TABLES

SECTION 4.15

Utilities

This section characterizes existing utilities and service systems serving UC Santa Cruz and evaluates the effects on these systems from development under the 2005 LRDP. This section describes and evaluates the following utilities and service systems: water supply, wastewater, storm water drainage, solid waste, electricity and natural gas, and telecommunications.

During the scoping process for this EIR, comments were received regarding the various utility systems both on and off campus. In general, the comments related to the ability of existing campus and City utilities infrastructure and services to meet future demand that could result from campus growth under the 2005 LRDP. Several commentators expressed concern about water supply and conservation in particular. The need for the City of Santa Cruz to approve and receive Local Agency Formation Commission (LAFCO) approval for increased water service to the unincorporated area of the campus was also raised as an issue. The impacts under the proposed 2005 LRDP on sewer, storm water and waste collection infrastructure were also identified as issues of concern. Additionally, concerns were expressed over new telecommunications infrastructure that could be constructed under the LRDP. To the extent that issues raised during the scoping process have environmental impacts, they are discussed in this chapter. Comments were also received about drainage, erosion and water quality issues, which are discussed in Section 4.8, *Hydrology and Water Quality*. Comments relating to the City's water rates and to the existing instability of internet service in Merrill College are outside the scope of this EIR.

4.15.1 Environmental Setting

4.15.1.1 Study Area

For purposes of evaluating impacts of the population growth and development under the 2005 LRDP on utilities and services systems, the study area is defined to include all of the UC Santa Cruz main campus; 2300 Delaware Avenue; the cities of Santa Cruz, Capitola, and Scotts Valley; and unincorporated Santa Cruz County.

4.15.1.2 Water Supply

UC Santa Cruz

UC Santa Cruz Water System. The UC Santa Cruz campus water system receives water through four connections to the City of Santa Cruz Water Department (SCWD). Water is pumped from the City's Bay Street Reservoir to three consecutive in-line reservoirs at separate elevations. SCWD Reservoir No. 2 is at elevation 426 feet and supplies UC Santa Cruz's 1-inch Barn Theater connection. SCWD Reservoir No. 4 is at elevation 748 feet and supplies UC Santa Cruz's 6-inch Arboretum and 14-inch Heller Drive connections. SCWD Reservoir No. 5 is at elevation 982 feet and supplies UC Santa Cruz's

14-inch Cave Gulch connection. The Campus also has the ability to pump from SCWD Reservoir No. 5 to the UC Santa Cruz Emergency Water Storage Reservoir at elevation 1,113 feet through the 12-inch Pump Station connection. The campus water system has eight separate pressure zones isolated through 13 pressure-reducing valves (Kennedy/Jenks Consultants 2004a).

The UC Santa Cruz Emergency Water Storage Reservoir provides the campus with an emergency water supply in the event the City system is incapable of supplying water. The reservoir is also necessary to provide adequate fire flow to the Crown/Merrill Apartments (Kennedy/Jenks Consultants 2001). The campus has an existing on-campus well that could potentially supply water for non-potable purposes.

2300 Delaware Avenue is served by the City's water distribution system. Water mains that serve the site are located in adjacent streets.

Campus Water Use. In 2003, the UC Santa Cruz campus water demand was 565,601 gallons per day (gpd) (206 million gallons per year (mg/year)(UC Santa Cruz 2003). Total UC Santa Cruz water demand is estimated to have been about 4 percent of total SCWD demand in 2003, based on the City's Integrated Water Plan (IWP) (Gary Fiske & Associates 2003), and about 5.3 percent based on a more recent City report on adequacy of the City's supply for future development (Goddard 2004). Residential water use accounts for half of the UC Santa Cruz consumption. Academic buildings and "other" water use accounts for 22 percent of UC Santa Cruz consumption. Irrigation accounts for 28 percent of water use. Irrigation water serves campus landscaping (29 percent of irrigation total), Agriculture/Research at the CASFS, Garden, and Arboretum (31 percent of irrigation total), and three turf fields (40 percent of the irrigation total) (UC Santa Cruz 2003).

Under the terms of a 1962 Water Services Agreement between the City of Santa Cruz and the University, the City agreed to provide sufficient water to meet University growth. The agreement also states that the City will provide, at no expense to the University, water and sewer lines up to the boundaries of the campus. An additional agreement made between the University and City of Santa Cruz in 1965 states that the City will install a water system capable of supplying 2 million gpd to the campus. Through these agreements, the University has contracted for adequate water service for the entire campus, including the unincorporated areas. The University does not believe LAFCO approval is necessary for the campus to receive increased service for the development of those portions of the campus that lie in unincorporated County. The University executed a Memorandum of Understanding with the City of Santa Cruz under which the University agreed to pay the cost of certain pump upgrades that could be needed in the future to serve the campus.

Campus Water Conservation. Ongoing and past water conservation activities at UC Santa Cruz include the following:

- Retrofitting campus toilets, showerheads and sink faucets with water efficient alternatives
- Using predominantly drought-tolerant species in campus landscaping
- Installing well-designed, efficient and serviceable irrigation systems
- Adjusting irrigation systems to reduce overspray onto unlandscaped areas or hardscape

- Adjusting irrigation run times to match fluctuating water demand conditions
- Using mulch for landscaping
- Installing irrigation meters

In addition to these efforts, the Campus Standards Handbook includes guidelines for development that seek to conserve water. For example, water-efficient plant species are recommended for landscaping, and minimal lawn areas are recommended to minimize water usage (UC Santa Cruz 1999b: 3).

The UC Santa Cruz campus introduced a new irrigation system in fall 1999 that has achieved a significant reduction of water use on campus. The water-saving Rain Master Evolution Central Control System involves a central computer, a weather station, and "satellite" controllers in the field, with a communication system linking the three components. Various irrigation systems throughout the campus are controlled by the Rain Master system. The system is able to update weather information and irrigation schedules, and to check for irrigation problems. In the first year of operation, the system resulted in a reduction in irrigation water consumption by 22 percent compared to the same time period in the previous two years (UC Santa Cruz 2004b).

City of Santa Cruz Water Supply

The SCWD provides water to approximately 90,000 customers in the city of Santa Cruz, the UC Santa Cruz campus, a portion of the unincorporated area of Santa Cruz County, and a small portion of the City of Capitola (Gary Fiske & Associates 2003). The SCWD water service area is approximately 30 square miles in size (City of Santa Cruz 2001).

The City currently has four water supply sources (Gary Fiske & Associates 2003):

- North Coast Diversions from three North Coast streams (Reggiardo Creek, Laguna Creek, and Majors Creek) and one natural spring (Liddell Spring)
- San Lorenzo River
- Loch Lomond Reservoir
- Live Oak (Beltz) Wells

The system relies entirely on rainfall, surface runoff, and groundwater infiltration occurring within watersheds located in Santa Cruz County. No water is purchased from state or federal sources or imported to the region from outside the Santa Cruz area (City of Santa Cruz 2001). On average, about 75 percent of the City's annual water supply needs are met by surface diversions from the coastal streams and the San Lorenzo River. Water stored in the Loch Lomond Reservoir is used mainly in the summer and fall months when the flows in the coast and river sources drop off and accounts for only about 20 percent of the City's annual supply. The remaining 5 percent is produced from the Live Oak Wells (Goddard 2004).

Water Treatment. Water from the North Coast sources, the San Lorenzo River and Loch Lomond Reservoir is pumped to the Graham Hill Water Treatment Plant where it is treated to remove impurities

and disinfected with chlorine. Thereafter, the water is distributed to the entire service area. During the dry season the water supply is supplemented by groundwater from the Live Oak wells. The groundwater is treated at the Live Oak Water Treatment Plant to remove naturally occurring iron and manganese and then disinfected with chlorine (City of Santa Cruz 2003). The maximum capacities of the Graham Hill and Live Oak water treatment plants are 31 cubic feet per second (cfs) and 1.55 cfs, respectively (Gary Fiske & Associates 2003).

System Capacity. The City's water supply system has a capacity in average water years of about 4,300 mg/year. In below average rainfall years, the capacity of the system can be much less, resulting in severe use curtailments that can be as high as 50 percent. The average annual water use over the past several years has been about 4,000 mg/year (Kocher 2005).

The City's water system has limited remaining operational capacity, and also lacks sufficient water to supply existing demand during periods of drought. In dry years, when the San Lorenzo River and coast sources run low, the system relies more heavily on water stored in Loch Lomond to satisfy demand, which depletes available storage. In critically dry or multi-year 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 (Goddard 2004).

Given existing operational capacity, the City estimates that there is approximately 300 mg/year of excess capacity. The City's water supply system is able to meet 100 percent of the existing water demand in about 7 out of every 10 years, and at least approximately 90 percent of existing demand in about 9 out 10 years. A significant shortage occurs on average about 1 out of every 10 years. This means, qualitatively, that most of the time, there is sufficient water available to meet existing water supply needs, that some of the time there are minor shortages, and once in about 10 years there is an extreme water shortage (Goddard 2004). For the time being, the City of Santa Cruz reports that it would appear that there is somewhat more water available in most years than the amount being used by the present population. However, even in normal weather conditions, three of the four major sources are being used at maximum capacity for a significant portion of the year (Goddard 2004).

Water Supply Planning. The City has been considering possible new water supplies for almost two decades. Previous water supply planning efforts were based on the need for new water supply projects to fully serve existing and future ultimate water demands, even during a critical drought such as the event of 1976-77 (Gary Fiske & Associates 2003).

In 1997, the City undertook a new water supply planning effort that incorporated a systematic process to investigate alternative approaches to bringing supply and demand into balance. This new approach considers new supply options as one of three ways to achieve this balance. The other two ways are reducing water demands through water conservation programs and accepting some level of water curtailments during drought conditions (see *City Integrated Water Plan* section below) (Gary Fiske & Associates 2003).

Water Conservation Plan. The City adopted a Water Conservation Plan in 2000, which recognized the urgency of the City's supply situation and directed staff to begin implementing the Plan. The Plan

seeks to reduce the need for mandatory measures and enforcement in times of drought by promoting mainly voluntary and incentive-based measures under normal water supply conditions.

The Plan includes four types of programs: financial incentives, new regulations, water audits for high-use customers, and a program to distribute water conservation kits. The programs cover all major customer categories including residential, commercial, industrial, municipal and large landscape groups. The programs address all predominant end uses of water, including toilets, clothes washers, showers, and landscaping. Some of the programs implemented under the Water Conservation Plan include:

- Ultra-low-flush toilet rebates
- High efficiency clothes washer rebates
- Conservation kit distribution
- Residential water surveys

The Water Conservation Plan is one element of the City's Integrated Water Plan (IWP), which is described below. The Water Conservation Plan is expected to reduce customer demand for water by almost 300 million gallons per year in 2010 or by about 0.8 million gpd (EDAW 2005).

City Integrated Water Plan (IWP). The City's most recent effort to address the City's water supply situation is the 2003 IWP. The IWP provides water demand forecasts and identifies potential supplemental water sources, with the goals of reducing near-term drought year shortages, and providing a reliable supply that meets long-term needs. According to the IWP, the City's objective is to maximize the use of its existing water resources before considering new supplies (Gary Fiske & Associates 2003).

The three primary components of the IWP are as follows:

- Conservation: a series of programs that reduce long-term water demand
- Curtailment: mandatory rationing that would reduce the water demand and extend the water supply during dry or critically dry years
- Additional water supply: 2.5 million gpd desalination facility, with the potential for expansion to 3.5 million gpd in 2015 and 4.5 million gpd in 2025 (EDAW 2005)

The IWP recommends desalination as the preferred water supply alternative, along with conservation and curtailment components. A cornerstone of the IWP is to achieve the maximum practical water-use efficiency through conservation. The conservation component is a method for maximizing use of the existing sources in all years, and for minimizing the amount of new water supply needed. The curtailment component would be invoked in dry years when the flowing sources are at low levels and cutbacks are needed to preserve limited storage in Loch Lomond Reservoir. The desalination component bridges the deficit between existing supply sources in dry years and system demand (EDAW 2005).

