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Table 4.15-1 Existing and Projected Demand for Utilities

4.15 UTILITIES

This section characterizes existing and proposed utilities and service systems and evaluates changes to these systems that may be required to meet demand associated with growth under the 2003 LRDP. Existing on-campus utility and service systems that would continue to serve the campus under the 2003 LRDP are described in the environmental setting below and include water supply, wastewater conveyance and treatment, storm water drainage, solid waste disposal, electricity and natural gas, campus chilled water and steam, and telecommunications. The environmental setting section also describes utility and service systems in the City of Davis. While on-campus and service systems would serve most development under the 2003 LRDP, the proposed NMP Project could potentially be served by the Yolo County landfill rather than the Campus Landfill. This section evaluates potential on-campus demand placed on campus utility and service systems and the Yolo County landfill under the 2003 LRDP. The cumulative impact analysis at the end of this chapter assesses the indirect effects of LRDP-related off-campus population growth on the utilities and service systems in other communities in the region, namely the cities of Davis, Dixon, Winters, and Woodland.

Public comments received in response to the Notice of Preparation raised issues related to the following: the domestic water delivery system, impacts to the capacities of local landfills, wastewater treatment system capacity, and wastewater discharge requirements. These issues are addressed in the analysis that follows.

4.15.1 Environmental Setting

4.15.1.1 Water Supply

UC Davis. The campus is served by three water supply systems, including the combined domestic/fire water system, the utility water system, and the agricultural water system. These three systems, discussed further below, are independently operated, draw water from different sources, and contain water of different quality.

Domestic/Fire Water System. The campus' domestic/fire water system provides chlorinated water for use in campus buildings (such as student housing and laboratories), for landscape irrigation on the west and south campuses (in areas where the utility water system does not extend), and for the heating and cooling systems at the Central Heating and Cooling Plant (CHCP). This system obtains water from six wells that tap into deep aquifers at depths between approximately 1,360 and 1,470 feet below the ground surface (bgs). The major elements of this system include the six deep aquifer wells with a total pumping capacity of approximately 5,290 gallons per minute (gpm), approximately 144,000 linear feet of distribution pipelines, a water tower and a ground storage tank with a combined capacity of approximately 500,000 gallons, an underground storage reservoir with a capacity of approximately 1.3 million gallons, and a booster pump station that pumps water from the underground reservoir into the water tower to maintain water pressure in the system (West Yost & Associates 2000a, UC Davis 2001b).

Table 4.15-1
Existing and Projected Demand for Utilities

Utility	2001-02 Consumption & Demand		LRDP Consumption & Demand		NMP Consumption & Demand		Total Through 2015-16
	Annual Consumption	Peak Demand	Annual Consumption	Peak Demand	Annual Consumption	Peak Demand	Annual Consumption
Domestic/Fire Water	2,671 ac-ft	3,100 gpm	4,877 ac-ft	4,335gpm	423.7 ac-ft	3821 gpm	5,301 ac-ft
Utility Water	1,170 ac-ft	1.5 mgd	948 ac-ft	1.8 mgd	436 ac-ft	0.85mgd	1,384 ac-ft
Wastewater	650 mg	1.6 mgd	1,400 mg	3.5 mgd	178 mg	0.35 mgd	1578 mg
Solid Waste	8,700 tons	NA	17,811.6 tons	NA	in LRDP	NA	17,811.6 tons
Electricity	200,000,000 KWh	34,000 KW	506,000,000 KWh	107,000 KW	13,154,000 KWh	6,473 KW	519,000,000 KWh
Natural Gas	16,800,000 therms	2,900 therms/hr	45,000,000 therms	6,700 therms/hr	1,298,000 therms	495 therms/hr	46,128,000 therms

Source: UC Davis Architects and Engineers 2003.
Phillips, David. 2003a. Memo to Sid England. Domestic Water Projections.
Phillips, David. 2003b. Memo to Sid England. Utility Water Projections.

As presented in Table 4.15-1, peak hour capacity of the campus' domestic/fire water system in 2000 (including wells, storage, and booster pumping) was estimated at approximately 10,890 gpm, nnual use of water from the system in 2001 was estimated at approximately 867-million gallons per year (mgy) (West Yost & Associates 2000a, Phillips 2003a). During emergency utility water system and with the City of Davis water system. Deep aquifer water demand and supply are discussed further in Section 4.8 Hydrology and Water Quality (Volume II).

Utility Water System. The campus' utility water system provides water for landscape irrigation, greenhouse irrigation, and some laboratories. The system obtains water from six wells that tap into intermediate-depth aquifers at depths from approximately 320 to 415 feet bgs. The components of this system include: the six intermediate-depth wells with a total pumping capacity of approximately 5,045 gpm, one 100,000-gallon water tower, and distribution pipelines (West Yost & Associates 2000b).

The peak hour capacity of the campus utility water distribution system was estimated at approximately 5,365 gpm in 2000, and estimated annual use of water from the system was approximately 381 mgy in 2001 (West Yost & Associates 2000b, Phillips 2003a). During emergency conditions, the campus utility water system can be cross-connected with the campus' domestic/fire water system. Intermediate aquifer water demand and supply are discussed further in Section 4.8 Hydrology and Water Quality.

Agricultural Water System. The campus has approximately 3,500 acres of agricultural lands, most of which are irrigated by water from the campus' agricultural water system. UC Davis purchases approximately 1,303 mgy (or 4,000 acre-feet) of Putah Creek surface water from the Solano County Water Agency (although reductions in deliveries can occur during drought conditions). This water is delivered via an underground pipeline to a storage reservoir located on the southwestern corner of the west campus. Due to the water's generally high quality, it is used on campus primarily for field teaching and research activities. In addition, the agricultural water system obtains water from 21 main campus wells and 12 Russell Ranch wells that tap into intermediate-depth aquifers. In addition, limited volumes of surface water from Putah and Cache Creeks (delivered via Willow Canal) are used by a tenant farmer at Russell Ranch for irrigation of commercial crops. Surface water and intermediate aquifer water demand and supply are discussed further in Section 4.8 Hydrology and Water Quality.

UC Davis Water Conservation. Direction for water conservation on campus comes from state law, the UC Office of the President, the University of California's Facilities Manual (2000), and standard campus practices. The campus reduces demand for water from the deep aquifer by installing low-flow shower heads and low-water-use toilets in new campus buildings and by retrofitting older buildings with these fixtures, by implementing an ongoing maintenance program to repair water leaks, and by converting existing single-pass cooling systems to cooling tower systems that recirculate water. Water demand from the shallow/intermediate aquifer is limited by reducing landscape watering, landscaping with drought resistant plantings, limiting turf coverage, using low-flow spray systems, connecting landscape irrigation to a centralized controller, and using heavy applications of mulch to reduce evaporation from landscaped areas. As discussed further in Section 4.8 Hydrology and Water Quality, the campus' water conservation efforts are reflected in the fact that despite significant campus growth, the campus' current demand for water from the deep aquifer is comparable to that since 1968, and that the

campus' demand for water from the utility water system has declined by approximately 30 percent since 1989.

City of Davis. The City of Davis Public Works Department obtains municipal water from 22 wells. Five of these wells are installed in the deep aquifer between depths of approximately 700 and 1,800 feet bgs, and 17 wells tap into intermediate aquifers at depths from 300 to 600 bgs (Schoech 2003, City of Davis 2002a). Recent City of Davis water use was estimated at approximately 3,584 mgy. The EIR for the 2000 City of Davis General Plan anticipated that the quantity of available groundwater would be adequate to support increases in demand anticipated under the General Plan, however, pumping capacities would need to be increased (Jones & Stokes 2000).

4.15.1.2 Wastewater

UC Davis. UC Davis operates a campus wastewater conveyance and treatment system that is independent from regional facilities. Major system elements include collectors, approximately 20 miles of sewer main lines, over 10 miles of service sewers, nine primary sanitary sewer lift stations, the campus Wastewater Treatment Plant (WWTP) located in the south campus, and an effluent discharge outfall on Putah Creek (West Yost & Associates 2000c).

The campus WWTP provides advanced tertiary level treatment by oxidation, sand filtration, and UV disinfection. The peak month capacity of the campus WWTP, as regulated under the existing National Pollutant Discharge Elimination System (NPDES) permit issued by the Central Valley Regional Water Quality Control Board, is 2.7 million gallons per day (mgd). The facility, which began operation in March 2000, was designed to accommodate growth that was anticipated in the 1994 LRDP through 2005-06 and to allow for future expansion when necessary. Since the new WWTP began operation, the maximum monthly flow has been 2.2 mgd. Maximum flows in 2001-02, as shown in Table 4.15-1, were 1.6 mgd.

A recent assessment of the campus' sanitary sewer system identified a few sanitary sewer line segments on the core campus that have severe defects. Maintenance projects addressing these defects have been underway during 2001-02 and 2002-03. Wastewater effluent disposal is discussed further in Section 4.8 Hydrology and Water Quality.

