter 7

WATER RECYCLING

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

7.1 Wastewater Facility Description

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

Figure 7-1. Wastewater Treatment Plant and Service Area

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

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

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

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

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

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

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

7.2 Wastewater Plant Capacity and Flow Levels

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

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

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

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

Notes:
(a) June through September

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

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

7.3 Recycled Water Currently Being Used

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

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

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

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

Table 7-2. Recycled Water Currently Being Used

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

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

7.4 Potential Uses and Limitations of Recycled Water

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

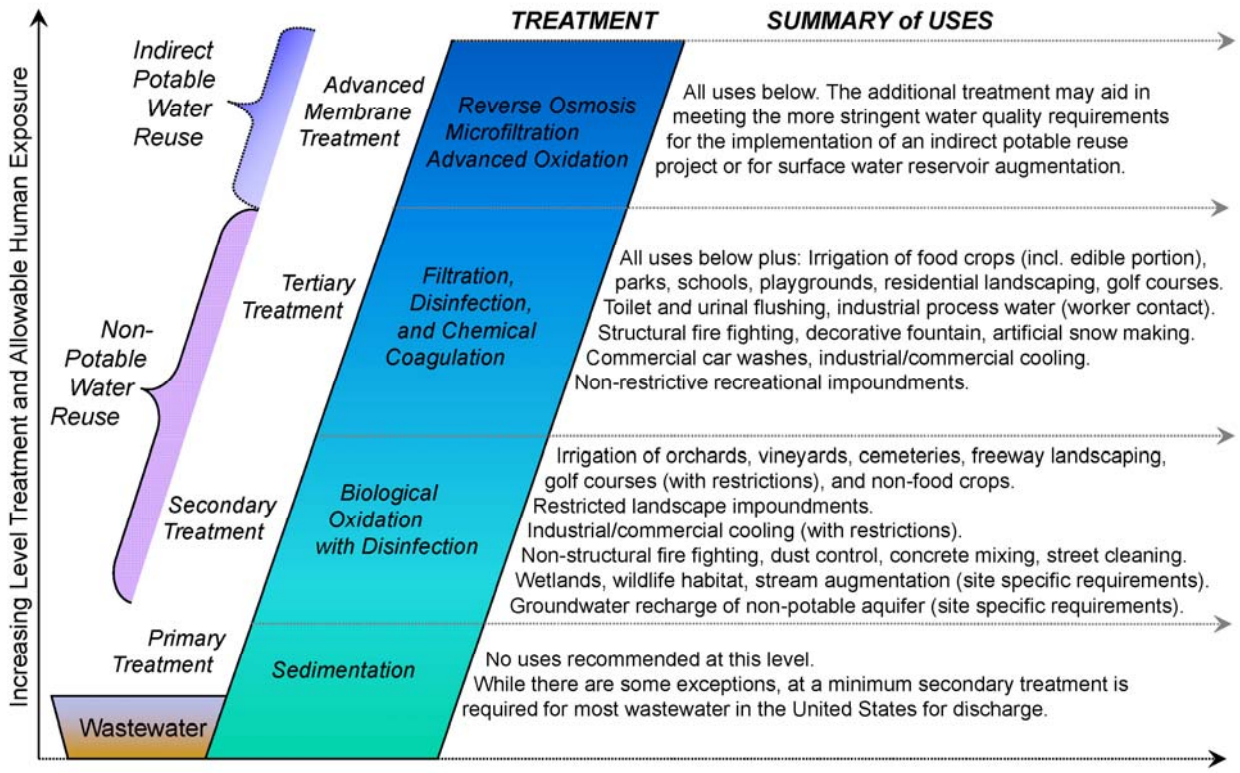
Table 7-3. Recycled Water Criteria (Title 22 CCR)

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

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

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

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



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

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

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

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

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

7.5 Recycled Water Opportunities

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

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

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

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

7.5.1 Direct Potable Reuse

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

7.5.2 Urban Landscape Irrigation

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

7.5.3 Agricultural Application for the North Coast

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

Upon evaluation, several major (if not fatal) flaws emerged with this recycled water concept, including 1) uncertainty about the yield in a multi-year drought, 2) disinclination of CA Department of Parks and Recreation to support the project and opposition voiced by local organic growers. Specifically, the California Department of Parks and Recreation, which is the major landowner above the groundwater basin being used by the coastal growers, expressed its opposition to the reclamation project. In a letter dated September 11, 2002, it stated that the exchange was felt to involve "uncharted legal and complex policy issues having serious long-term implications of statewide consequence" and that "the use of reclaimed water at Wilder Ranch could result in potential adverse impacts to sensitive natural resources, place possible constraints on recreational usage

and adversely impact organic agricultural leasing operations at Wilder Ranch State Park." The project was also opposed by local organic growers over concerns related to food safety, suitability of recycled water for organic crops, certification, and marketing if recycled water was brought up the coast. Ultimately, the State's unwillingness to consider the groundwater exchange represented a major, if not insurmountable, barrier to moving forward with the reclamation strategy. And although the IWP committee discussed bringing legislative pressure to challenge the Department's position, it decided against taking that approach for the time being, given the doubts about the groundwater yield and the potential for lengthy delay.

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

7.5.4 Recycled Water Exchange with Scotts Valley Water District

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

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

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

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

7.5.5 Groundwater Recharge with Recycled Water (Indirect Potable Reuse)

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

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

7.6 Projected Use of Recycled Water

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

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

7.7 Description of Actions to Encourage and Optimize Recycled Water Use

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