The IWP identified two desalination strategies: D-1 (City-only Desalination) and D-2 (Cooperative Desalination) as the two preferred alternatives. Generally, Alternative D-1 would provide water supply during a drought to the City service area, and Alternative D-2 would also provide water to the City during droughts but would also provide water supply for its potential partner, Soquel Creek Water District,

during non-drought periods. Facilities associated with the two operational alternatives would generally be the same, except that implementation of Alternative D-2 would require additional conveyance and pumping facilities. Because there were no clear advantages to either Alternative D-1 or D-2, the decision was made to defer selecting one or the other as the final preferred strategy until the completion of the EIR (EDAW 2005).

The City of Santa Cruz published a Draft Program EIR on the IWP in June 2005. Mitigation measures have been proposed which will reduce all potential impacts, except noise, to a less-than-significant level (City of Santa Cruz 2005).

Future Water Projections. The IWP developed a water demand forecast based on a Water Demand Investigation completed in 1998. In the short run (i.e., through 2005), the Demand Investigation is based on General Plan growth projections and in the long run, the forecasts are based on the 1997 Projections produced by AMBAG. Table 4.15-1 shows the projection of annual demand to 2020, under average weather conditions, that resulted from the Demand Investigation. Because of its relative size and uniqueness, separate projections were made for UC Santa Cruz.[1] These same projections appear in the City's 2000 Urban Water Management Plan (City of Santa Cruz 2001), and in the IWP, although the IWP revises the estimates for 2000 through 2015 estimates downwards by about 200 million gallons to reflect the reduction in water usage that has been observed in recent years. The IWP does not adjust the 1998 forecast for 2020.

Table 4.15-1
Annual Demand Forecast From 1998 Water Demand Investigation
(Millions of Gallons)

Demand Category	2000	2005	2010	2015	2020	Buildout
Single-Family Residential	1,578	1,592	1,581	1,579	1,583	1,605
Multi-Family Residential	934	952	960	970	983	1,044
Business	838	880	930	970	1,001	1,174
UC Santa Cruz	204	321	408	408	408	408
Other	619	635	647	657	666	710
Subtotal	*4,173*	*4,380*	*4,526*	*4,584*	*4,641*	*4,941*
Unaccounted-for Water	464	487	503	510	516	549
Total	**4,637**	**4,867**	**5,029**	**5,094**	**5,157**	**5,490**

Source: Gary Fiske & Associates 2003, Table B-II.

Other Water Districts in the Study Area

Water service to Scotts Valley is provided by two water districts, the Scotts Valley Water District (SVWD) and the San Lorenzo Valley Water District (SLVWD). The SVWD currently obtains its water supply from the Santa Margarita Groundwater Basin. The SVWD operates six wells, two major water treatment plants, five major and two minor storage tanks, and 55 miles of variously sized water main lines. The Santa Margarita Groundwater Basin has a perennial yield of 4,370 acre-feet per year (AFY)

[1] The Integrated Water Plan assumes UC Santa Cruz usage of 408 million gallons of water per year (for an average of 1,118,000 gpd) at 15,000 FTE students (UC Santa Cruz Campus/Community Work Group 2004).

(City of Scotts Valley 2002b). A recently implemented water recycling system could provide up to 600,000 gallons per day for landscape irrigation that would reduce existing pumping from the Santa Margarita Groundwater Basin. However, the current infrastructure does not include storage space for the treated water, so the system can only distribute up to 100,000 gpd. At the end of 2002, there were 3,466 water service connections. The District is planning the water system for a total of 3,962 water connections at build-out in 2020 (City of Scotts Valley 2002b).

The SLVWD water supply comes from three groundwater wells, two in the Lompico Sandstone aquifer and one in the Santa Margarita sandstone aquifer. The SLVWD has a safe yield (annual recharge) of 165 AFY. Currently, the demand exceeds the safe yield by approximately 600 AFY. The principal users of this water resource are the SLVWD, Hanson Aggregates (previously known as Kaiser Quarry) and the Mt. Hermon Association. Pumpage ranges from 650 to 770 AFY. The SLVWD projects a demand of 375 to 450 AFY in 10 years for the SLVWD only. The SLVWD estimates the total potential additional water service connections within the District's South system (includes Santa Cruz County) to be 26 vacant parcels and seven existing single-family dwellings with individual wells as source of supply (City of Scotts Valley 2002b).

Capitola is served by the Soquel Creek Water District, which, as of August 2002, maintained 13,682 regular service connections and 870 fire service connections (Soquel Creek Water District website 2003). The district served a population of approximately 42,000 through 14,371 connections in four service areas within mid-Santa Cruz County. The Soquel Creek Water District encompasses seven miles of shoreline on Monterey Bay, and extends from one to three miles inland into the foothills of the Santa Cruz Mountains, essentially following the County Urban Services Line. Ninety percent of the Soquel Creek Water Districts customers are residential, and there are no agricultural connections to the system. The Soquel Creek Water District sells approximately 5,400 acre-feet, or about 1.8 billion gallons, of water annually, all of which are from two groundwater aquifers. The Purisima formation provides two-thirds of the Soquel Creek Water District's annual production (3,600 acre-feet) for Capitola, Soquel, Seacliff Beach, and Aptos. The Aromas Red Sands Aquifer provides the remaining one-third (1,800 acre-feet) for the communities of Seascape, Rio Del Mar, and La Selva Beach. The Soquel Creek Water District operates 17 production wells with an estimated production capacity of over 15 million gpd. The system encompasses approximately 130 miles of pipeline, which range in diameter from two to 16 inches. The 18 water storage tanks have a combined capacity of 7.5 million gallons (Santa Cruz County 2001).

4.15.1.3 Wastewater

UC Santa Cruz

Wastewater produced on campus is conveyed via the campus sewer system, without treatment, to the City of Santa Cruz system.

There are two major trunk sewers on the UC Santa Cruz campus, one on Empire Grade Road and the other along Jordan Gulch, that combine into a single sewer at the Cook House, which discharges into the city's sewer system at Bay and High Streets. The wastewater is then transported through the sewer system to the City of Santa Cruz Wastewater Treatment Plant, where it is treated before being discharged

to Monterey Bay. The City regulates what the campus can discharge to make sure it can properly treat it before discharging it to Monterey Bay. Additionally, campus wastewater is routinely monitored by UC Santa Cruz and the City to ensure that the campus complies with wastewater discharge limitations (UC Santa Cruz EH&S Waste Water Discharge website 2005). The campus generated a total of approximately 110 million gallons of wastewater in 2003 or about 301,370 gpd (UC Santa Cruz 2003).

City of Santa Cruz

The City of Santa Cruz provides municipal wastewater treatment services to the UC Santa Cruz campus through the Santa Cruz Wastewater Treatment Plant. The plant is located near Neary Lagoon and Bay Street. The current rated design capacity is 17 million gpd. On average, the plant has a daily flow of 10 million gpd. Design for wet weather flow is 81 million gpd (City of Santa Cruz Public Works website 2005; City of Santa Cruz, no date). The plant operates at approximately 60 percent of capacity (Wolfman 2005a). The City maintains over 200 miles of sewer pipe ranging from 6 to 54 inches in diameter (City of Santa Cruz Public Works website 2005). Under the terms of a 1962 agreement between the City of Santa Cruz and the University, the City agreed to provide sanitary sewer lines sufficient to meet the needs of the University (City of Santa Cruz and The Regents 1962).

The City's 1984 Sewer System Master Plan Update identified sewer system constraints and necessary improvements. Some improvements to the system have been made, but segments of the Oxford Street main and the Arroyo Seco main, which serve the UC Santa Cruz campus, and theoretically operate over design capacity, had not been improved at the time of the writing of this report (Wolfman 2005b). These sewer segments have not yet exhibited any functional problems; however, the City intends to install flow meters in the Arroyo Seco line during the winter of 2005-2006. This line will be specifically monitored as part of a new sewer master plan the City is preparing to prioritize sanitary sewer improvement needs. The plan is expected to be completed by May 2006 (Wolfman 2005b).

Other Study Area Communities

Wastewater from Capitola is also treated at the Santa Cruz Wastewater Treatment Plant, but the City of Scotts Valley treats its wastewater separately. With approximately 40 miles of pipeline serving Scotts Valley, the City's Wastewater Treatment Plant handles approximately 950,000 gallons per day. The facility has been awarded "Overall Plant of the Year" by the Monterey Bay Section of the California Water Environment Association several times since 1996, and has been producing recycled water for local parks and schools for irrigation use since 2002.

4.15.1.4 Storm Water Drainage

This section describes the existing storm water drainage system at UC Santa Cruz. Campus hydrology and the potential for flooding are discussed in Section 4.8, *Hydrology and Water Quality*.

Storm Water Drainage at UC Santa Cruz

The UC Santa Cruz campus and surrounding City and County lands rely on a series of natural drainage courses and sinkholes for storm drainage. Historically, development near the campus has occurred

without a major network of storm drainage pipes leading to the ocean. There is no existing City or County piped storm water drainage system for the campus to tie into. The campus drainage systems also rely on natural drainage (UC Santa Cruz 2004c). See Section 4.8, *Hydrology and Water Quality* (Volume I), for a more detailed discussion of the campus's storm water drainage system. The 1962 agreement between the City of Santa Cruz and the University requires that the City provide, at no expense to the University, any and all storm drainage lines up to the boundaries of the campus (City of Santa Cruz and The Regents 1962).

The campus storm water conveyance system comprises engineered detention basins and settling tanks serving localized building clusters, storm water piping, catch basins and conveyance methods that redirect storm water from developed areas to natural drainages. Runoff from most parking lots on the campus is filtered to remove typical urban contaminants. A relatively small amount of storm water leaves the campus as surface flow because most of the flow in the natural drainages is captured by sinkholes and enters the karst aquifer (UC Santa Cruz 2004c). Water in surface drainages fed by the karst aquifer, as well as water flowing off the campus in surface drainage, drains to the Monterey Bay. See Section 4.8, *Hydrology and Water Quality* (Volume I) for more details.

While the existing storm drainage system meets current overall capacity requirements, there are localized areas of concern. The Campus has identified several problems with the existing system; in particular, surface flooding, concentrated flows, and the associated erosion and potential habitat degradation. Capacity problems at some sinkholes and the impact of sediment on sinkholes have also been identified as issues of concern (UC Santa Cruz 2004c). Furthermore, in some areas existing detention systems and drainage/erosion control measures have not been effective in preventing channel incision or spilling over of sinkholes. Some channels are so damaged that in-stream channel repairs or redirection of flow are required. Channel and sinkhole problems are most severe on the Moore Creek East Fork watershed, including the Baskin, Science Hill and Kresge subwatersheds (Kennedy/Jenks Consultants 2004b). Four important sinkholes (McLaughlin Drive, Middle Fork of Jordan Gulch, and the Baskin and Kresge Tributaries to the East Fork of Moore Creek) are at or exceeding their capacity (Kennedy/Jenks Consultants 2004b).

UC Santa Cruz Stormwater & Drainage Master Plan

The UC Santa Cruz Stormwater and Drainage Master Plan, prepared in 2004, is the planning document that guides improvements to the campus storm water drainage system. The study included a channel stability field survey of all the campus drainages and a hydrology field survey of the Baskin Engineering and Jordan Gulch Middle fork sinkholes. The Plan identifies master planning issues for the system and includes recommendations to address deficiencies in the storm water drainage system. In addition, the Plan includes best management practices for improving the quality of storm water runoff. Most of the capital improvements recommended in the Plan have been included in Phases I and II of the Infrastructure Improvements Project, which is described and evaluated in Volume III of the Draft EIR.