City of Davis. The City of Davis Public Works Department manages sewer service for the city. The City's sewer system includes over 150 miles of sewer lines and the City of Davis Water Pollution Control Plant, which is located approximately 6 miles northeast of Davis, immediately east of the Yolo County Landfill (Jones & Stokes 2000).

The City's Water Pollution Control Plant provides primary and advanced secondary treatment by oxidation ponds and overland flow. The plant is currently designed to treat an average dry-weather flow of 7.5 mgd and a peak wet-weather flow of 12.6 mgd (City of Davis 2002b). The EIR for the 2000 City of Davis General Plan determined that the City's wastewater infrastructure has been planned and sized to meet planned growth of the City under the City's current General Plan (Jones & Stokes 2000).

4.15.1.3 Storm Water Drainage

UC Davis. As discussed in further detail in Section 4.8 Hydrology and Water Quality, the central campus and developed parts of the west and south campuses are served by campus storm water drainage systems, including the following:

- The central campus drainage system involves a system of underground pipes ranging from 10 to 52 inches in diameter, the Arboretum Waterway (providing the only major detention storage in the system), and 18 lift stations located throughout the central campus. Storm water runoff on the central campus is collected and transported to the Arboretum Waterway, where it is pumped to the South Fork of Putah Creek during large storm events.
- An approximately 450-acre developed area within the west campus near Hopkins Road (including the University Airport) is served by a storm drainage pipe system that conveys discharge directly to Putah Creek.
- Storm water runoff from much of the low-density developed areas on the south campus located east of Old Davis Road drains to a ditch located near the Union Pacific railroad tracks. This ditch retains water and eventually discharges through a culvert to the South Fork of Putah Creek at a point east of the Raptor Center. Two other minor drainage systems on the south campus drain runoff from the Center for Health and the Environment (CHE) located east of Old Davis Road, from buildings and paved areas located just east of the CHE, and from portions of two inactive landfill modules at the South Campus Disposal Site.

For most of the campus' undeveloped teaching and research fields, storm water collects, causing local ponding that either percolates or evaporates. Irrigation practices associated with teaching and research fields typically do not generate surface runoff. Surface storm water flow from portions of the west campus and the Russell Ranch drains to regional storm water drainage systems, as discussed below:

- Overland flows from areas west of County Road 98 on the west campus discharge to the City of Davis Covell Drain at Russell Boulevard.
- Overland storm water flows that occur south of Russell Boulevard at the Russell Ranch collect in a drainage ditch that traverses along the southern side of Russell Boulevard and connects to the Covell Drain.
- Runoff from the north of Russell Boulevard at Russell Ranch collects in the Dry Slough, located north of the Russell Ranch. The Dry Slough transfers flows to the Willow Slough (located between Woodland and Davis),which drains to the Yolo Bypass (UC Davis 1997).

City of Davis. The City of Davis Public Works Department manages a system of storm drain collectors, pumping stations, and retention ponds. Central Davis is primarily served by a subsurface storm water drainage system that conveys flows north to detention basins that discharge to Channel A. Channel A conveys drainage to the Willow Slough, which drains to the Yolo Bypass. West Davis is served by the Covell Drain, which traverses along Richards Boulevard and joins Channel A. During large storm events, the Covell Drain can reach capacity

and cause ponding. The Covell Drainage System Comprehensive Drainage Plan (currently being implemented) and campus storm water drainage improvements at the California National Primate Research Center (CNPRC) (currently in design) will improve storm drainage capacity in this area. East Davis is served by subsurface drains that convey flows east to a retention pond located at the intersection of Pole Line Road and Second Street. During large storm events, water in this basin is pumped to a ditch that traverses the southern side of the Union Pacific railroad tracks and flows east to the Yolo Bypass (Jones & Stokes 2000).

4.15.1.4 Solid Waste

UC Davis. UC Davis provides solid waste collection and recycling services for the campus. All nonrecycled and nonhazardous solid wastes collected on campus are disposed at the campus owned and operated Class III sanitary landfill located in the west campus west of County Road 98 and north of Putah Creek. As shown in Table 4.15-1, the campus sends approximately 8,700 tons of solid waste to the campus landfill per year (approximately 34 tons per working day). In addition, approximately 3,300 tons of wastes from the UC Davis Medical Center in Sacramento are disposed at the landfill each year. The permitted capacity of the landfill is 500 tons per day, and the landfill unit currently being used has anticipated capacity to serve the campus needs through 2027 (Magness 2003).

While not legally obligated to comply with the 1989 Integrated Waste Management Act (AB 939), which required state, county, and local governments to substantially decrease the amount of waste disposed at landfills by the year 2000, UC Davis created the R4 Program to act in accordance with the spirit and intent of the Act. The R4 Program coordinates campus-wide recycling collection efforts between the Solid Waste Division, Custodial Services, Grounds Division, and various other campus entities. In 2001-02, approximately 10,804 tons of paper, cardboard, cans, bottles, metal, and organics were diverted for recycling and reuse (R4 Recycling 2003). This total represents a diversion of approximately 55 percent of the total waste generated on campus (approximately 8,700 tons of campus waste was delivered to the Campus Landfill).

City of Davis – Yolo County. The private firm Davis Waste Removal provides solid waste services (including collection and recycling) to the City of Davis. All nonrecyclable wastes collected within the City are disposed of at the Yolo County Central Landfill, a 770-acre facility located approximately 6 miles northeast of the City of Davis. The Yolo County Landfill, with an estimated capacity of 25 million cubic yards, is anticipated (based on Sacramento Area Council of Governments population projections) to remain open until 2020 (Jones & Stokes 2000).

4.15.1.5 Electricity and Natural Gas

UC Davis. The main campus currently receives electricity from PG&E at the campus substation located south of I-80. With completion of the Phase 2B Electrical Improvements in 2003, the campus electrical system has an available capacity of 64.4 MW. The main campus receives power from the campus substation and from an approximately 2.7 MW cogeneration plant located on the core campus in the CHCP facility. Annual electrical usage on campus in 2001-02 was approximately 200 million kilowatt-hours (KWh) per year and peak demand was approximately 34,000 KW (MTH Engineers 2002).

The campus purchases natural gas from outside vendors and provides it to the campus through PG&E pipelines. Natural gas is provided to four locations on campus for use and distribution: the CHCP, the Primate Center Plant, the Cogeneration Plant, and the Master Meter #1. Peak natural gas demand in 2001-02 was approximately 2,900 therms per hour.

UC Davis Energy Conservation. Direction for energy conservation on campus comes from state law, the UC Office of the President, the University of California's Facilities Manual (Volume 6, Chapter 5 – Energy and Water Conservation and Management), and standard campus practices. UC Davis currently meets or exceeds Title 24 energy conservation requirements for all new campus buildings. In addition, as required by the UC Davis Campus Standards and Design Guide (UC Davis Architects and Engineers 2002), UC Davis ensures that as many long-term energy- and cost-efficient measures are installed as possible in all new construction and remodeling projects. These measures address providing adequate insulation, connection to the campus' energy-efficient chilled water and steam systems, using appropriate thermal and air handling conveyance and controls, using energy-efficient lighting and light-controls, and using the least lighting to meet required needs. The campus also regularly reviews the campus' power and heating/cooling systems, and upgrades these systems and associated operations as needed to achieve maximum efficiency. In addition, UC Davis formed an Energy Advisory Committee in March 2001 to provide guidance for long-term energy policy and operational practices, including those that relate to green energy alternatives, new building design, building operation, energy-efficient purchases, measuring and monitoring energy use, reward systems for conservation, and energy communication. In addition, The Regents are currently evaluating system-wide principles and policies associated with sustainable development that will provide additional direction for the campus.

City of Davis. Electrical and natural gas service in the City of Davis is provided by PG&E.

4.15.1.6 Campus Chilled Water and Steam Systems

The campus chilled water and steam systems produce and convey steam to provide heat and chilled water to cool several buildings on the central campus. Campus buildings that are not connected to the campus chilled water and steam systems use individual heat, ventilation, and air conditioning (HVAC) systems.

The campus operates two main chilled water plants with a total system capacity of approximately 15,500 tons, including:

- The chilled water facilities located at the campus' CHCP located east of Dairy Road and north of the Tercero student housing complex. The CHCP includes three steam-driven chillers with a total capacity of approximately 9,150 tons/hour.
- The Thermal Energy Storage Plant located south of La Rue Road and north of the University Arboretum. This plant, which began operation in 2002 and has a capacity of 10,350 tons/hour, consists of two 2,000-ton electric chillers and an approximately 40,000-ton thermal storage tank (UC Davis 2002).

The campus' main steam plant is located in the CHCP. The total steam capacity at the CHCP is approximately 280,000 pounds per hour (pph) (including a 75,000 pph backup boiler for use in emergencies) (UC Davis 2002).

The centralized campus chilled water and steam systems are more efficient in terms of cost and energy use than several smaller heating/cooling units, and they are more reliable to operate.

4.15.1.7 Telecommunications

UC Davis. The majority of all telephone, data, video, and wireless infrastructure and facilities on campus are owned by the campus and operated by the UC Davis Communications Resources Department. The main campus switching facility is located in the Telecommunications Building, which is located east of the CHCP.

As new buildings are constructed, the Communications Resources Department coordinates with the UC Davis Office of Architects and Engineers to design and direct the installation of intra- and inter-building telecommunications facilities in accordance with established standards.

City of Davis. SBC provides telephone service in the City of Davis.

4.15.2 Impacts and Mitigation Measures

4.15.2.1 Standards of Significance

The following standards of significance are based on Appendix G of the CEQA Guidelines and include standards specific to the campus. For the purposes of this EIR, implementation of the 2003 LRDP would have a significant impact with regard to utilities and service systems if it would:

- Exceed the Central Valley Regional Water Quality Control Board's wastewater treatment requirements
- 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
- 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, chilled water, or steam 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 two standards. The first standard, which relates to water quality effects from the

discharge of treated effluent, and the fourth standard, which relates to the need for new or expanded water supply entitlements, are addressed under LRDP Impact 4.8-5, LRDP Impact 4.8-6, and LRDP Impact 4.8-7, respectively, in Section 4.8 Hydrology and Water Quality (Volume II).

4.15.2.2 CEQA Checklist Items Adequately Addressed in the Initial Study

The Initial Study determined that all checklist items should be evaluated in the EIR.

4.15.2.3 Analytical Method

To estimate impacts on the campus utility systems, projected annual usage estimates were developed based on assumptions and factors described below.

Domestic/Fire Water. Expected annual water usage was derived by evaluating historic water use data, without considering the six drought years of 1987 through 1992 when water usage was uncharacteristically low, and applying this factor to the incremental asf that is projected to be constructed on campus under the 2003 LRDP. The estimated number includes water use in new buildings as well as cooling tower and boiler make up water (Phillips 2003b).

Utility Water. The demand for utility water was calculated by determining the amount of water used per acre of irrigated landscaping in 1999 and the additional acreage on the central campus that would be landscaped under the 2003 LRDP (Phillips 2003c).

Wastewater. The increase in wastewater flows was estimated using a series of flow factors depending upon the type of building or source. For future residential areas to be constructed on campus under the 2003 LRDP, a factor of 85 gallons per day/per capita was applied. For general non-residential buildings (office, academic, laboratory, etc.) a factor of 0.50 gallons per day per assignable square foot (gpd/asf) was used. For animal facilities, a factor of 1.0 gpd/asf was used, and for sports arena/theaters, a factor of 3.0 gpd per seat was applied (West Yost & Associates 2000c).

Solid Waste. The current per capita rate of solid waste generated on campus was calculated by dividing the total waste disposed of at the Campus Landfill in 2001-02 (8,700 tons) by the total on-campus student and employee population of 35,520 persons. This rate is about 0.24 tons per person per year. This rate captures the campus daytime population and students who reside in on-campus housing, but does not include solid waste generated by the existing faculty and staff housing within Aggie Village, as that waste is disposed at the County Landfill. This rate (0.24 tons per person per year) was applied to the projected 2015-16 on-campus population of 49,870. To account for the additional waste generated by the residential units in the Neighborhood, higher solid waste generation rates of 0.46 tons/year/unit for apartments and 0.36 tons/year/per resident for single-family homes were used. The NMP Project could be served by the Yolo County landfill as opposed to the campus landfill; therefore, the following analysis addresses both potential options.

Cumulative Utility Demand. As described further in the cumulative impact section below, the methodology used to develop the projected distribution of off-campus population is discussed in Section 4.11 Population and Housing (Volume II). Based on the projected distribution, four communities—Davis, Woodland, Winters, and Dixon—would likely receive LRDP-related population that would constitute more than 3 percent of each affected community's total

population in 2015. Because LRDP-related population growth in these communities is essentially a part of the overall regional growth, information in the General Plans of each of these communities was examined to determine whether new demand associated with the 2003 LRDP would require new or modified facilities that could result in environmental impacts.

4.15.2.4 2003 LRDP Impacts and Mitigation Measures

Growth under the 2003 LRDP would primarily impact on-campus utility systems. The NMP may be served by the Yolo County landfill for solid waste disposal, and therefore the NMP as an element of the LRDP could directly affect this non-campus utility. The potential direct impacts of the LRDP on on-campus utility systems and on the Yolo County landfill are analyzed below. Growth as a result of the 2003 LRDP could also indirectly affect utility systems of those regional communities that would receive some of the new LRDP-related population. This indirect impact is also analyzed below.

Domestic and Fire Water

LRDP Impact 4.15-1: Implementation of the 2003 LRDP would require the expansion of campus domestic/fire water extraction and conveyance systems, which would not cause significant environmental impacts.

Significance: Less than significant

LRDP Mitigation 4.15-1(a): Once preliminary project design is developed, the campus shall review each project to determine if existing domestic/fire water supply is adequate at the point of connection. If domestic/fire water is determined inadequate, the campus will upgrade the system to provide adequate water flow and pressure to the project site before constructing the project.

LRDP Mitigation 4.15-1(b): Implement domestic water conservation strategies as indicated in LRDP Mitigation 4.8-5(a) (Section 4.8 Hydrology and Water Quality).

Growth under the 2003 LRDP would increase demand for domestic water on campus. The campus Domestic Water Master Plan is currently, and would continue to be, reviewed on an ongoing basis and updated regularly. This would assist the campus in identifying the need to modify the domestic water system to provide additional capacity in a timely manner. Based on the projects expected to be built within the timeframe of the 2003 LRDP including the NMP, the annual consumption of domestic water would increase from 2,671 in 2001-02 to approximately 5,301 acre-feet through 2015-16 (Phillips 2003b).

In order to serve the on-campus growth under the 2003 LRDP and increase reliability of the domestic water extraction and delivery system, the current Draft Domestic Water Master Plan projects that the campus may install new wells or make other improvements. Based on the projected pattern of development under the proposed LRDP, potential new wells could include new wells and/or a tank on the south campus, a new well on the central campus, and/or a new well or a new tank on the west campus to serve the NMP Project. Additional water could also be pumped from existing wells (West Yost & Associates 2000a). Adequate fire water pressure on

campus would be ensured by increasing system capacity in these ways and also by eliminating dead-end mains on campus and providing adequate pressures at points of connection by pumps or system to serve individual projects.

The construction of these water supply facilities described above to serve the on-campus growth under the 2003 LRDP would not result in significant environmental impacts. New wells would occupy between ½- and 1-acre sites on the campus and would be located on land designated for Support under the 2003 LRDP. To the extent that the designation of this land for Support use would result in a conversion of prime farmland, that impact is addressed in Section 4.2 Agricultural Resources (Volume I). With respect to the environmental impact of increased extraction of groundwater from the deep aquifer using existing or new wells, that impact is addressed in Section 4.8 Hydrology and Water Quality.

Most of the growth in academic and administrative space under the 2003 LRDP, which could require expansion of domestic water lines, would occur within the central campus. Per campus practice of locating all linear utilities within road rights-of-way where feasible, new or expanded domestic water pipes 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. In addition, the campus would implement 2003 LRDP mitigations that include pre-construction surveys and monitoring to avoid inadvertent impacts to biological and cultural resources during construction of utility pipeline expansions and extensions. Potential impacts of erosion and water quality effects from trenching and constructing in rights-of-way would be mitigated to less-than-significant levels through implementation of 2003 LRDP mitigations presented in Section 4.8 Hydrology and Water Quality. Therefore, effects associated with utility extensions on campus would be less than significant. For example, as shown by the project-level evaluations presented in Volume III of this EIR, environmental impacts associated with utilities for the NMP and the RPMP would be reduced to less-than-significant levels.

Furthermore, the campus would implement LRDP Mitigation 4.15-1(a), which would ensure that when specific projects are proposed in the future under the 2003 LRDP, required domestic water system improvements are identified. This would allow the capacity needs of the project to be met and would allow for review of any associated off-site environmental effects to be considered with environmental review of the project. In addition, Mitigation 4.15-1(b) would continue to ensure that domestic water conservation measures are implemented on campus to reduce demand on the domestic/fire water system.

In summary, development of the LRDP is unlikely to result in a significant impact associated with the construction and operation of domestic/fire water extraction and conveyance systems. Implementation of LRDP Mitigation 4.15-1(a) and (b) would ensure that this impact is further reduced.

* * *

Utility Water Use

LRDP Impact 4.15-2: Implementation of the 2003 LRDP would require the expansion of campus utility water extraction and conveyance systems, which would not cause significant environmental impacts.