Campus Standards Handbook

The Campus Standards Handbook includes site requirements that address drainage issues. Among the requirements most relevant to storm water flow volumes are the following:

- Protect all major springs, seep zones, drainage channels, year-round streams, and natural superficial drainage patterns from alteration
- Design for high levels of absorption in all identifiable groundwater recharge areas (flatter slopes encouraged to maximize absorption rates)
- Provide for detention of storm water runoff to ensure that peak post-development runoff flow rates do not exceed pre-development runoff rates. Dissipate and diffuse storm runoff when possible. Ensure that storm water detention does not saturate the ground at building foundations

Other standards address storm water quality. These are discussed in Section 4.8, *Hydrology and Water Quality*.

4.15.1.5 Solid Waste

This section provides an overview of applicable solid waste regulations and describes existing solid waste and recycling collection services on the UC Santa Cruz campus. Hazardous waste collection and disposal are discussed in Section 4.7, *Hazards and Hazardous Materials* (Volume I).

Regulatory Framework

The California Integrated Waste Management Act of 1989 (Assembly Bill [AB] 939) required the implementation of integrated waste management plans and mandated that county and local governments divert at least 50 percent of all solid waste generated, starting January 1, 2000. The University of California is exempt from this Act. However, in 1989, Assembly Concurrent Resolution (ACR) 149 was passed, requesting that the University of California abide by the diversion benchmarks established in AB 939. It is University policy to comply with ACR 149.

Waste Disposal

The City of Santa Cruz has its own municipal landfill, located three miles west of the city limits, that serves the entire incorporated city, including UC Santa Cruz (Matthews 2005). The City of Santa Cruz Public Works Department indicates that this landfill has a total capacity of 10,484,325 cubic yards and a remaining capacity of 6,029,272 cubic yards (58 percent). The landfill is not expected to reach capacity until 2037. There are no plans to secure new city landfills at this time, due to the estimated lifetime of the current landfill (Gamboa 2005).

In 2004, the City landfill accepted 56,100 tons of solid waste. The City had a waste diversion rate of 48 percent. The UC Santa Cruz campus disposed directly of about 2,450 tons of solid waste in the City landfill in 2003.[2] This represents about 4 percent of the total waste disposed at the landfill. Campus-wide

[2] Materials landfilled include refuse, barnyard and miscellaneous refuse and surplus waste materials.

refuse collection is performed six days a week by the Grounds Equipment Shop (UC Santa Cruz Physical Plant – Recycling and Refuse website 2005).

Recycling

Recycling has been in place at UC Santa Cruz since 1989. Campus recycling is overseen by Physical Plant-Ground Services, which collects materials from recycling bins throughout the campus, including cardboard; mixed paper; clear and colored glass; aluminum, tin, and steel cans; and plastic. The Campus also collects green-waste, such as tree trimmings and lawn waste, from the campus groundskeepers (UC Santa Cruz Physical Plant – Recycling and Refuse website 2005). The UC Santa Cruz campus also has an E-Waste recycling program. E-Waste is defined as equipment that would plug into an electrical outlet. All campus E-Waste must go through UC Santa Cruz Surplus Operations/Moving Services for disposal. Collected equipment is recycled through certified recyclers (UC Santa Cruz Material Management website 2005). As of 2003, the Campus had achieved approximately 26 percent diversion of its waste stream and was in compliance with its recycling goal (UC Santa Cruz 2004a).[3]

College-Specific Recycling Programs

In addition to campus-wide recycling, Kresge and Merrill Colleges, and College Eight have expanded recycling efforts. Kresge College has a recycling coordinator whose job duties include education and supervising college composting. Merrill College has a program called EnviroMerrill through which the college provides students with the opportunity to recycle various items not collected through the campus recycling program (UC Santa Cruz Student Environmental Center 2004). College Eight collects compostable scraps from the resident apartments and College Café on a weekly basis, and recycles discarded campus mail. These efforts divert a significant volume of materials from disposal and contribute to waste reduction awareness on campus. The College Eight program is run by students (UC Santa Cruz College Eight website 2005); the other programs are run by campus staff.

Other Study Area Communities

Solid waste in Scotts Valley in handled by the City of Scotts Valley Wastewater and Environmental Program. The City collected approximately 13.4 tons of solid waste in 2004, with a diversion rate of approximately 61 percent. Solid waste from Scotts Valley goes to Santa Cruz County's Buena Vista Landfill and the Marina Landfill, which have 15 and 100 years remaining capacity, respectively. There are currently no plans to construct any new landfills to serve Scotts Valley (Hamby 2005).

The City of Capitola also sends its solid waste to the Buena Vista landfill for disposal. The City recycled 51 percent of its refuse from the landfill in 2004 (City of Capitola waste disposal website 2005).

The cities of Capitola, Scotts Valley, Watsonville and Santa Cruz, and Santa Cruz County Department of Public Works, under the direction of the Integrated Waste Management Local Task Force, began a study

[3] Note that this does not include construction waste, which is off-hauled and disposed off by construction contractors and is not tracked by the Campus. In 2000 and 2001, when construction debris recycling was included in the campus waste diversion totals, 59 and 52 percent of the campus waste was diverted (UC Santa Cruz 2004).

of future garbage disposal options in 2005 in light of the projected closure of the Buena Vista landfill in about 15 years (Santa Cruz County Public Works website 2005).

4.15.1.6 Electricity and Natural Gas

Pacific Gas and Electric (PG&E) provides gas and electric services to the UC Santa Cruz campus and to the 2300 Delaware Avenue property. In addition, the campus Central Heating Plant is a cogeneration facility that produces electricity for the campus. These services are described below.

Electricity

UC Santa Cruz's electricity distribution network is campus-owned and mostly underground. Most of UC Santa Cruz's electricity is received from PG&E at 21,000 volts (21 kV or kilovolts). The PG&E point of service connection (Slug Substation) is located northeast of the Hagar Court employee housing complex. Power is distributed from the point of service to the Merrill Substation, located near Merrill College, where the voltage is reduced to 12 kV by two transformers. Four campus electrical feeders branch out from this location to provide dual power connections to most of the campus buildings (UC Santa Cruz 2004c). Power to the lower campus buildings comes from a separate, single PG&E line. Family Student Housing and employee housing complexes on the campus are served by separate PG&E connections (UC Santa Cruz 2004c).

The Central Heating Plant, which provides heating to the campus core, includes a cogeneration system that produces electricity. The cogeneration system has the capability of operating independently of the PG&E grid and thus also provides back-up power for the campus core area labs and facilities that have critical power needs (UC Santa Cruz 2004c). The cogeneration system provides approximately 2.6 megawatts (MW) of power. However, it operates at 2.3 MW due to restrictions imposed by the Monterey Bay Area Unified Air Pollution Control District (Testoni 2005). On average, the cogeneration plant provides about one-third of the main campus electricity. Since deregulation of electricity began in 1996, UC Santa Cruz has participated as a "Direct Access" customer with PG&E, which means that the electric commodity has been purchased under a separate contract from the transportation and distribution services that have continued to be provided by PG&E. The Campus is currently under contract with Arizona Public Services (UC Santa Cruz Physical Plant – Utility Providers website 2005).

Electrical system peak total demand in 2003 was approximately 9.49 megavolt-amperes (MVA),[4] for which the campus electrical system had adequate capacity and back-up capacity. However, an Electrical Systems Master Plan prepared for the campus in 2002 (Applied Power, Master Plan for High Voltage System, University of California Santa Cruz) revealed potential deficiencies in the existing 12 kV distribution system, which present concerns for the safety of campus electricians and pose a threat of power failure. In addition, some components of the existing electrical infrastructure are outdated or are not rated to handle additional electrical load. The proposed electrical improvements are described in detail in Volume III of the Draft EIR as part of the Infrastructure Improvements Project.

[4] This is the demand on the campus distribution loop. Total campus demand for 2003, including employee housing, was estimated at 8.5 MW.

Natural Gas

UC Santa Cruz is a member of the state buying pool for natural gas through the Department of General Services Gas Procurement Program (UC Santa Cruz Physical Plant – Utility Providers website 2005).

The campus natural gas distribution system is owned and maintained by UC Santa Cruz. Except for Family Student Housing on the west side of the campus and employee housing on the south end, the gas distribution system serves the natural gas needs of the entire campus (Rogers & Associates, 2004). Peak demand in 2003 was 656 therms per hour. The single biggest consumer of natural gas on campus is the combined Central Heating Plant (Rogers & Associates 2004; Testoni 2005).

PG&E provides natural gas to the campus via a 3-inch pipeline routed up Bay Street and High Street to the service connection at the site of the former Liquefied Petroleum Gas standby facility on the campus on Empire Grade Road near Western Drive. The 3-inch PG&E line comes off of a utility distribution main beneath Mission Street and serves a portion of the City of Santa Cruz as well as the campus (Rogers & Associates 2004). Approximately 12 miles of gas distribution pipelines extend up both the east and west sides of the campus from the service connection, with crossties delivering gas to the various campus facilities (Rogers & Associates 2004). The system includes two pressure-reducing stations: one at the supply point and the other near the College Eight access road. From the College Eight station, a dedicated, unregulated higher-pressure gas main is routed north and supplies the cogeneration plant (UC Santa Cruz 2004c).

Over the years various extensions to the original system have been added to accommodate new areas and facilities. As a result of these extensions, demands on the original distribution piping and pressure regulator system have increased. The Campus has determined that three existing conditions prevent the campus from providing natural gas at appropriate pressure to certain areas:

- Insufficient gas pressure on high demand (cold) days to provide gas to the upper campus
- Undersized pressure reducing stations
- Constricted gas pipes (UC Santa Cruz 2004c)

The Campus is proposing to address these issues as part of the Infrastructure Improvements Project, which is discussed in Volume III of the Draft EIR.

The *UCSC Natural Gas Master Plan*, prepared in 2004, recommends various actions to maintain and assure continued adequate performance of the natural gas distribution system as it is currently used. The Master Plan also concluded that continued attention to the system's capacity will be required as the campus grows. Specifically, the Master Plan notes that inadequate utility service pressures and increased loading on specific branch lines of the distribution system will eventually result in inadequate delivery service pressures (Rogers & Associates 2004).

Campus Energy Conservation Guidelines

The UC Santa Cruz campus has developed a set of energy conservation guidelines to inform students, faculty and staff of ways to reduce energy consumption. These guidelines include the following:

- Eliminating space heaters
- Regulating temperature (for heating, maintaining thermostat at 68 degrees or less where individual controls exist; for cooling maintaining thermostat setting at 78 degrees or higher for air conditioned spaces where process will not be compromised)
- Minimizing the use of personal electrical appliances such as coffee pots and hot plates
- Eliminating unnecessary lighting, maximizing the use of natural light, and using energy efficient bulbs
- Unplugging water coolers that heat or cool water
- Turning off office equipment when not in use and implementing energy-savings practices related to computer usage
- Replacing small and old refrigerators with large, energy-efficient refrigerators
- Keeping fume hood sashes closed whenever possible (UC Santa Cruz Physical Plant, Campus Energy Guidelines website 2005)
- Continuation of the campus policy of minimizing energy-intensive mechanical air conditioning

Campus Standards Handbook

The energy standards contained in CCR Title 24 set the minimum energy efficiency design criteria for all campus construction. The Campus Standards Handbook formalizes UC Santa Cruz's interest in pursuing cost effective energy conservation measures over and above the requirements of Title 24. In particular, the Handbook suggests design alternatives that could be incorporated into building design and includes guidelines to reduce the cost of energy over the life of a building. Examples of guidelines include siting buildings for maximum solar gain (when feasible), using architectural devices to provide protection from excessive heat gain, and standardizing the use of fluorescent fixtures equipped with energy saving lamps and ballast (UC Santa Cruz 1999a).

The Regents Green Building Policy and Clean Energy Standard

In July 2003, The Regents approved a system-wide Green Building Policy. This policy authorizes the President to:

- Require that new buildings be at least 20 percent more energy efficient than required under Title 24
- Adopt as University policy for all capital projects, the principles of energy efficiency and sustainability within budgetary constraints, and regulatory and programmatic requirements
- Implement programs to reduce consumption of non-renewable energy
- Develop and implement this policy for all proposed and existing University facilities, and provide an annual report to The Regents that examines impacts on energy utilization and building design and the effects of this policy on capital and operating costs (Dynes 2004)

4.15.1.7 Campus Core Cooling Water and Heating Water Systems

This section describes the campus core cooling water and heating water systems that produce and convey hot water to provide heat and chilled water for climate control in the buildings on the campus.

Existing Campus Cooling System

The campus uses a central closed loop cooling water system with heat rejection by central cooling towers to supply water to chillers in core buildings and also for process cooling water for lab equipment. Condenser water pumps outside the Central Heating Plant pump water from the cooling towers out to each building's chillers via an underground pipe system (Salas O'Brien Engineers 2004). Three cooling towers are located adjacent to the Central Heating Plant. Chillers are located in the following buildings: Communications, Jack Baskin Engineering, Sinsheimer, Earth and Marine Sciences, and Engineering (Salas O'Brien Engineers 2004).

The cooling tower system has a total capacity of 2,125 tons (UC Santa Cruz 2004b). The cooling towers have limited expansion capability due to their proximity to Jordan Gulch and neighboring protected land. Only one of the towers can accommodate more capacity (Salas O'Brien Engineers 2004). Current system demand for cooling water is about 1,922 tons. Once currently planned and approved projects are completed, the central cooling tower system capacity will be 3,238 tons and the system demand will be 3,179 tons (UC Santa Cruz 2004b).

The Campus has identified two key problems with the existing cooling water infrastructure:

- The southern core area does not have the cooling water capacity to accommodate currently envisioned projects and/or new research facilities in existing buildings (UC Santa Cruz 2004c)
- Core campus projects under design will use most of the remaining system capacity (UC Santa Cruz 2004b)

The Campus is proposing to address these issues as part of the Infrastructure Improvements Project, which is discussed in Volume III of the Draft EIR.

Existing Heating Water System

The campus heating water system consists of a Central Heating Plant and underground heating water distribution piping system serving 14 buildings in the campus core. The Central Heating Plant, which is located north of McLaughlin Drive, consists of three boilers and a cogeneration plant. The three boilers each have a heating output capacity of 23.4 MBtuh. The cogeneration plant generates electricity and the byproduct heat is used to pre-heat the water for the heating water system boilers. The cogeneration plant capacity is 7.5 million British thermal units per hour (MMBtuh) (Rogers & Associates 2003).

Two pumps in the Central Heating Plant serve the boilers and the distribution loop, while two separate pumps serve the decoupled cogenerator heat reclaim loop (Rogers & Associates 2003). The boilers and cogeneration system have an installed capacity of 77.7 MMBtuh, however the usable capacity of the plant is 54.3 MMBtuh, since the three boilers cannot operate concurrently due to air permit limitations (Rogers

& Associates 2003). The total domestic and industrial hot water requirements create a total estimated demand of 43.7 MMBtuh (Rogers & Associates, 2003). During maximum load conditions, year 2003 campus heating requirements, as reported in the *UC Santa Cruz Heating Water System Master Plan*, equated to 80 percent of the Central Heating Plant boiler/cogeneration production capacity and 85 percent of the pumping capacity (Rogers & Associates 2003).

The Campus has identified the following problems with the existing core heating system:

- Deficiencies in the distribution piping
- Deficiencies in the heat rejection equipment associated with the campus cogeneration plant particularly that the equipment is overheating when there is low heat demand (UC Santa Cruz 2004c)

The Campus is proposing to address these issues as part of the Infrastructure Improvements Project, which is discussed in Volume III of the Draft EIR.

4.15.1.8 Telecommunications

Wireline communications services are provided to the campus by SBC through a single point of connection at the main entrance to the campus. The on-campus wireline communications system is owned by the University and managed by UC Santa Cruz Information Technology Services (ITS). ITS is located in the Communications Building on campus and provides telephone services, campus voicemail, two-way radio communications, a micro-cell telephone network and a call center for students, faculty and staff of UC Santa Cruz (UC Santa Cruz Information Technology Services website 2005).

ITS also manages CruzNet, the UC Santa Cruz wireless network on campus. Residence hall Ethernet and network connections are administered by ResNet, a joint effort between ITS and the Colleges and University Housing Services (CUHS). Off-campus connectivity to the campus network is currently provided via Gigaman service from Pacific Bell. ITS also offers a departmental dial-in modem service where phone lines and modems are reserved for the exclusive use of subscribers.

The campus is served out of seven second-tier area facilities. Telephone, television, and LAN fiber radiate out of each area facility to third-tier distribution points, typically individual building entrances. Because there is only a single point of connection to the off-campus network, campus telephone and data services are vulnerable to failure. Several generations of older underground communications systems are no longer in use but have been left underground. Adequate capacity to serve the envisioned core infill development would be available in existing conduit if the dead wiring is removed.

The Campus leases space to Nextel and Verizon for cell phone towers next to the KZSC radio tower above Crown-Merrill Apartments. AT&T also leases space for antennae on the KZSC tower.

4.15.2 Impacts and Mitigation Measures

4.15.2.1 Standards of Significance

For the purposes of this EIR, campus development under the 2005 LRDP would have a significant impact with regard to utilities and service systems if it would:

- Exceed the Central Coast Regional Water Quality Control Board's wastewater treatment requirement
- Require or result in the construction or expansion of water or wastewater treatment facilities, which would cause significant environmental effects
- Require or result in the construction or expansion of storm water drainage facilities, which could cause significant environmental effects
- Result in the need for new or expanded water supply entitlements due to insufficient water supplies available to serve the project from existing entitlements and resources
- Exceed available wastewater treatment capacity
- Be served by a landfill with insufficient permitted capacity to accommodate the project's solid waste disposal needs
- Fail to comply with applicable federal, state, and local statutes and regulations related to solid waste
- Require or result in the construction or expansion of electrical, natural gas, cooling water, or heating water facilities, which would cause significant environmental impacts
- Require or result in the construction or expansion of telecommunication facilities, which would cause significant environmental impacts

Impacts with respect to each of the standards listed above are addressed in the discussion that follows except the first standard, which relates to water quality effects from the discharge of treated effluent. That is addressed under in Section 4.8, *Hydrology and Water Quality*.

4.15.2.2 Analytical Method

Campus development under the 2005 LRDP and associated population growth would result in increased demand for utilities. Some of the demand for certain utilities would stem from activities that occur on the campus. For instance, as new buildings are added to the campus, the demand for water and wastewater treatment would increase and new facilities could potentially be needed to handle this increased demand. Impacts that stem directly from activities on the campus are addressed in the analysis below as project impacts (LRDP Impacts UTIL-1 through UTIL-8).

In addition to the above, additional demand for a utility would stem from 2005 LRDP-related population that would live off-campus in the study area communities. That population would place a demand on utilities in the communities that these persons would reside in. The effect of the 2005 LRDP-related

population that would live off-campus on demand for utilities is analyzed under cumulative impacts (LRDP Impact UTIL-10).

Note that the impact of the proposed project on water supply is evaluated as a cumulative impact. This is because as shown in the analysis under LRDP Impact UTIL-9, campus growth on its own would not require the City to develop a new water supply source; it would however contribute to the cumulative need for a new supply source. The impacts on the City's wastewater treatment plant and landfill capacity are also evaluated as cumulative impacts under LRDP Impact UTIL-10; these take into account not just the demand on city utilities from 2005-LRDP related off-campus population but also the demand from on-campus growth.

The sections that follow provide information on how the demand for each utility was estimated, and the data that were used to evaluate impacts.

Water Supply

At full development under the 2005 LRDP, in 2020 the main campus would have an average daily water demand of 1,000,551 gpd or 365.2 million gallons per year (ARUP 2005). This estimate accounts for existing campus water conservation efforts, including ultra-low flow fixtures in all new buildings, and includes potable and irrigation water needs, but does not assume the use of the campus well water for irrigation. Projected demand was derived using historical UC Santa Cruz metered demand and consumption and assuming growth in water demand proportionate to growth in building space and on-campus housing except for irrigation water for athletic fields, which would increase in proportion to the increase in acreage.

As described in Chapter 3, *Project Description* (Volume I), the Campus is also proposing to offer expanded summer programs that could potentially increase the summer quarter enrollment levels from a current enrollment level of about 1,650 students to about 8,100 students in 2020, an increase of about 6,450 students over current levels. Assuming that ½ of the summer quarter students (4,000) would be housed on campus, and that the indoor water usage per bed would be about 40 gallons per day, these students would generate a demand for about 11 million gallons of water during the 10-week period. This water is not included in the average annual main campus demand reported above.

The annual demand at 2300 Delaware Avenue assuming current landscaping and no low-flow fixtures in Building C would be approximately 9,304 gpd or 3.4 million gallons a year.

If the three estimates reported above were summed together, the total annual demand of the campus in 2020 would be about 379.6 million gallons per year or an average of about 1,040,000 gallons per day.

Table 4.15-2
Average Daily Water and Sewer Projections

	2003	2020
Water (average daily demand)	565,600 gallons	1,040,000 gallons [a]
Wastewater (average daily flow)	301,370 gallons	423,875 gallons [b]

Notes:

The water projection does not assume the use of well water for irrigation, which would further reduce the demand for City water.

(a) Assuming new facilities have ultra-low-flow fixtures, which are required in new construction by state law; includes 9,304 gallons per day for 2300 Delaware Avenue.

(b) As a function of projected water usage.

Wastewater

As shown in Table 4.15-2, at full development under the 2005 LRDP, the main campus (including 2300 Delaware Avenue) would have an average daily wastewater flow of 423,875 gpd.

Storm Water

For methodology used to estimate the increase in runoff on the campus under the 2005 LRDP, see Section 4.8, *Hydrology and Water Quality*.

Solid Waste

The per capita waste disposal rate for the campus was calculated by dividing the total waste disposed by UC Santa Cruz in 2004 (2,450 tons per year[5] or 6.7 tons/13,400 pounds per day) by the total 2003-2004 academic year on-campus population of 18,939. This rate is about 0.71 pounds per person per day (251 pounds per person per year) and captures the campus daytime population and students and faculty residing on campus. This rate (251 pounds per person per year) was applied to the projected 2020 on-campus population of 27,670 (including dependents). To account for additional waste generated by the employee population at 2300 Delaware Avenue and other off-campus locations, the rate was also applied to the projected 2020 population for off-campus locations, and the waste was estimated to be 892 tons. The total waste generated by the Campus, including 2300 Delaware Avenue, would be about 3,585 tons.

Electricity

Potential impacts of campus growth under the 2005 LRDP on electricity use were assessed by determining demand factors appropriate for the various types of building space on campus. The projections assumed that building space would be added at a uniform rate between 2005 and 2020, and that new technology would provide increased energy efficiency over time. To avoid underestimating electricity use, it was assumed that 100 percent of power would come from the standard grid, powered by fossil fuel-generated power.

[5] UC Santa Cruz Recycling and Waste Diversion Totals Table, updated 3/14/05 and 5/9/05.