Significance: Less than significant

LRDP Mitigation 4.15-2(a): Once preliminary project design is developed, the campus shall review each project to determine whether existing utility water supply is adequate at the point of connection. If the utility water supply is determined to be inadequate, the campus will upgrade the system to provide adequate water flow to the project site prior to occupation or operation.

LRDP Mitigation 4.15-2(b): Implement utility water conservation strategies as indicated in LRDP Mitigation 4.8-6(a) (Section 4.8 Hydrology and Water Quality [Volume II]).

Utility water drawn from the shallow/intermediate aquifer is used for landscape irrigation on the central campus. Utility water distribution lines do not extend to the west or south campuses at this time and are not expected to serve the west and south campuses in the future. Landscape irrigation, which comprises the bulk of utility water usage on campus, as well as some greenhouse and laboratory uses, required an estimated 381 mgy of utility water, or about 948 acre-feet per year (Phillips 2003a). Additional landscaped areas on the central campus under the 2003 LRDP would increase utility water demand to approximately 1,384 acre-feet per year with full development under the 2003 LRDP (Phillips 2003c). The impacts of the withdrawal of this additional water from the shallow/intermediate aquifer are addressed in Section 4.8 Hydrology and Water Quality.

Some upgrades of the utility system would be necessary to meet the projected increase in demand. These could include using three of the existing utility water wells in conjunction with water from the Arboretum Waterway; using the Arboretum Waterway as the primary source of utility water supplemented by well water as necessary; or constructing one replacement and two new utility water wells (West Yost & Associates 2000b). The proposed NMP Project would not be served by the utility water system and would likely receive water for landscape irrigation from two existing agricultural wells on the site.

The construction of utility water supply facilities described to serve the on-campus growth under the 2003 LRDP would not result in significant environmental impacts. New wells would occupy between ½- and 1-acre sites on the campus and would be located on land designated for Support under the 2003 LRDP. To the extent that the designation of this land for Support use would result in a conversion of prime farmland, that impact is addressed in Section 4.2 Agricultural Resources (Volume I). With respect to the environmental impact of increased extraction of groundwater from the shallow and intermediate aquifer using existing or new wells, that impact is addressed in Section 4.8 Hydrology and Water Quality (Volume II).

Expansion of utility water lines under the 2003 LRDP would occur within the central campus. Per campus practice of locating all linear utilities within road rights-of-way where feasible, new or expanded utility water pipes would likely be located within existing road rights-of-way, areas that have already been disturbed and where cultural and biological resources would likely not occur. In addition, 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 utility pipeline expansions and extensions. Potential impacts of erosion and water quality effects from trenching and constructing in rights-of-way would be mitigated to less-than-significant levels through implementation of 2003 LRDP mitigations

presented in Section 4.8 Hydrology and Water Quality. Therefore, effects associated with on-campus utility extensions would be less than significant.

To further reduce this impact, the campus would implement LRDP Mitigation 4.15-2(a) which would ensure that when specific projects are proposed in the future under the 2003 LRDP, any required utility water system improvements are identified. This would allow the capacity needs of projects to be met and would allow for review of any associated offsite environmental effects to be considered during project-specific environmental reviews. LRDP Mitigation 4.15-2(b) would continue to ensure that utility water conservation measures are implemented on campus to reduce demand on the utility water system.

* * *

Wastewater

LRDP Impact 4.15-3: Implementation of the 2003 LRDP would require the expansion of wastewater treatment and conveyance facilities, the construction and operation of which would not result in significant environmental impacts.

Significance: Less than significant

LRDP Mitigation 4.15-3: Once preliminary project design is developed, the campus shall review each project to determine whether existing capacity of the sanitary sewer line at the point of connection is adequate. If the capacity of the sewer line is determined inadequate, the campus will upgrade the system to provide adequate service to the project site prior to occupation or operation.

Development under the 2003 LRDP, including the NMP, would increase the average daily population on the campus from about 36,445 persons in 2001-02 to about 51,645 persons by 2015-16. This increase would result in increased wastewater flows to the campus WWTP. Other sources of increased wastewater flows would be teaching and research activities, and expanded cooling and heating facilities that would discharge cooling tower blowdown to the sanitary sewer system. Based on the projected growth in population and on-campus activities, the volume of discharge as a result of full development under the 2003 LRDP including the NMP is estimated to be 3.85 mgd. The permitted peak monthly average capacity of the campus WWTP is currently 2.7 mgd. Therefore, it would be necessary to increase the treatment capacity of the campus WWTP to accommodate projected growth under the 2003 LRDP, or to use other means to reduce flows.

As is the current practice, the campus Wastewater Master Plan would be reviewed on an ongoing basis and updated regularly. Under the WWTP master planning process, the plan predicts when additional capacity will be needed based on projected load. It enables the campus to identify the need for an expansion of the WWTP in a timely manner. Once the need is identified based on this process, details of the WWTP expansion project would be developed and the project would be reviewed in compliance with CEQA. Growth under the 2003 LRDP between 2006 and 2015 would require the campus wastewater treatment plant to be expanded. Likely expansions to the facility would occur within the facility's current site (on previously disturbed and developed areas) and just north of the site within a small area that is currently used for Teaching and Research Field uses, but would be designated for Support uses in the 2003 LRDP. The campus

anticipates that the plant's capacity can be increased by 50 percent by adding a second headworks channel, a third secondary clarifier, a forth and fifth filter cell, a third ultraviolet disinfection channel, a third effluent pump, a third solids drying bed, and a third solids storage basin. In addition to expanding the existing system components, the campus anticipates the need for a lined emergency storage basin to manage peak hourly flows during extreme storm events and other emergency conditions. The campus anticipates that these improvements would occur in phases through 2015-16 (UC Davis 2003). Most of the ground-disturbing improvements would occur within the existing WWTP site or in previously disturbed area adjacent to the site. The minor losses of agricultural land and foraging habitat associated with the small expansion of the facility onto teaching and research fields are addressed and mitigated in this EIR's program level evaluations of agricultural and biological resources (Sections 4.2 and 4.4 [Volume I], respectively). Due to the disturbed nature of the site, significant impacts to cultural resources are also considered unlikely. Monitoring before and during construction would further reduce the potential to affect any unknown cultural and biological resources. The potential for increased discharge of treated effluent from the expanded WWTP to Putah Creek to cause an exceedance of the Central Valley Regional Water Quality Control Board's wastewater discharge requirements for the campus WWTP is analyzed under LRDP Impact 4.8-4 in Section 4.8 Hydrology and Water Quality (Volume II), and a process that would be used to keep the campus WWTP in compliance with its permit is identified.

Except for a few sewer lines on the central campus that require upsizing even under current conditions, all sewer lines are of adequate size to handle increased flows due to growth under the 2003 LRDP. Environmental impacts from the replacement of existing central campus sewer lines with new larger sewer lines would be minimal. Per campus practice of locating all linear utilities within road rights-of-way where feasible, new or expanded sewer lines 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. 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 expansions and extensions. Potential impacts of erosion and water quality effects from trenching and constructing in rights-of-way would be mitigated to less-than-significant levels through implementation of 2003 LRDP mitigations presented in Section 4.8 Hydrology and Water Quality. To further reduce this impact, the campus would implement LRDP Mitigation 4.15-3, which would ensure that when specific projects are proposed in the future under the 2003 LRDP, each project identifies any offsite utility improvements triggered by the project so that the environmental effects of those offsite improvements are considered in the environmental evaluation of the project.

No upsizing is necessary for the south campus sewer lines. New sewer lines would be needed on the west campus to serve the proposed neighborhood. Environmental impacts of wastewater collection and conveyance for the NMP are detailed in Section 2 Neighborhood Master Plan (Volume III). As that analysis shows, sanitary sewer service to the NMP Project would result in less-than-significant environmental effects because conveyance lines would be located along existing rights-of-way where sensitive biological and cultural resources are not present and/or where the potential for adverse effects on these resources is low. Furthermore, the project would implement LRDP mitigations to reduce the potential for significant impacts to these resources.

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Storm Water

LRDP Impact 4.15-4: Implementation of the 2003 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 4.15-4: Once preliminary project design is developed, the campus shall review each project to determine whether existing storm drainage system is adequate at the point of connection. If the storm drainage system is determined inadequate, the campus will upgrade the system to provide adequate storm water drainage and/or detention prior to occupation or operation.

Impact on On-Campus Storm Drainage System. Implementation of the 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 would be associated with the Neighborhood in the west campus where agricultural fields would be replaced by urban uses. Irrigation practices associated with teaching and research field activities on this site typically do not generate surface runoff. Stormwater that does run off from this area drains to the City of Davis Covell Drain to the north along Russell Boulevard. With the implementation of the NMP Project, the volume of runoff from the site would increase.