Natural Gas

Similar to electricity, the potential impacts of campus growth under the 2005 LRDP on natural gas usage were assessed by determining demand factors appropriate for the various types of building space on campus. The projections assumed that building space would be added at a uniform rate between 2005 and 2020 and that new technology would result in increased energy efficiency over time. The largest increase in natural gas usage would be associated with additional boilers for heating.

4.15.2.3 2005 LRDP Impacts and Mitigation Measures

LRDP Impact UTIL-1:	Development under the 2005 LRDP would require the expansion of campus and off-campus domestic/fire water conveyance systems, which would not cause significant environmental impacts.
Significance:	Less than significant
LRDP Mitigation:	Mitigation not required
Residual Significance:	Not applicable

On-Campus Water Infrastructure

Most of growth in academic and support space under the 2005 LRDP would occur within the central and north campus. It is anticipated that infill development in the central campus under the 2005 LRDP could demand new water storage capacity and infrastructure upgrades, and new development in the north campus would require infrastructure extensions such as new pipelines, a north campus pump station with booster pumps to augment pressure, and new storage capacity. New development on the north campus above elevation of 900 feet would require a booster pump and another reservoir to assure adequate fire suppression water supply.

The environmental impacts associated with infrastructure improvements would depend on the resources present within the areas in which these improvements would be made. Since the 2005 LRDP envisions that many of these improvements would be placed in existing utility corridors, they would be constructed in previously-disturbed areas where cultural and biological resources would likely not occur. Other improvements could occur along new roadways, such as the north campus loop road, or in north campus areas designated for development.

The environmental impacts of constructing the north campus loop road and other development in the north campus are addressed in other sections of this EIR. The Campus would implement the 2005 LRDP mitigation measures in Section 4.2, *Biological Resources* and Section 4.3, *Cultural Resources* (Volume I) to mitigate potential impacts to biological and cultural resources from construction of new water pipelines or extensions to a less-than-significant level. Potential impacts to air quality and water quality from construction activities related to utility extensions or placement would be mitigated to less-than-significant levels by implementing mitigation measures presented in Section 4.3, *Air Quality* (Volume I) and Section 4.8, *Hydrology and Water Quality* (Volume II). Furthermore, the Campus would continue its ongoing practice of reviewing individual project designs to determine the adequacy of domestic/fire water

supply infrastructure and upgrading systems, as necessary, before project construction. Therefore, the effects associated with utility extensions on campus would be less than significant.

The Campus is also proposing the Infrastructure Improvements Project, the environmental impacts of which are evaluated in Volume III of the Draft EIR.

Off-Campus Water Infrastructure

No major improvements to off-campus water distribution facilities would be needed to serve the campus growth. As part of the Bay Street transmission project, the City plans to replace a short water main section in Bay Street between the Bay Street Reservoir and Pump Station 2. This will be constructed in 2006. The pumping capacity of Pump Stations 2 and 6 would need to be increased to supply more water to the campus. This would be achieved by either adding more pumps to the two stations or replacing existing pumps with larger capacity pumps, which would not result in environmental impacts because the improvements would be located at existing developed stations.

The impact of the 2005 LRDP on domestic/fire water conveyance systems would be less than significant, and no mitigation is required. Government Code Section 54999 authorizes public utilities to charge the University a limited capital facilities fee under certain circumstances (i.e., a non-discriminatory charge to defray the actual cost of that portion of a public utility facility actually serving the University). The University will comply with its obligations as authorized under Section 54999.

For a discussion of impact related to water supply, see LRDP Impact UTIL-9.

LRDP Impact UTIL-2:	Development under the 2005 LRDP would require expansion of on- and off-campus wastewater conveyance facilities, the construction and operation of which would not result in significant environmental impacts.
Significance:	Less than significant
LRDP Mitigation:	Mitigation not required
Residual Significance:	Not applicable

On-Campus Wastewater Conveyance

Development under the 2005 LRDP would increase the on-campus population of students, faculty, staff and affiliates, dependents, visitors, construction workers and non-UC employees working on campus to about 27,300 persons by 2020. This population increase would result in increased wastewater flows through the campus sewer system and to the City of Santa Cruz wastewater treatment plant. The projected increase in the volume of wastewater discharged into the sanitary sewer system, based on the projected campus population and space growth, would be about 122,505 gpd, and the total discharge would increase to 423,875 gpd, as shown in Table 4.15-2 above. This would be an increase of about 41 percent relative to current average daily flows. To determine whether the existing sewer system would be adequate to handle the projected flows, an evaluation of the two sewer mainlines, the westerly mainline that extends down Heller Drive and Empire Grade Road and the easterly mainline that extends down

Jordan Gulch to the main entrance area, was conducted in July 2005. Based on pipe sizes, average slopes, existing wastewater volumes, projected wastewater volumes by area of campus, and estimated infiltration/inflow, the study estimated peak dry weather flows and peak wet weather flows under 2020 conditions for each mainline and for the 21-inch sewer main near the main entrance into which the two mainlines discharge. The study estimated the future flows for the average school day (i.e., when the campus is in session). The study found that both mainlines as well as the 21-inch main near the main entrance would be adequate to handle the projected flows, although the 15-inch City sewer into which the 21-inch main discharges would be at 100 percent capacity in 2020, and may need to be upgraded (URS 2005). Therefore, any new sanitary sewer construction on campus under the 2005 LRDP would be limited to repair, maintenance, and upgrade of existing facilities and extensions to serve new development in the north campus. Since the 2005 LRDP envisions that many of these improvements would be placed in existing utility corridors or streets, they would be constructed in previously-disturbed areas where cultural and biological resources would likely not occur. Potential air, noise or water quality impacts from pipeline construction activities would be limited and therefore less than significant. Furthermore, LRDP mitigation measures would be implemented which would ensure that the impacts remain less than significant.

Other improvements could occur along new roadways, such as the north campus loop road, or in north campus areas designated for development. The environmental impacts of constructing the north campus loop road and other development in the north campus are addressed in other sections of this EIR. The Campus would implement the 2005 LRDP mitigation measures in Sections 4.4, *Biological Resources,* and 4.5, *Cultural Resources* (Volume I) to mitigate potential impacts to biological and cultural resources during construction of new water pipelines to a less-than-significant level. Potential impacts to air quality and water quality from construction activities related to utility extensions or placement would be mitigated to less-than-significant levels by implementing mitigation measures presented in Section 4.3, *Air Quality*, and Section 4.8, *Hydrology and Water Quality*. Furthermore, the campus would continue its ongoing practice of reviewing individual project designs to determine the adequacy of wastewater infrastructure before project construction. Therefore, the effects associated with sewer line extensions on campus would be less than significant. For these reasons, no significant impacts would be expected with regard to the expansion of wastewater conveyance facilities on campus.

Off-Campus Wastewater Treatment and Conveyance

Wastewater flows from campus development would be conveyed to the City's wastewater treatment plant, which has a design capacity of 17 million gpd and current average daily flow of 10 million gpd. Wastewater flows projected under the 2005 LRDP would account for less than 6 percent of average daily flow at the plant. Therefore, there would be adequate capacity to serve the campus. Even with increases in flows from other sources, the City has indicated that the wastewater treatment plant will have adequate capacity to serve the projected campus demand (Wolfman 2005b).

As discussed above, the 15-inch main into which the on-campus 21-inch main discharges would be at 100 percent capacity in 2020 and may need to be upgraded. In addition, wastewater from the campus flows into a city sewer that runs down Bay Street for a short distance, runs to the west and then through the Arroyo Seco canyon. A portion of that line is considered to be undersized (and has been considered

undersized since 1988). The City will be metering the flow in that line in the winter of 2006. Following metering, the City will be able to determine what portion of the line, if any, will need to be upgraded. Alternately, the City may add another sewer main in city streets to handle the increased flows. The construction of off-campus wastewater system upgrades or expansions could have the potential to cause environmental impacts. Such projects would be required to undergo environmental review and it is reasonable to assume that all impacts would be mitigated to a less-than-significant level. Upgrades to the portions of the existing sewer main or installation of a new main under city streets, if required, would not result in significant environmental impacts because the upgrades would occur within the existing right-of-way. The city streets are already disturbed and the work is unlikely to affect significant biological or cultural resources. Because construction activities associated with upgrades within city streets would be limited and small scale, potential air, noise or water quality impacts from construction activities would be less than significant. If upgrades to the line in Arroyo Seco are required, the ground disturbing activities associated with those upgrades could potentially affect archaeological resources and biological resources, and potentially result in short-term air, noise and water quality impacts.

As stated earlier, Government Code Section 54999 authorizes public utilities to charge the University a limited capital facilities fee under certain circumstances. The University will comply with its obligations as authorized under Section 54999. This fee (i.e., a non-discriminatory charge to defray the actual cost of that portion of a public utility facility actually serving the University) covers the Campus's fair share of the construction cost, including cost of mitigation measures to address environmental impacts from the construction of these improvements.

LRDP Impact UTIL-3:	Development under the 2005 LRDP would require the expansion of campus storm drainage conveyance and detention facilities, which would not result in significant environmental impacts.
Significance:	Less than significant
LRDP Mitigation:	Mitigation not required
Residual Significance:	Not applicable

Implementation of the 2005 LRDP would increase the amount of impervious surface on campus that would produce increased runoff that would require collection and discharge. The most notable increase in impervious surfaces would be in the new development area in the north campus. New facilities in this area would require new storm water collection systems. Additional improvements could also be required over time as development occurs. The environmental impacts associated with development in the north campus area are discussed in other sections of this EIR, including Section 4.4, *Biological Resources*, and Section 4.5, *Cultural Resources* (Volume I), and Section 4.8, *Hydrology and Water Quality*.

In other parts of the campus, the expansion of storm water collection and conveyance system under the 2005 LRDP will make use of existing infrastructure. The Campus would continue to assess, during the preliminary project design phase, whether the existing storm drainage system is adequate prior to project approval. The Campus would also continue to adhere to the drainage guidance in the Campus Standards Handbook. These measures would help to minimize storm water volumes from new project sites. To the

extent that an extension or expansion of a storm drain or detention facility is needed to serve the new buildings, environmental impacts from such replacement or extension of existing central campus storm drains would be evaluated as part of the environmental review of the project but are generally expected to be minimal. Per campus practice of locating all linear utilities within road rights-of-way where feasible, new or expanded storm drains would likely be located within existing road rights-of-way, areas that have already been disturbed where cultural and biological resources would likely not occur. Due to limited ground disturbance associated with most storm drain projects, air quality, noise, and other construction-phase impacts would also be less than significant. Furthermore, the Campus would implement as appropriate LRDP mitigations that include pre-construction surveys and monitoring to avoid inadvertent impacts to biological and cultural resources during construction of pipeline and detention basin expansions and extensions. The Campus is also proposing the Infrastructure Improvements Project (evaluated in Volume III of this EIR), which would include repairs to storm water conveyance systems.

LRDP Impact UTIL-4:	Development under the 2005 LRDP would increase the volume of municipal solid waste that would require disposal, but would not require an expansion of the city landfill.
Significance:	Less than significant
LRDP Mitigation UTIL-4:	The Campus will continue to improve its recycling and waste reduction programs and identify additional means of reducing waste.
Residual Significance:	Not applicable

With a current (2003-04 academic year) on-campus population of 18,939, the campus generated about 2,450 tons per year or 6.7 tons of solid waste per day in 2003. That amounts to 251 pounds of solid waste per person per year. Under the 2005 LRDP, the on-campus population would increase to 27,670 by 2020. Based on existing waste disposal rates, the on-campus population at full development under the 2005 LRDP would dispose of about 3,473 tons of solid waste per year. The population of 892 projected under the 2005 LRDP for 2300 Delaware Avenue and leased campus facilities in Santa Cruz would contribute an additional 112 tons of waste per year. Thus the total waste disposed of at full development under the 2005 LRDP would be 3,585 tons per year in 2020.

Although the University of California is exempt from the 1989 Integrated Waste Management Act (AB 939), under University policy, UC Santa Cruz would continue its recycling collection and education programs to operate in accordance with the intent of AB 939. Additionally, the 2005 LRDP expresses the Campus's commitment to promoting sustainable practices in campus operations, including recycling. Continued implementation of recycling programs and other sustainable practices would help minimize the campus's contribution of solid waste to the City's landfill. Campus development would also comply with the UC Green Building Policy, which encourages recycling of construction waste.

The remaining capacity of the City's landfill is about 6,029,270 cubic yards. Using a conversion rate of 1 cubic yard per 0.5 ton of municipal solid waste (U.S. EPA website 2005), and 3,585 tons per year of solid waste disposed of at full development under the 2005 LRDP, the per year disposal in 2020 would be 6,970 cubic yards. Conservatively applying this amount to the 15 years between 2005 and 2020, the total

waste disposed of by UC Santa Cruz would be 104,550 cubic yards, assuming that the diversion rate does not change. This likely overestimates the total waste disposed since the campus population is not projected to reach 27,670 until 2020 and it is likely that the Campus will divert a larger percentage of its waste in future years. The addition of 104,550 cubic yards of waste over 15 years represents only two percent of the total remaining capacity of the landfill. Since there is capacity to handle projected waste disposal volumes generated from growth under the 2005 LRDP, no expansion of the landfill would be required as a result of campus growth under the 2005 LRDP and the impact would be less than significant.

To further reduce this less-than-significant impact, the Campus will implement LRDP Mitigation UTIL-4. Examples of ways the Campus could improve its recycling and waste reduction programs under LRDP Mitigation UTIL-4 include but are not limited to the following:

- Conduct waste audits of representative areas of the campus to determine waste generation and diversion levels for the purposes of identifying opportunity areas for greater waste reduction and recycling efforts
- Expand on-campus waste reduction and recycling communications efforts
- Expand on-campus composting
- Improve waste reduction policies in food service areas, athletic events catering, conferences, concerts and other campus events
- Expand the existing E-waste recycling program
- Establish a campus and/or student waste exchange program
- Require construction contractors to prepare a construction waste recycling plan

LRDP Impact UTIL-5:	Development under the 2005 LRDP would require the expansion of the campus electrical system, which would not result in significant environmental impacts.
Significance:	Less than significant
LRDP Mitigation UTIL-5:	Where feasible, new campus buildings will be added to the Campus Energy Management System and heating and cooling will be controlled based on time of use of building and outside temperature.
Residual Significance:	Not applicable

On-Campus Electrical System

With campus development under the 2005 LRDP, campus use of electricity would increase to an anticipated peak electricity demand of approximately 21.01 MVA. In 2003, the campus' electrical system maximum demand was 9.49 MVA.

One of the principles of the 2005 LRDP is sustainability and environmental stewardship. This principle emphasizes promoting and exploring sustainable practices including energy conservation. Under the

2005 LRDP, the Campus would continue to promote energy efficiency and consistent service quality with demand-reduction strategies. The Campus Standards Handbook formalizes UC Santa Cruz's interest in pursuing cost effective energy conservation measures over and above the requirements of the state's Title 24 for new construction and retrofit projects. Furthermore, in July 2003, The Regents approved a system-wide Green Building Policy, which includes a commitment to the principles of energy efficiency and sustainability for all capital projects within budgetary constraints and regulatory and programmatic requirements. The policy requires new buildings to exceed the requirements of Title 24 by at least 20 percent. The continued implementation of these policies would help minimize on-campus energy use as the campus population grows under the 2005 LRDP. To further reduce energy use, the Campus will implement LRDP Mitigation UTIL-5.

According to the 2002 Master Plan Document for High Voltage System, in 2002 UC Santa Cruz was already approaching the limits of its 12 kV system. Also, the current configuration of the numerous vaults that carry the 12 kV conductors is such that a problem in one vault could lead to a campus-wide shutdown lasting several days. Based on the report's findings, an additional A2 feeder was recommended, as well as the replacement of the underground oil switches with aboveground pad mount switches. These findings formed the justification for the current Infrastructure Improvements Project, described and analyzed in Volume III of this EIR.

Future campus growth would increase demands on the campus electrical infrastructure and require localized upgrades and line extensions, particularly to the north campus area. Extensions to serve development in the north campus area would be placed within the area of disturbance of the north campus loop road. The environmental effects of constructing the north campus loop road and other development in the north campus are addressed in other sections of this EIR, including Section 4.4, *Biological Resources*, and Section 4.5, *Cultural Resources* (Volume I), and Section 4.8, *Hydrology and Water Quality* (Volume II). Upgrades and extensions in the central campus would occur primarily within roadways, areas which are already disturbed and which are unlikely to have biological or cultural resources. Due to limited ground disturbance needed to install electrical lines, air quality, noise, and other construction-phase impacts would generally be less than significant. If potentially significant impacts were indicated, they would be mitigated to less-than-significant levels by the implementation of mitigation measures presented in this EIR.

Off-Campus Electrical System

The increased demand for electricity under the 2005 LRDP could, in conjunction with other regional demand, result in the need for more regional electricity generation capacity. However, as discussed further under LRDP Impact UTIL-10, it would be speculative to predict where regional generation facilities would be located or what the impacts from their operation and construction would be. In addition, locally, upgrades to off-campus electrical lines, including an upgraded PG&E service to the campus substation, could be needed to serve campus demand under the 2005 LRDP. The upgraded service would be provided by re-conductoring existing power lines within city streets, along Highway 1 and through the Pogonip using existing electrical poles.

The construction of off-campus electrical system improvements could have the potential to cause environmental impacts. Such projects would be required to undergo separate environmental review and it is reasonable to assume that all impacts would be mitigated to a less-than-significant level. Since the likely improvements would occur within existing utility corridors, which are already disturbed areas, such improvements would be anticipated to result in less-than-significant impacts on biological and cultural resources. Because of the small scale of the likely improvements, potential air, noise or water quality impacts from construction activities would also be limited and less than significant, or would be expected to be mitigated to a less-than-significant level

LRDP Impact UTIL-6:	Development under the 2005 LRDP would require the expansion of natural gas transmission systems, which would not result in significant environmental impacts.
Significance:	Less than significant
LRDP Mitigation:	Mitigation not required
Residual Significance:	Not applicable

On-Campus Natural Gas System

Campus growth under the 2005 LRDP would increase the campus use of natural gas, with an anticipated peak demand of approximately 1,850 therms/hour through 2020. Peak demand in 2003 was 656 therms per hour. The existing campus distribution system has the capacity to supply this demand. As mentioned under electricity impacts, UC Santa Cruz would continue to implement conservation strategies and programs under the 2005 LRDP, and comply with the UC Office of the President Energy and Green Building Policy to minimize the demand for natural gas.

Anticipated growth under the 2005 LRDP would require upgrades to existing natural gas infrastructure and an extension of natural gas service to new development areas within the campus. Although the distribution system has been extended over time and currently accommodates the demand, the original system has undersized piping and regulators that hinder performance. On colder days, there is sometimes not enough pressure to reach the upper parts of campus. Growth under the 2005 LRDP would also necessitate the construction of a natural gas pipeline along the envisioned north campus loop road that would connect to the existing system at McLaughlin Drive and service the planned growth in the north campus area. A third natural gas pressure-regulating station would also be needed on campus and would be constructed concurrently with the construction of the north campus natural gas pipeline extension. The environmental impacts of constructing the north campus loop road and other development in the north campus are addressed in other sections of this EIR. The Campus would implement the 2005 LRDP mitigation measures listed in Section 4.2, *Biological Resources,* Section 4.3, *Cultural Resources* (Volume I), Section 4.8, *Hydrology and Water Quality* (Volume II) to mitigate potential impacts to biological and cultural resources during construction of new natural gas pipelines to a less-than-significant level. Due to limited ground disturbance needed to install natural gas pipelines, air quality, noise, and other construction-phase impacts would generally be less than significant. If potentially significant impacts

were indicated, they would be mitigated to less-than-significant levels by the implementation of mitigation measures presented in this EIR.

As part of the planned improvements under the Infrastructure Improvements Project, which is further discussed and analyzed in Volume III of this EIR, the existing below-grade College Eight pressure reducing station would be upgraded with an above-grade vault and the undersized piping along Hagar Drive between Steinhart and McLaughlin would be upgraded. Potential adverse environmental impacts due to project construction are discussed in Volume III of this EIR.

Off-Campus Natural Gas System

The increased demand for natural gas under the 2005 LRDP could result in a need for upgrades or extensions to off-campus systems to serve the campus. A new underground natural gas pipeline would be installed by PG&E to supply more natural gas to the campus. Possible routes for this second PG&E connection include Bay Street or Western Drive down to Mission Street, and a short section of pipeline along High Street. The construction of off-campus natural gas system improvements could have the potential to cause environmental impacts. Such projects would be required to undergo separate environmental review and it is reasonable to assume that all impacts would be mitigated to a less-than-significant level. Since the likely improvements would occur within existing utility corridors, which are already disturbed areas, such improvements would be anticipated to result in less-than-significant impacts on biological and cultural resources. Because of the small scale of the likely improvements, potential air, noise or water quality impacts from construction activities would also be limited and less than significant, and in any case could be mitigated to a less-than-significant level.

LRDP Impact UTIL-7:	Development under the 2005 LRDP would require the expansion of campus cooling water and heating water generation and conveyance facilities, which would result in significant environmental impacts.
Significance:	Significant
LRDP Mitigation UTIL-7:	The Campus shall implement LRDP Mitigation AIR-2A.
Residual Significance:	Significant and unavoidable

In 2003, on-campus peak demand for heating water was 43.7 MMBtuh. Despite adequate capacity to meet the existing demand, the Campus has identified existing service inefficiencies in the core heating water system, such as limited capabilities of accepting design temperatures within components of the distribution system; thus the system cannot be operated at system capacity and other inefficiencies also exist.

Full development under the 2005 LRDP is projected to result in an increased demand for heating water. Upgrades to the existing heating water system, possibly including installation of two additional boilers near the Central Heating Plant, would be required to supply this demand. Alternately, the demand may be met by expanding the campus cogeneration system capacity. Extensions of distribution lines to the north campus development areas would also be required. Heat for buildings outside the core campus would be supplied by individual boilers for each building.

On-campus growth is also anticipated to require increased cooling water facilities. The current system uses a centralized cooling water system, consisting of three cooling towers with a total capacity of 2,125 tons/hour. In 2004, peak demand for cooling water was 1,922 tons/hour. Planned upgrades to Cooling Tower 1 will increase total cooling water capacity to 3,238 tons/hour, but currently planned and approved projects will also increase demand to 3,179 tons/hour and exceed planned capacities. Proposed development under the 2005 LRDP would also exceed capacities with an anticipated additional demand for 4,860 tons of cooling water. Phase 1 of the Infrastructure Improvements Project would replace the existing central cooling tower with a larger tower and associated new piping and connections or add a new cooling tower adjacent to the Earth and Marine Sciences Building, including associated pumps and piping to pump into the existing system, and install additional new piping elsewhere on the campus. This is discussed further in Volume III. Subsequent improvements may include building one or two Thermal Energy Storage System (TES) tanks.