Three options are being considered to manage Neighborhood storm water. All three options would use one or more detention basins for storm water detention. The basins would have a combined capacity of approximately 27 acre-feet. Under the three storm drain options, storm water would be conveyed via a new storm drain to the Arboretum, or via a new storm drain along the west side of SR 113 to a new outfall on Putah Creek, or via an enlarged storm drain along Hutchison Drive and Hopkins Road to an enlarged outfall on Putah Creek. As discussed in detail in Section 2 of Volume III, the construction of these storm drainage facilities would not result in significant environmental impacts that cannot be mitigated to a less-than-significant level.

Except for the development of a new storm water system for the NMP Project, the expansion of storm water service under the LRDP will make use of existing infrastructure. Areas where new storm drains would be needed or existing storm drains should be upsized are identified in the UC Davis Storm Drainage Master Plan (West Yost & Associates 2000a). Environmental impacts from such replacement or extension of existing central campus storm drains would 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. 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 expansions and extensions. The campus would also implement LRDP Mitigation 4.15-4, which would ensure that when specific projects are proposed in the future under the 2003 LRDP, required storm water system improvements are identified. This would allow the capacity needs of future projects to be met and would also allow for review of any associated offsite environmental effects to be considered during project environmental reviews.

Impact on the City's Storm Drain System. Development under the LRDP, including the NMP, would not result in increased peak flows into the City of Davis' storm water collection and conveyance system, and therefore would not trigger the need to expand or otherwise modify that system. Under current conditions, storm water runoff from agricultural areas on west campus west of County Road 98 discharges into the Covell Drain via a culvert under Russell Boulevard. The campus is currently designing storm water drainage improvements in this area to be constructed in 2004. These improvements would reduce existing peak flows by detaining runoff in a large detention basin. Furthermore, LRDP Mitigation 4.8-3(c) would continue to reduce peak flows from developed campus lands to the Covell Drain (see Section 4.8 Hydrology and Water Quality). Therefore, there would be no impacts to the City's storm drain system.

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Solid Waste Generation

LRDP Impact 4.15-5: Implementation of the 2003 LRDP would increase the volume of municipal solid waste that would require disposal, but would not require an expansion of the campus or county landfills.

Significance: Less than significant

LRDP Mitigation: Mitigation is not required.

Impact on Campus Landfill. With a current on-campus student and employee population of 35,520 persons, the campus generates about 8,700 tons of solid waste per year, or 34 tons per working day (Magness 2003). This includes waste generated in campus academic buildings as well as in on-campus student housing. Waste from Aggie Village, the only on-campus faculty and staff housing development, is disposed of at the County Landfill. Under the 2003 LRDP, the on-campus population would increase to 49,870 students and employees, which would result in about 12,214 tons of solid waste per year at full development under the 2003 LRDP. The NMP's housing component would contribute another 908 tons per year. As a result, by 2015-16 the total annual waste tonnage would increase to 13,123 tons per year or approximately 50 tons per working day.

UC Davis would continue its recycling programs to continue to act in accordance with the spirit and intent of the 1989 Integrated Waste Management Act (AB 939).

The permitted capacity of the Campus Landfill is 500 tons per day. Based on an annual growth rate of 1.8 percent, the *1994 Report of Site Disposal Information* estimated the life expectancy of the landfill to be 2027 (Magness 2003). With the proposed NMP, more waste would be deposited in the landfill annually than was projected in this report. As a result, the life expectancy of the landfill would be shortened to 2023. Therefore, there would be adequate capacity in the campus landfill to handle the increased waste generated as a result of the implementation of the 2003 LRDP, including the NMP. There would be no new environmental impacts because an expansion of the landfill would not be needed under the 2003 LRDP.

Impact on Yolo County Landfill. Under existing conditions, waste from Aggie Village is collected and disposed of at the Yolo County Landfill. Because the campus waste collection department does not have equipment to do curbside collection, it is possible that waste collection from the entire Neighborhood or only from the residential component would be contracted to a local collection company that would be expected to dispose the waste at the Yolo County

Landfill. The NMP residential component at buildout would generate approximately 908 tons of waste per year, and the entire Neighborhood (including the nonresidential component) would generate about 955 tons per year. As of June 1999, the landfill had an estimated closing date of 2020 (Jones & Stokes 2000). Therefore, the landfill has the capacity to receive waste resulting associated with the NMP component of the 2003 LRDP, and an expansion of the landfill would not be necessary. There would be no environmental impacts because an expansion of the landfill would not be needed.

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Electricity

LRDP Impact 4.15-6: Implementation of the 2003 LRDP would require the expansion of the campus electrical system, which would not result in significant adverse environmental impacts.

Significance: Less than significant

LRDP Mitigation 4.15-6(a): Once preliminary project design is developed, the campus shall review each project to determine whether the existing electrical system is adequate at the point of connection. If the electrical system is determined inadequate, the campus will upgrade the system to provide adequate service to the project prior to occupation or operation.

LRDP Mitigation 4.15-6(b): The campus would continue to meet or exceed Title 24 energy conservation requirements for new buildings, and it would continue to incorporate energy efficient design elements outlined in the *UC Davis Campus Standards & Design Guide* in new construction and retrofit projects. These energy conservation standards may be subject to modification as more stringent standards are developed.

Impact on the Campus Electrical System. The peak electricity demand on campus under the 2003 LRDP, including the NMP, is anticipated to be approximately 113,500 KW. The current peak demand is approximately 35,000 KW and the current maximum capacity of the system is approximately 64,400 KW. Based on current projections of increase in demand, the campus Main Substation will have the available capacity to serve the needs of the campus until 2010. Expansion of the campus electrical system through new connections at various locations would be necessary in order to accommodate demand resulting from the implementation of the 2003 LRDP after 2010. The Electrical System Master Plan for the campus discusses two options to address this need: (1) an expansion of the campus Main Substation located on the south campus, or (2) construction of a new substation on the west campus which is the area that would need additional electric supply under the 2003 LRDP. The new west campus substation would have a capacity of approximately 50 MVA by 2015-16, and would be located within an area in the west campus that is designated Support in the 2003 LRDP. A new or expanded substation could result in conversion of habitat and prime farmland. These impacts are addressed at the LRDP level because the acreage of land that would be taken out of agricultural use under the 2003 LRDP (including for Support) has been estimated and analyzed for the campus as a whole (see LRDP Impact 4.2-1).

Environmental impacts from replacement or extension of electrical lines would be less than significant. Pursuant to campus practice of locating all linear utilities within roadway rights-of-way where feasible, most new or expanded electrical lines would likely be located in areas that are already disturbed where cultural and biological resources would likely not occur. In addition, the campus would implement as appropriate 2003 LRDP mitigations that include pre-construction surveys and monitoring to avoid inadvertent impacts to biological and cultural resources during construction of pipeline expansions and extensions. Potential impacts of erosion and water quality effects from trenching and constructing in rights-of-way would be mitigated to less-than-significant levels through implementation of 2003 LRDP mitigations presented in Section 4.8 Hydrology and Water Quality. To further reduce this impact, the campus would also implement LRDP Mitigation 4.15-6(a), which would ensure that when specific projects are proposed in the future under the 2003 LRDP, required electrical system improvements are identified. This would allow the capacity needs of future projects to be met and would also allow for review of any associated offsite environmental effects to be considered during project environmental reviews. Implementation of LRDP Mitigation 4.15-6(b) would continue to ensure energy conservation on campus to reduce demand on the electrical system.

The most notable increase in electrical distribution under the 2003 LRDP would occur on the west campus to serve the Neighborhood. As discussed in Section 2 Neighborhood Master Plan (Volume III), there would not be any significant impacts on biological resources associated with these lines because they would be located in existing roadway right-of-ways that are already disturbed and do not support significant biological resources. Furthermore, because other existing utilities are located within these road corridors, the potential to affect unknown archaeological resources is low. The NMP Project would implement 2003 LRDP mitigations to reduce the potential for significant impacts to archaeological resources. Therefore, the environmental impacts from the provision of electrical service to the NMP site would be less than significant.

Impact on Off-Campus Electrical System. The increased demand for electricity under the 2003 LRDP could, in conjunction with other regional demand, result in the need for more generation capacity. However, as discussed in more detail under cumulative LRDP Impact 4.15-11, because sources of electricity are diverse and widespread, and electricity can be transmitted over long distances, it is not possible to reasonably predict where the generation facilities would be located or what the impacts from the operation and construction of those facilities would be. In addition, minor upgrades and/or extensions to off-campus electrical lines may be needed to serve campus demand under the 2003 LRDP. However, these improvements would occur primarily within previously disturbed utility corridors and roadways, and, as discussed above for the discussion on the campus electrical system, such improvements would result in less-than-significant environmental impacts.

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Natural Gas

LRDP Impact 4.15-7: Implementation of the 2003 LRDP would require the expansion of natural gas transmission systems, which would result in environmental impacts.

Significance: Potentially significant

LRDP Mitigation 4.15-7(a): Once preliminary project design is developed, the campus shall review each project to determine whether existing capacity of the natural gas supply pipeline at the point of connection is adequate. If the capacity of the pipeline is determined inadequate, the system will be updated to provide adequate service to the project site prior to occupation or operation.