Apart from the near-term improvements that will be made under the Infrastructure Improvements Project, it is envisioned that the cooling and heating water distribution systems would be expanded to provide service to some of the Academic Core buildings and academic buildings included in the new colleges. These pipelines would be placed within the north campus loop road. Other development to the north (mainly student and employee housing and campus support facilities) would be served by individual building boilers and chillers or by equipment serving building clusters. The environmental effects of constructing the north campus loop road and other development in the north campus are addressed in other sections of this EIR, including Section 4.4, *Biological Resources*, and Section 4.5, *Cultural Resources* (Volume I), and Section 4.8, *Hydrology and Water Quality* (Volume II). Due to limited ground disturbance needed to install cooling and heating water pipelines, air quality, noise, and other construction-phase impacts would generally be less than significant. If potentially significant impacts were indicated, they would be mitigated to less-than-significant levels by the implementation of mitigation measures presented in this EIR. The environmental impacts from the operation of additional boilers, chillers, and emergency generators are addressed in Section 4.3, *Air Quality* (Volume I). All impacts would be reduced to a less-than-significant level with mitigation with the exception of significant and unavoidable air quality impacts from operational emissions of NO_x from the new boilers at the Central Heating Plant and space heating in other new non-residential buildings on the campus. No other mitigation is available. Accordingly, this impact is also determined to be significant and unavoidable.

LRDP Impact UTIL-8:	Development under the 2005 LRDP would require expansion of campus communication facilities, which would not result in significant environmental impacts.
Significance:	Less than significant
LRDP Mitigation:	Mitigation not required
Residual Significance:	Not applicable

The main switching facility is located in the central campus in the telecommunications building, east of the engineering buildings. UC Santa Cruz ITS operates and maintains the majority of the on- and off-

campus voice and data switching equipment and network infrastructure needed by the students, faculty and staff, all of which is owned by UC Santa Cruz. The increased population and development anticipated under the 2005 LRDP, along with the rapidly changing nature of technology and research demands, would put pressure on existing campus networks and other telecommunications infrastructure. Upgrades to both central facilities and distribution channels are expected during the lifetime of the 2005 LRDP, especially to accommodate growing academic pursuits. Short- and long-term improvements would be needed for band width/density, reliability and flexibility of the telecommunications network.

New and expanded telecommunication facilities and infrastructure would be built in conjunction with new development under the 2005 LRDP. Like other utilities infrastructure, telecommunications infrastructure would be placed within the area of disturbance of existing roads, or for development in the north campus area, within the area of disturbance of the north campus loop road. Upgrades and extensions within existing roadways would occur in disturbed areas that are unlikely to have biological or cultural resources. The environmental effects of constructing the north campus loop road and other development in the north campus are addressed in other sections of this EIR, including Section 4.4, *Biological Resources*, and Section 4.5, *Cultural Resources* (Volume I), and Section 4.8, *Hydrology and Water Quality* (Volume II). Due to limited ground disturbance needed to install telecom lines, air quality, noise, and other construction-phase impacts would generally be less than significant. If potentially significant impacts were indicated, they would be mitigated to less-than-significant levels by the implementation of mitigation measures presented in this EIR.

4.15.2.4 Cumulative Impacts and Mitigation Measures

LRDP Impact UTIL-9: Development under the 2005 LRDP, in conjunction with other regional growth in the SCWD service area, would generate increased demand for water during normal and drought years, and the development of new water supplies and infrastructure to serve normal and drought year demand could result in significant environmental impacts. The contribution of the proposed project to this impact would be cumulatively considerable.

Significance: Significant

LRDP Mitigation UTIL-9A: The Campus shall continue to implement water conservation strategies to reduce demand for water. Domestic water conservation strategies shall include the following or equivalent measures:

- Continue the leak detection and repair program
- Install water meters in new employee housing developments to encourage residential water conservation

LRDP Mitigation UTIL-9B: The Campus shall implement pilot programs for high-efficiency plumbing fixtures. If the programs prove to be successful, the Campus shall revise its standards to require use of the fixtures in all new

buildings, and in existing buildings as the existing fixtures need to be replaced.

LRDP Mitigation UTIL-9C: Residential use washing machines installed in student housing on campus must be certified by the Consortium on Energy Efficiency (CEE) 6 to have a water factor (WF) of 5.5 or less or meet an equivalent standard. New washing machines purchased by UC Santa Cruz Office of Physical Education, Recreation and Sports (OPERS) shall meet applicable water efficiency standards for institutional machines. The University shall provide residents of employee housing with information on high-efficiency washing machines.

LRDP Mitigation UTIL-9D: The Campus shall require all new landscape installations to incorporate water-efficient landscaping practices. Water-conservative landscaping practices shall include but will not be limited to: use of water-efficient plants, temporary irrigation systems for plant establishment for areas where mature plants will be able to survive without regular irrigation; grouping of plants according to their water requirements, design of planting areas to maximize irrigation pattern efficiency, and mulch covering in planting areas.

LRDP Mitigation UTIL-9E: The Campus shall require installation of waterless urinals in new development and when replacing urinals in existing buildings.

LRDP Mitigation UTIL-9F: When campus water consumption reaches 250 million gallons per year, the Campus shall initiate a program to retrofit existing campus facilities with the current efficient campus standards for toilets, showers and sinks, and with waterless urinals.

LRDP Mitigation UTIL-9G: Before campus annual water consumption reaches 300 million gallons, the Campus shall conduct a study on feasible measures for utilization of reclaimed water (including rainwater, grey water and/or recycled water) in new development. Potential uses of reclaimed water include cooling, irrigation, and toilet flushing. The study shall include a plan to utilize reclaimed water in new development. The Campus shall implement the plan when campus annual water consumption reaches 350 million gallons.

LRDP Mitigation UTIL-9H: When campus water consumption reaches 300 million gallons per year, the Campus shall implement the following water conservation measures:

- Explore and implement additional means to reduce residential water

[6] The CEE is a national, non-profit organization that promotes energy-efficient products and services; www.cee1.org/home.html.

use. These means could include but would not be limited to installing timers on showers and use of dual-flush toilets.

- Add existing irrigation systems to the campus's central control system and complete the metering of all irrigation systems on the campus where the point of connection irrigates one acre or more.
- Pursue replacement of natural turf on athletic fields with artificial turf.
- Initiate a water conservation education program. Examples of measures that could be included in this program are:
  - Distributing pamphlets to residents of employee housing on basic home water conservation practices, plumbing retrofits and replacements and strategies to conserve landscape irrigation.
  - Presentations in student orientations.
  - Press releases and public space advertising in campus media.
  - Special events such as water conservation fairs.

LRDP Mitigation UTIL-9I: If and when the City implements drought emergency management measures, the University will implement the following measures for the duration of the drought emergency:

- Reduce use of potable water for irrigation on the campus landscape, the CASFS and the Arboretum in accordance with reductions required by the City for similar users.
- Utilize water from the existing supply well in Jordan Gulch for non-potable uses. The Campus shall implement a program of monitoring flow at down-gradient springs during the time when the well is being used.
- Require that residential water use on campus be reduced consistent with the City's target for multifamily residential facilities.

Residual Significance: Significant and unavoidable

Campus growth under the 2005 LRDP, in conjunction with other growth in the City's water service area (which is the study area for cumulative impacts on water supply), would demand additional water from a system that does not have adequate supplies during normal and drought years in 2020. The cumulative impact would be considered significant if the cumulative water demand would trigger the need for new or expanded water resources, the development of which would have significant environmental impacts. The analysis below discusses the impact both under normal and drought conditions, as well as the impact of campus water demand during the summer session on the available supply.

Note that in the analysis that follows, the estimated demand for water by the Campus during normal years does not include the demand for water that would be associated with 2005 LRDP-related population that would live off campus within the City Water Department's service area. Although the off-campus LRDP-related population is not included in the latest AMBAG population forecasts for the City, the City's water demand projections are based on 1997 AMBAG population forecasts, which were higher than the 2004 forecasts by about 4,462 persons. Therefore, even if the 2005 LRDP-related population that would live off campus within the service area (about 3,500 persons) were to be considered additional to the population that is anticipated under the 2004 AMBAG forecasts, the demand associated with this off-campus population would not exceed the demand already accounted for in the City's demand forecasts.

Impact Under Normal Conditions

Growth under the 2005 LRDP would increase demand for domestic/fire water on campus. As previously discussed, UC Santa Cruz has a contract for water service from the City to serve the reasonable needs of the entire campus including the growth of the campus under the 2005 LRDP. Thus, the campus has sufficient entitlement to water and there would not be a significant impact associated with securing more water for campus growth.

In 2003, water demand at UC Santa Cruz was 565,600 gpd (about 206 million gallons for the year). Under the 2005 LRDP, UC Santa Cruz proposes a water management strategy that builds on existing water conservation programs. Through 2020, the Campus would continue to implement a range of water conservation efforts including the use of mulch and drought-tolerant species in landscaping; installing water control devices; and the continued retrofit of existing buildings with more efficient plumbing fixtures, as they require replacement. New buildings constructed under the 2005 LRDP would be fitted with ultra-low-flow fixtures. All of these measures would help reduce the campus's demand on the City's water supply. Therefore, future water demand for the campus (main campus and 2300 Delaware Avenue) in 2020 is estimated at 379.6 million gallons per year. The incremental demand for water by 2020 over 2003 levels would be about 174 million gallons per year. Based on an estimated campus demand of about 225 million gallons in 2005, the incremental demand for water by 2020 over 2005 levels would be about 155 million gallons.

According to the IWP, the total system demand within the service area in 2005 is about 4,627 million gallons and is projected to increase to 5,157 million gallons by 2020. Therefore, the system demand is forecast to increase by about 530 million gallons in the next 15 years.

UC Santa Cruz water demand is included in the City's annual forecasts as a separate line item. The City's 1998 forecasts predicted that by 2010, UC Santa Cruz would require 408 million gallons of water and that the Campus's demand would not increase after that. The total UC demand projected by the City would amount to about 8 percent of the total system demand of 5.2 billion gallons in 2020. According to Campus estimates, however, based on the growth envisioned under the 2005 LRDP the total water demand (main campus and 2300 Delaware Avenue) by 2020 would be approximately 379.6 million gallons per year. This would be about 7.4 percent of the total system demand projected for 2020 in the

City's forecasts. If the projected water demand at the Marine Science Campus[7] of 19.8 million gallons per year were added to the campus demand noted above, the total UC Santa Cruz demand in 2020 would be about 399.4 million gallons per year. The total projected demand would still be lower than that projected for UC Santa Cruz by the City in the IWP. The City has thus adequately considered UC Santa Cruz growth in its water supply planning.

It should be noted that the service area demand projections used in the IWP are high compared to annual consumption that has been observed in the service area since 1999. For instance, in 2000 water usage was about 3,956 million gallons whereas the IWP forecast 4,409 million gallons for that year, about 450 million gallons more than the actual usage. Similarly, in 2003 the water usage was 3,872 million gallons whereas the IWP forecast an estimated number of 4,540 million gallons (derived by interpolation between 2000 and 2005 estimates), which is about 670 million gallons more than the actual usage in that year. Similarly, the IWP estimate of UC Santa Cruz's demand of 321 million gallons in 2005 is also high compared to the Campus's 2005 estimated demand of 225 million gallons for the main campus (including 2300 Delaware Avenue) and 7 million gallons for the Marine Science Campus for a total of 232 million gallons. The IWP forecast of 408 million gallons for UC Santa Cruz in 2020 is slightly higher than the demand forecast by the Campus (Table 4.15-3).

Table 4.15-3
Campus Water Demand Compared to System Demand

	2000	2005	2020	Increase between 2005 and 2020
	million gallons per year			
Main Campus Annual Water Demand[a, b]	177	225 [d]	379.6	154.6
Total UC Santa Cruz Annual Water Demand [c]	179	232	399.4	167.4
IWP Annual Water Demand Forecasts for UC Santa Cruz	204	321	408	204
IWP Annual Demand Forecasts	4,409	4,627	5,157	530

Sources: City of Santa Cruz 2003, Integrated Water Plan; Table 3-3 of the City of Santa Cruz 2000 Urban Water Management Plan and Table II-3 of the IWP; based on average weather conditions. Note that the IWP adjusted the 2000 and 2005 demand estimates for the system in the 1998 Water Demand Investigation downward by 200 million gallons to reflect the actual demand experienced to date, but the long-term demands were assumed to remain the same; City of Santa Cruz 2004; Testoni 2005.