LRDP Mitigation 4.15-7(b): To minimize disturbance to archaeological resources associated with CA-Yol-118, PG&E can and should implement directional drilling or other alternative means to trenching, or should have a qualified archaeological monitor present and provide a representative of the local Native American community an opportunity to monitor during construction.

Residual Significance: Significant and unavoidable

Impact on On-Campus Natural Gas System. As presented in Table 4.15-1, current peak demand for natural gas on campus is approximately 2,900 therms per hour. Natural gas peak demand under the 2003 LRDP is anticipated to increase to approximately 7,195 therms/hour, including approximately 495 therms/hour associated with the proposed NMP. Annual natural gas consumption is anticipated to increase from approximately 16.8 million therms in 2001-02 to 46 million therms through 2015-16.

The campus and PG&E natural gas distribution systems on campus are expected to require expansions in order to meet increased demand under the 2003 LRDP. PG&E supply deficiencies could be corrected through the addition of new service points, reinforcing existing piping, and shutting down meters on lines feeding more than one meter to allow increased gas flow to the remaining meters (MTH Engineers 2002). Options for correcting campus distribution problems include raising system pressure, adding new piping, increasing the diameter of existing piping, and using new gas sources. Future conditions analysis indicates that due to the growth planned for the west campus, including the NMP, the peak gas demand on the west campus will increase beyond current capacity. To provide capacity for the NMP, PG&E would need to modify its A Street pipeline or make other system modifications to serve this growth. Three options available to serve the future west campus demand include installing (1) a new or replacement natural gas pipeline under Russell Boulevard from A Street to a connection near the neighborhood, (2) a new or replacement pipeline along Russell Boulevard from A Street to the campus CHCP with a second natural gas pipeline from the CHCP to the west campus, and (3) a new pipeline from a PG&E main on Old Davis Road near the Union Pacific railroad tracks at the east end of the campus to the central campus, and another pipeline from the central campus to the west campus. All three options would also require an upgrade of the 4-inch PG&E main along A Street, as discussed further below in the discussion on impacts associated with off-campus natural gas pipelines. Environmental impacts from the construction of these pipelines on campus would be minimal. Per campus practice of locating all linear utilities within road rights-of-way where feasible, the new pipeline would be located within existing road rights-of-way, areas that have already been disturbed where cultural and biological resources would likely not occur. In addition, 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 expansions and extensions. Potential impacts of erosion and water quality effects from trenching and constructing in rights-of-way would be mitigated to less-than-significant levels through implementation of 2003 LRDP mitigations presented in Section 4.8 Hydrology and Water Quality. To further reduce this impact, the campus would implement LRDP Mitigation 4.15-7(a), which would ensure that when specific projects are proposed in the future under the 2003 LRDP, required natural gas system improvements are identified. This would allow the capacity needs of future projects to be met and would also allow for review of any associated offsite environmental effects to be considered during project environmental reviews.

Impact of Off-Campus Natural Gas Pipelines. Impacts on biological and cultural resources from installing a new natural gas pipeline in the Russell Boulevard corridor or from Old Davis Road to the central campus would be less than significant for the same reasons as noted above for on-campus pipelines. With respect to the upgrade of the PG&E main on A Street, that improvement would potentially disturb a known archaeological site (CA-Yol-118) located at First and A streets, which was encountered during previous construction activities in this area. The impact of this off-campus improvement could potentially be significant. Although LRDP Mitigation 4.15-7(b) could be implemented to reduce this impact, the full extent of the site is not known and the effectiveness of the mitigation measures cannot be guaranteed. Furthermore, it is PG&E that must implement the mitigation measure. Before PG&E can begin this project, it will undergo CEQA review by the California Public Utilities Commission, which should implement measures to reduce environmental impacts. Due to these uncertainties associated with the effectiveness and feasibility of the mitigation measure, this EIR concludes that the impact would be significant and unavoidable.

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Chilled Water and Steam

LRDP Impact 4.15-8:	Implementation of the 2003 LRDP would require the expansion of campus chilled water and steam generation and conveyance facilities, which would not result in significant environmental impacts.
Significance:	Less than significant
LRDP Mitigation 4.15-8:	Once preliminary project design is developed, the campus shall review each project to determine whether existing capacity of the chilled water and/or steam system at the point of connection is adequate. If the capacity of the pipelines is determined inadequate, the campus will upgrade the system to provide adequate service to the project site prior to occupation or operation.

Chilled water capacity on campus is approximately 9,150 tons/hour at the CHCP and 380 tons/hour at the CNPRC Plant. In 2002, a thermal energy storage (TES) plant was constructed on the central campus at a site south of La Rue Road and north of the Arboretum, which increased the total capacity to 19,500 tons/hour (Black and Veatch 2003). Another expansion of this chilled water plant is proposed under the 2003 LRDP, which would add 8,100 tons/hour capacity, and with this expansion, the system would be adequate to serve the campus needs until

2006-07. The Chilled Water Facilities Expansion Project, which addresses this expansion, is addressed as a specific project in Volume III of this EIR. Additional expansion of the chilled water system would be needed to accommodate increased campus demand after 2007. As is current practice, the campus Chilled Water Facilities Master Plan would be reviewed on an ongoing basis and updated regularly. This would enable the campus to identify in a timely manner the need for additional chilled water facilities to serve campus development after 2007. There is adequate space on the chilled water plant site for any future phases of expansion, therefore future phases would likely be constructed at the same location, and would involve the same types of facilities including cooling towers and chillers. As a result, the construction and operational impacts of any subsequent phase of chilled water plant expansion would essentially be the same as those described for the Chilled Water Facilities Expansion Project in Section 6 (Volume III), and would be less than significant after mitigation.

The current capacity of the steam system (including a co-generation unit) is 280,000 pounds per hour at the CHCP and 20,000 pounds/hour at the CNPRC Plant. As a result of the implementation of the 2003 LRDP, it is estimated that the campus requirement for steam use would increase beyond current capacity. Thus, expansion of the existing system would be needed to support the development proposed under the 2003 LRDP. The campus Steam and Condensate System Master Plan would be reviewed on an ongoing basis and updated regularly. This would enable the campus to identify in a timely manner the need for additional steam generation facilities to serve campus development. The primary environmental impacts associated with the steam system expansion would be consumptive use of domestic water to generate steam and the emissions of criteria pollutants and toxic air contaminants from the operation of steam boilers. Both these impacts are analyzed at the LRDP level because the use of domestic water for the campus as a whole by 2015 includes the volume of water that would be used at the expanded CHCP to generate additional steam. Similarly, toxic air contaminants and criteria pollutants from the future expansion of the steam system are accounted for in the campus-wide estimates of these pollutants. With respect to impacts from ground disturbance, because the additional steam generating facilities would likely be located on the central campus within or adjacent to the CHCP, there would no impacts to biological resources. Implementation of archaeological surveys and monitoring (identified as mitigation in Section 4.5 Cultural Resources [Volume I]) and erosion control methods (identified in Section 4.8 Hydrology and Water Quality [Volume II}) would reduce cultural and water quality effects associated with construction to less-than-significant levels. Therefore the impacts from steam and chilled water generation facilities would be less than significant. Furthermore, the campus would implement LRDP Mitigation 4.15-8, which would ensure that when specific projects are proposed in the future under the 2003 LRDP, required chilled water and steam improvements are identified. This would allow the capacity needs of future projects to be met and would also allow for review of any associated offsite environmental effects to be considered during project environmental reviews.

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Telecommunications

LRDP Impact 4.15-9: Implementation of the 2003 LRDP would require expansion of campus communication facilities, which would not result in significant environmental impacts.

Significance: Less than significant

LRDP Mitigation 4.15-9: Once preliminary project design is developed, the campus shall review each project to determine whether existing capacity of the telecommunications system is adequate. If the capacity is determined to be inadequate, the campus will upgrade the system to provide adequate service to the project site prior to occupation or operation.

New structures would be developed on campus under the 2003 LRDP, and the UC Davis Communications Resources Service is capable of supporting the associated telephone service requirements that might be encountered on campus under the 2003 LRDP. In order to accommodate increased demand in telecommunications associated with the new structures, the campus telecommunications master plan currently identifies the need for 4,730 new data Network Access Modules (NAMs), 603 new voice NAMs, and associated line extensions (UC Davis 2001a). These would be planned and installed as part of development of the new buildings expected to be built on campus under the 2003 LRDP. Similar to other utilities, less-than-significant impacts are expected from the construction of these connections because of the disturbed environment and LRDP mitigation measures designed to avoid or reduce impacts. Furthermore, the campus would also implement LRDP Mitigation 4.15-9, which would ensure that when specific projects are proposed in the future under the 2003 LRDP, required telecommunication system improvements would be identified. This would allow the capacity needs of future projects to be met and would also allow for review of any associated offsite environmental effects to be considered during the project-level environmental review process.

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4.15.2.5 Cumulative Impacts and Mitigation Measures

LRDP Impact 4.15-10: Implementation of the 2003 LRDP together with other regional development could generate a cumulative demand for wastewater treatment facilities in the region, the construction of which could result in significant environmental impacts on habitat.

Significance: Significant

LRDP Mitigation 4.15-10: If documented unmitigated significant environmental impacts are caused by the construction of wastewater treatment facilities in the Cities of Davis, Dixon, Woodland, and/or Winters that are needed in part due to implementation of the 2003 LRDP, UC Davis shall negotiate with the appropriate local jurisdiction to determine the campus' fair share (as described in Section 4.12.2.3) of the costs to implement any feasible and required environmental mitigation measures so long as the unmitigated impacts have not been otherwise reduced to less-than-significant levels through regulatory requirements, public funding, or agreements. This mitigation measure shall not apply to any

other costs associated with implementation of utilities or service systems.

Residual Significance: Significant and unavoidable

The study area for cumulative impacts on utility systems is the three-county area in which majority of the LRDP-related off-campus population is expected to reside. This LRDP-related population would place a demand on the utilities in the affected communities, which would combine with effects stemming from other regional growth. The cumulative impacts of this combined growth on utilities in the affected communities are examined below.

The methodology used to develop the projected distribution of off-campus population is discussed in Section 4.11 Population and Housing (Volume II). Based on the projected distribution, four communities—Davis, Woodland, Winters, and Dixon—would likely receive LRDP-related population that would constitute more than 3 percent of each affected community's total population in 2015. The LRDP-related population that would locate in the remainder of the three-county region is projected to constitute a very small fraction of the population of the affected communities. There is no evidence indicating that LRDP-related population in those communities will contribute to the need for new or expanded utility systems that will have a significant effect on the environment. The analysis below therefore focuses only on the four identified communities.

Because LRDP-related population growth in these communities is essentially a part of the overall regional growth, information in the General Plans of each of these communities was examined to determine what the demand the projected growth would place on each community's utility infrastructure, and whether that demand would then require new or modified facilities that could result in environmental impacts.

City of Davis. As discussed in Section 4.11 Population and Housing, the campus would provide adequate housing for practically all new students under the 2003 LRDP. Of the new faculty, staff, and non-UC employees working on campus, about 970 would likely occupy housing in the City. These employees and their dependents would make up a total of approximately 2,600 persons, which would constitute about 4 percent of the total 2015 population (67,240 persons) of the City of Davis as projected by SACOG. This population would place a demand on the City's utilities, and potential impacts could result from that demand in conjunction with other growth in city.

The City of Davis' wastewater treatment plant has a permitted capacity to treat an average dry weather flow of 7.5 mgd. The current average dry weather flow is approximately 6.3 mgd. While this is above the volume projected in the City's General Plan EIR (approximately 5.5 mgd), according to the City of Davis, there is enough remaining capacity to serve the projected development in the City through 2010 under the current General Plan (Smith 2003). However, the City's wastewater treatment plant would likely need to be expanded to serve growth projected beyond the current General Plan. According to the City, if future annexations are proposed, there will be a review of the treatment plant capacity in the light of the new demand (Fitzsimmons 2003). In addition, the City is currently evaluating solutions to both address plant compliance and future growth beyond the horizon of the General Plan. The existing City wastewater treatment system involves primary and secondary treatment followed by final treatment via overland flow over grassy land. This last step is effective in removing ammonia during summer months, but is not as effective during winter when there is less sunshine. State

waste discharge regulations require a more stable ammonia removal rate than is available with this treatment method, and such a method may not be allowed in the future. If this occurs, the City would need to add other treatment facilities for which there is adequate space at the existing treatment plant site. If the City continues its overload flow option, it will need to acquire additional land (Smith 2003). Land adjacent to the existing treatment plant is primarily agricultural. Therefore, depending on which option is implemented, there may or may not be significant environmental impacts associated with future expansion of the City's wastewater treatment plant. Expansion of the City's wastewater treatment plant would be subject to CEQA review, and most associated environmental impacts could be mitigated to less-than-significant levels. However, if the plant is expanded off site onto agricultural lands, the loss of farmland and/or habitat could result. Other potentially significant environmental impacts are too speculative to determine at this time. To the extent that LRDP-related population growth contributes to the need for expanded wastewater treatment facilities that result in environmental impacts, in compliance with LRDP Mitigation 4.15-10, the campus would negotiate with the City to determine the University's fair share (as described in Section 4.12.2.3) of costs for feasible mitigation to reduce associated significant environmental impacts. The campus' contribution to mitigation could include implementation of preservation mechanisms for on-campus prime farmland and/or habitat conservation. However, impacts associated with an irreversible loss of farmland and habitat could not be reduced to less-than-significant levels. Therefore, this impact is considered significant and unavoidable.

Wastewater collection system improvements would also be required in the City through 2015-16. However, it is reasonable to assume that impacts associated with the construction of these improvements would not be significant as they likely would include minor disturbances and would be located with existing utilities and within disturbed street rights-of-way.

City of Woodland. An estimated 3,200 LRDP-related persons are expected to reside in Woodland under the 2003 LRDP. This population would constitute about 5 percent of the City's population of 60,415 persons in 2015 based on current SACOG projections. According to the City's General Plan EIR, the City expects to attain a population of 65,860 by 2020 (J. Laurence Mintier & Associates 1996).

The City's General Plan EIR notes that development under the General Plan would increase wastewater flows, requiring expansion of the wastewater collection and treatment systems. With the new development, flows to the wastewater treatment plant would increase to approximately 9.2 mgd average daily weather flow in 2020 and to 10.3 mgd average daily weather flow at buildout. Because the Woodland WWTP has a current capacity of 7.8 mgd, an expansion in capacity would be needed. The EIR lists three alternatives to provide expansion: (1) expand the Woodland WWTP with continued discharge of treated effluent to Tule Canal, (2) expand the plant with disposal of reclaimed water on agricultural lands, or (3) pump wastewater to the City of Davis WWTP, which could be expanded to serve as a regional treatment facility. The EIR finds the last alternative to be costly and not a viable option. With respect to the other two options, the EIR notes that there is adequate space at the Woodland WWTP site to accommodate the needed expansion, and that policies of the General Plan and state and federal permitting requirements would reduce the impacts of such an expansion to a less-than-significant level. According to the City of Woodland, plans for expansion of the plant to increase capacity to 10.4 mgd have been approved by the City Council and construction is anticipated to start in spring 2004. This expansion would be adequate to serve the City's need through 2010, and not through

the buildout of the City under the General Plan, therefore additional expansions would be needed for growth beyond 2010 (Wilson 2003). Such expansions would likely occur within and/or adjacent to the existing treatment plant site. Expansion adjacent to the site could convert agricultural land. Expansion of the City's WWTP would be subject to CEQA review, and most associated environmental impacts could be mitigated to less-than-significant levels. However, if the plant is expanded off site onto agricultural lands, the loss of farmland and/or habitat could result. Other potentially significant environmental impacts are too speculative to determine at this time. To the extent that LRDP-related population growth contributes to the need for expanded wastewater treatment facilities that result in environmental impacts, in compliance with LRDP Mitigation 4.15-10, the campus would negotiate with the City to determine the University's fair share (as described in Section 4.12.2.3) of costs for feasible mitigation to reduce associated significant environmental impacts. The campus' contribution to mitigation could include implementation of preservation mechanisms for on-campus prime farmland and/or habitat conservation. However, impacts associated with an irreversible loss of farmland and habitat could not be reduced to less-than-significant levels. Therefore, this impact is considered significant and unavoidable.

Sewer conveyance would also need to be expanded to meet projected demands. The City's General Plan EIR indicates that a General Plan policy requiring all new development to provide for all facilities needed to serve the specific area would adequately reduce the impact to a less-than-significant level (J. Laurence Mintier & Associates 1996). In addition, it would be reasonable to assume that impacts associated with the construction of these improvements would not be significant as they likely would disturb small areas and would be located with existing utilities and within disturbed street rights-of-way.

City of Dixon. An estimated 940 LRDP-related persons are expected to reside in Dixon. This population would constitute about 3.8 percent of the City's population of 24,300 persons in 2015 based on current Association of Bay Area Governments (ABAG) projections. According to the City's General Plan, which was last adopted in 1993, the City expected to attain a population of 20,325 by 2010. This year is also the horizon year for the City's General Plan (City of Dixon 1993).