Notes:

(a) Main campus demand includes 2300 Delaware Avenue and excludes Marine Science Campus demand.

(b) Main campus demand for 2000 does not include 2300 Delaware Avenue.

(c) Includes Marine Science Campus demand.

(d) Derived by interpolating between 2003 and 2020 estimates

In 2004, the City of Santa Cruz Water Department prepared an evaluation of the adequacy of the water supplies to support future development in its service area (Goddard 2004). This study compared the supply of water to existing and projected demand to determine the maximum level of development that could be accommodated within the service area based on existing supply sources in average or normal

[7] Note that UC Santa Cruz's Marine Science Campus operates under a separate LRDP, and is not part of the program of development and growth analyzed in this EIR. Water demand generated by the Marine Science Campus is presented here so that the entire water demand projected by the University for UC facilities in Santa Cruz can be compared with the City's projections.

weather conditions. The study examined the water production data for the period 1999 through 2003 by source, and determined that the North Coast, San Lorenzo River and Live Oak wells operating at capacity for most of the year could produce 3.2 billion gallons under average conditions. The study also reported that 1.04 billion gallons are available from Loch Lomond (the maximum amount the City has the right to withdraw), and that the system capacity is reached at about 4.3 billion gallons (plus or minus about 200 million gallons). The study also found that as of 2004 the average annual demand of the system under average weather conditions is about 3.94 billion gallons. Therefore, the City estimated that there were approximately 340 million gallons per year available for future growth based on existing water supply sources. According to the City Water Department, the current estimate of remaining water supply is about 300 million gallons (Goddard 2005). If no new supply sources were added, by 2020 the campus would use about 56 percent (176 million gallons out of the 300 million gallons) of the remaining supply of water under normal conditions.

As discussed earlier, the IWP was developed with two objectives: (1) to identify a strategy to reduce near-term drought shortages, and (2) provide a reliable supply that meets long term needs while ensuring protection of public health and safety (City of Santa Cruz 2005). The purpose is to reduce the level of curtailment of water use needed in a serious drought (similar to that experienced in 1976-77) to no more than 15 percent, and to provide for planned growth through 2030. The three elements of the City's strategy to address these objectives are conservation, curtailment (which would be invoked in dry years), and a new water supply source. The conservation program is expected to result in an estimated annual savings of nearly 300 million gallons by 2010. According to the City Water Department, about 150 million gallons of annual savings have already been realized by 2005 (Goddard 2005).

If 150 million gallons of remaining annual savings that would be attained through conservation by 2020 were deducted from the incremental 530 million gallons per year of water needed in 2020, the remaining incremental water that would be needed would be about 380 million gallons per year. This amount is more than the 300 million gallons per year of surplus water that would be available based on existing supply sources, and therefore, there would be a shortfall of about 80 million gallons per year. Based on demand forecasts and assuming no major changes in consumption patterns, it appears that the demand will exceed supply sometime between 2015 and 2020.

As discussed above, the City's forecasts may be high, and the shortfall in 2020 may not be of this magnitude. However, in the absence of updated demand forecasts and based on the data currently available, it is concluded that the City would need to secure a new supply source to meet the increased demand for water. To minimize its contribution to the regional water demand, UC Santa Cruz would implement LRDP Mitigations UTIL-9A through UTIL-9H.

Impact Under Drought Conditions

Development of a new source will also be necessary to address drought conditions and improve system reliability. About 95 percent of the water used in the City's service area comes from surface water sources, which are highly affected in drought years. Furthermore, the storage capacity of the City's water supply system is limited, and the City has no mechanism to import water from outside the service area. Therefore, supply falls severely short of demand in drought years. As the demand grows with the growth

in population, the supply problems in drought years will worsen, requiring more frequent and more severe curtailment. Campus growth under the 2005 LRDP would contribute to the increased demand for water in drought years and would therefore contribute to the need for the City to secure a new supply source. To minimize the Campus's contribution to the water deficit, in the event of a drought, in addition to LRDP Mitigations UTIL-9A through 9H, the Campus shall implement LRDP Mitigation UTIL-9I to curtail the use of water on campus for the duration of the drought.

The Santa Cruz Water Department recognizes the vulnerability of the City's water supply in drought years and the need for additional water to serve future growth in the service area. Although the City has considered the option of developing additional surface storage facilities, it has determined that development of surface storage facilities is not feasible in light of major regulatory issues. Further, the lead time to develop such a facility would be long (Gary Fiske & Associates 2003). The City is also seeking extensions of the time allowed to put water to full beneficial use pursuant to the Felton water right permits. This would ensure that in the future when the water is needed the City could divert up to 3,000 acre-feet per year of water from San Lorenzo River at Felton; through June 2005, the City has used only half of the permitted amount in any year (EDAW 2005). However, this would not be adequate to address the projected water supply shortage. As outlined in the IWP, the City is considering various supply options, including a desalination plant that would utilize seawater to produce potable water. Development of a new water supply source could result in environmental impacts. The City's Draft Program EIR for the IWP (SCH #2003102140) is programmatic, and thus does not evaluate the project-specific impacts related to construction of a desalination facility or other water supply expansion projects, although it notes that all potential environmental impacts from the construction of a desalination plant, except noise, could be mitigated to a less-than-significant level. Such projects would be reviewed, and as necessary, mitigated by the City in its role as CEQA lead agency.

As stated earlier, Government Code Section 54999 authorizes public utilities to charge the University a limited capital facilities fee under certain circumstances. The University will comply with its obligations as authorized under Section 54999. This fee (i.e., a non-discriminatory charge to defray the actual cost of that portion of a public utility facility actually serving the University) covers the Campus's fair share of construction, including cost of mitigation measures to address environmental impacts from the construction of these improvements.

Impact Associated with Campus Water Demand During Summer Sessions

As discussed in Chapter 3, *Project Description* (Volume I), currently about 1,650 students are enrolled in the summer programs. In order to serve the increased student enrollment under the 2005 LRDP, the Campus is planning to expand its summer programs to enroll up to 8,100 students during a 10-week session. As a result, there could be up to 6,450 additional students present on the campus during the months of June, July and August. There could also be an increase in the number of employees present on campus during the summer. However, this growth is anticipated to be minor, because the majority of the staff works on campus year-round, and it is anticipated that the overall summer employee population would remain slightly less than the regular school year employee population.

While the increase in the number of students (6,450 additional students) would be comparable to the increase of about 6,950 additional students in the other three quarters, the total student population during the summer quarter of up to 8,100 students would be substantially lower than the three-quarter average of 21,000 students. There would be two effects of this additional student population on campus water demand: firstly, the total annual campus demand would be higher compared to current conditions or 2020 without the summer program conditions; and secondly, the water demand profile of the campus would change. Currently, the campus's water demand profile does not resemble the bell-shaped curve that is typical of most communities, with the demand peaking in the summer months and dropping to lower levels during the rest of the year. Instead, the campus's water demand profile includes two peaks – the first in May and June and a second peak in October and November, both peaks associated with the presence of students on the campus. The water usage in July is somewhat lower because although only a small student population is present in that month, increased irrigation is also required. With the addition of the 6,450 students during the summer quarter, the usage in July would rise to be comparable to water usage in June. In addition, August usage would be slightly higher than in June and July. An estimated 11 million gallons of additional water would be used on the campus during the 10-week summer quarter. This amount is accounted for in the total annual demand reported in Tables 4.15-2 and 4.15-3, and the effects of that demand are analyzed above. The incremental water that the campus would use during the months of June through August would not be large enough to require the development of a new water source, although some improvements to the distribution system may become necessary. The environmental effect of distribution system improvements are addressed under LRDP Impact UTIL-1, above.

In summary, cumulative development within the City's water service area, including campus growth under the 2005 LRDP, would have a significant cumulative water supply impact due to inadequate water supplies, especially during periods of drought. Although the LRDP mitigation measures listed above, along with the campus's existing water conservation measures and obligations under Government Code Section 54999, would reduce the Campus's contribution to cumulative water supply impacts, they would not eliminate the need for a new water source. The development of a new city water supply source, such as a desalination facility, could have environmental impacts. Since it is unknown at this time whether all environmental impacts associated with water supply development projects could be reduced to a less-than-significant level, this EIR conservatively concludes that the cumulative impact would be significant and unavoidable.

LRDP Impact UTIL-10:	Development under the 2005 LRDP, in conjunction with other regional development, would generate increased demand for wastewater treatment facilities, landfills, energy, and natural gas in the region, and the expansion of associated utilities and service systems to meet this demand would not result in significant environmental impacts.
Significance:	Less than significant
LRDP Mitigation:	Mitigation not required
Residual Significance:	Not applicable

Full development of the 2005 LRDP, in conjunction with other development in the study area, would demand additional wastewater treatment, generate additional solid waste, and place additional demands on energy and natural gas systems.

Wastewater

At full development, the campus would generate 423,875 gpd or 0.42 million gpd of wastewater. This wastewater would be treated at the City's wastewater treatment plant. Wastewater flows from campus development would be conveyed to the City's wastewater treatment plant, which has a remaining capacity of 7 million gpd. This would be adequate for cumulative City and UC Santa Cruz development. Wastewater flows projected under the 2005 LRDP would account for less than 7 percent of average daily flow at the plant. The wastewater treatment plant is currently operating at about 60 percent of capacity and is projected to have available capacity to treat wastewater from its service area through 2020.

Solid Waste

Development of cumulative projects would produce additional quantities of solid waste, which would contribute to overall regional solid waste disposal and landfill demand. At full development, the campus would dispose of about 3,585 tons of solid waste per year. Off-campus population growth resulting from the 2005 LRDP would contribute to local and regional waste generation. The City landfill at present has a remaining capacity of 58 percent of its total capacity and is not projected to reach capacity until 2037, well beyond the horizon year of the 2005 LRDP. Since the landfill is for the exclusive use of the City and its residents, cumulative disposal needs from areas outside the city are not considered to apply to that landfill. On-going City and campus recycling programs would help to minimize the amount of solid waste disposed of at the landfill. No significant cumulative impacts related to solid waste disposal within the City would occur with development under the 2005 LRDP.

The County landfill (Buena Vista) was slated to close within the timeframe of the 2005 LRDP, in about 15 years. The cities of Capitola, Scotts Valley, Watsonville and Santa Cruz, and Santa Cruz County Department of Public Works began a study of future garbage disposal options in 2005 to address the eventual closure of Buena Vista landfill. However, in June 2005, the County Board of Supervisors adopted an ordinance to ban recyclables from the County landfill (County of Santa Cruz 2005). As a result of this ban, the life of the landfill has been extended.

Electricity and Natural Gas

The 2005 LRDP would result in the permanent and continued use of natural gas and energy resources for electricity. At full development, the campus would require 21.01 MVA MW of electricity and 1,850 therms/hour of natural gas. Development under the 2005 LRDP in conjunction with other regional development would result in increased consumption of electricity and natural gas. However, UC Santa Cruz's cumulative contribution to this increased consumption would be considered less than significant since development under the 2005 LRDP would be required to comply with Title 24 requirements. Additionally, development under the 2005 LRDP would be guided by the LRDP's sustainability and energy conservation principles as well as The Regents' policy on green buildings and energy.

There is no evidence to suggest that the electrical or gas demands of UC Santa Cruz, under the 2005 LRDP, would make a significant contribution to the need for new facilities. Future cumulative electricity and gas demand could require the construction of new facilities somewhere. It would be speculative to assume where or when such facilities might be needed. If they were required within California, such facilities would be required to undergo separate environmental review.

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