The City of Dixon General Plan states that improvements to the City WWTP and sewer mains would be needed to handle projected increased demand. The General Plan includes policies to ensure that the increases in demand for sewer treatment and conveyance capacity generated by new development will be met in a timely, cost-effective, and environmentally sound manner, and also includes a policy to ensure that the development does not exceed the capacity of the WWTP (City of Dixon 1993). According to the City of Dixon, the city has a managed growth policy that allows only 3 percent growth in housing each year. The City's WWTP, which has a capacity of 1.4 mgd, can handle their growth through 2010. After that, an expansion would be necessary (Maxwell 2003). Expansion of the facility could convert agricultural land. Expansion of the City's wastewater treatment plant would be subject to CEQA review, and most associated environmental impacts could be mitigated to less-than-significant levels. However, if the plant is expanded off site onto agricultural lands, the loss of farmland and/or habitat could result. Other potentially significant environmental impacts are too speculative to determine at this time. To the extent that LRDP-related population growth contributes to the need for expanded wastewater treatment facilities that result in environmental impacts, in compliance with LRDP Mitigation 4.15-10, the campus would negotiate with the City to determine the University's fair share (as

described in Section 4.12.2.3) of costs for feasible mitigation to reduce associated significant environmental impacts. The campus' contribution to mitigation could include implementation of preservation mechanisms for on-campus prime farmland and/or habitat conservation. However, impacts associated with an irreversible loss of farmland and habitat could not be reduced to less-than-significant levels. Therefore, this impact is considered significant and unavoidable. Sewer conveyance would also need to be expanded to meet projected demands; however, it would be reasonable to assume that impacts associated with the construction of these improvements would not be significant as they likely would disturb small areas, be located with existing utilities, and be located within disturbed street rights-of-way.

City of Winters. An estimated 670 LRDP-related persons are expected to reside in the City of Winters. This population would constitute about 6.3 percent of the City's projected population of 10,610 persons in 2015 based on current SACOG projections. According to the City's General Plan, which was last adopted in 1992, the City expected to attain a population of 12,500 by 2010. This year is also the horizon year for the City's General Plan (Duncan & Jones 1991).

Relative to wastewater collection and treatment facilities, the General Plan EIR notes that improvements to the City sewer mains and a new wastewater treatment plant would be needed to handle the projected growth. The EIR does not evaluate the effects of a new WWTP and notes that a subsequent environmental review of that project would be required. Overall, the General Plan EIR concludes that the impact associated with wastewater would be less than significant (Duncan & Jones 1991). Construction of a new WWTP would be subject to CEQA review, and most associated environmental impacts could be mitigated to less-than-significant levels. However, the plant could be sited on agricultural lands and the loss of prime farmland and/or habitat could result. In addition, this development could cause other significant environmental impacts that are too speculative to determine at this time. To the extent that LRDP-related population growth contributes to the need for expanded wastewater treatment facilities that result in environmental impacts, in compliance with Mitigation Measure 4.15-10, the campus would negotiate with the City of Winters to determine the University's fair share (as described in Section 4.12.2.3) of costs for feasible mitigation to reduce associated significant environmental impacts. The campus' contribution to mitigation could include implementation of preservation mechanisms for on-campus prime farmland and/or habitat conservation. However, impacts associated with an irreversible loss of prime farmland and habitat could not be reduced to less-than-significant levels. Therefore, this impact is considered significant and unavoidable. Sewer conveyance would also need to be expanded to meet projected demands; however, it would be reasonable to assume that impacts associated with the construction of these improvements would not be significant as they likely would disturb small areas, be located with existing utilities, and be located within disturbed street rights-of-way.

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LRDP Impact 4.15-11:	Implementation of the 2003 LRDP in conjunction with regional development could generate a cumulative demand for water, landfills, energy, and natural gas in the region, but the expansion of associated utilities and service systems to meet this demand would not result in significant environmental effects.
Significance:	Less than significant
LRDP Mitigation:	Mitigation is not required.

City of Davis. The City of Davis General Plan EIR examined the effects of City growth on utilities through 2010. The EIR concluded that the existing domestic water system would be sufficient through 2010. The EIR found that for higher growth alternatives, the impact associated with inadequate domestic water system capacity was significant and unavoidable, although it did not analyze the physical impacts of any needed distribution system improvements (Jones & Stokes 2000). As discussed in Section 4.11 Population and Housing (Volume II), the City population through the planning horizon of the 2003 LRDP will increase beyond levels projected in the General Plan. Therefore, it is likely that under the 2003 LRDP, the City's domestic water distribution system would need to be expanded to serve growth through 2015-16. The LRDP-related population that resides in the city could contribute to the need for these improvements. However, environmental impacts from distribution system improvements are expected to be less than significant because these improvements would likely include minor disturbances and would likely be located within city roads or other already disturbed environments. The cumulative impact on regional aquifers from increased withdrawal of groundwater to serve the increased population is discussed in Section 4.8 Hydrology and Water Quality.

As discussed in LRDP Impact 4.15-5, there is adequate capacity at the Yolo County landfill (which receives solid waste from the City of Davis), and an expansion of the County landfill would not be required through the 2003 LRDP's planning horizon. Therefore, there would not be any environmental effects associated with landfill expansion from the growth in the City, including growth associated with the off-campus population.

City of Woodland. The analysis in the City of Woodland's General Plan EIR shows that Woodland anticipates the need to install additional groundwater wells and distribution system improvements to serve the projected growth in City population. Because the General Plan includes policies that require new development to provide all facilities needed to serve the specific area, the EIR concludes that the impact would be less than significant (J. Laurence Mintier & Associates 1996). As discussed above for the City of Davis, environmental effects associated with water distribution system improvements are expected to be less than significant because these improvements would likely involve minor disturbances and would likely be located within city roads or other already disturbed environments. The cumulative impact on regional aquifers is discussed in Section 4.8 Hydrology and Water Quality.

The Woodland General Plan EIR analyzes the effects of solid waste generation from the projected growth through 2020 and concluded that the Yolo County landfill had adequate capacity for Woodland's projected quantities of waste. The EIR also noted that growth under the General Plan was consistent with the County's growth projections in projecting the life of the landfill, and therefore the impact was less than significant (J. Laurence Mintier & Associates 1996).

City of Dixon. With respect to water supply, the City of Dixon General Plan notes that to meet the demand for water service within the City's planning area through 2020, modifications to the delivery and pumping systems of the Dixon-Solano municipal water service (which serves the newly developing areas of Dixon) would be needed. The General Plan includes policies to ensure that the increases in water demand generated by new development will be met in a timely, cost-effective, and environmentally sound manner, and also includes a policy to encourage new development to incorporate water conservation features in structures and landscaping (City of

Dixon 1993). Environmental effects associated with water distribution system improvements are expected to be less than significant because these improvements would likely involve minor disturbances and would likely be located within city roads or other already disturbed environments. The cumulative impact on regional aquifers is discussed in Section 4.8 Hydrology and Water Quality.

The City of Dixon General Plan notes that new development of the magnitude anticipated under the General Plan would not have adverse effects on the landfill serving the area, although the increased volume of waste which would require disposal would shorten the expected life of the landfill in use. At the time that the General Plan was prepared (in 1993) the remaining life of the regional landfill was 45 to 50 years (City of Dixon 1993). Therefore, expansion would not be necessary under the planning horizon of the 2003 LRDP.

City of Winters. With respect to water supply, the City of Winters General Plan EIR notes although new wells would be needed to serve the increased demand, there would not be a significant impact of an inadequate water supply. The EIR requires monitoring of groundwater levels to ensure that overdraft is not taking place (Duncan & Jones 1991). Environmental effects associated with water distribution system improvements are expected to be less than significant because these improvements would likely involve minor disturbances and would likely be located within city roads or other already disturbed environments. The cumulative impact on regional aquifers is discussed in Section 4.8 Hydrology and Water Quality.

With respect to solid waste generation, the General Plan EIR notes that new development under the General Plan would increase the volume of waste that would require disposal at the Yolo County landfill (Duncan & Jones 1991). Because Winters would contribute a very small amount of the waste disposed at that landfill, it would not adversely affect the total landfill capacity. Expansion of the landfill is not anticipated within the planning horizon of the 2003 LRDP.

Electricity and Natural Gas. The campus and other communities in the region would depend upon the regional suppliers of natural gas and electricity. While the demand for electricity and natural gas at full development of the campus under the 2003 LRDP would not by itself be sufficient to trigger the need for new electric or gas generation facilities, this demand, when combined with demand due to other regional growth, would require that new generation facilities be established. Sources of electricity are diverse and widespread. Electricity and natural gas can be transmitted over long distances, and supply is usually made available from varying and numerous sources. Both electricity and natural gas needed in the region may in fact be generated outside of the state or the country.

It is not possible to reasonably predict where the new generation facilities would be located, or to evaluate environmental impacts from the construction and operation of these new facilities. However, should they be proposed in California, the California Energy Commission conducts a complete environmental review of proposed power plant projects 50 megawatts and larger before approving them, and requires as a matter of practice that all significant impacts be mitigated to a less-than-significant level. Smaller projects must also go through environmental review under the oversight of the local jurisdiction in which they are proposed. Accordingly, this cumulative impact is considered to be less than significant.

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4.15.3 References

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