4.8 HYDROLOGY AND WATER QUALITY

This section presents the hydrology and water quality conditions at and around the proposed campus site that could be affected by project implementation. It also presents a summary of impacts evaluated in the SSEIR and the mitigation measures that were adopted to address significant impacts. The proposed site of the new UC Merced Campus is located in eastern Merced County east of Lake Yosemite and northeast of the City of Merced.

In response to the Notice of Preparation (see Appendix A), the following concerns were raised by commentors regarding hydrology and water quality: the soils at the proposed UC Merced campus site and their conduciveness for effective groundwater recharge, the possible overdraft of local groundwater supplies; the need for compliance with the National Pollutant Discharge Elimination System Permit for Discharges of Storm Water Associated with Construction Activity; the project's impact on existing wastewater treatment and disposal facilities, or evaluation of alternatives considered in the construction and operation of new facilities; impacts on water quality, including nutrient loading, sedimentation, toxics, biological oxygen demand, and temperature in receiving waters; altered drainage and run-off patterns resulting from summer irrigation and other normal water applications; introduction of nuisance flows and significant adverse impacts on the vernal pool and creek habitat; an increase in impervious surface areas and the impacts on watersheds within the project sphere of influence; and the need for a drainage study to address peak flows for the development and surrounding developments to avoid adverse impacts to downstream properties. All of these issues are addressed in this section. Effects of hydrological changes and nuisance flows on vernal pools are addressed in Section 4.4, Biological Resources.

4.8.1 Summary of Site Selection EIR Impacts and Mitigation Measures

The SSEIR addressed potential impacts on hydrology and water quality from the development of a new campus at the Lake Yosemite site. That EIR analyzed impacts related to risk to life and property from flooding, impacts on groundwater recharge and surface runoff from increased impervious surfaces, and degradation of the quality of receiving water.

All impacts identified in the SSEIR relevant to the proposed project are presented in the following table. For all impacts, the level of significance before and after application of mitigation measures identified in the SSEIR is also presented in the table. As described in Section 2, the location of the proposed campus has been shifted farther south on the VST property compared to the location that was evaluated in the SSEIR. All other attributes of the proposed project are largely the same as the project examined in the SSEIR. Because of the shift in location, the proposed campus would affect more-limited portions of the watershed than would have been affected by the campus at the original location. No new watersheds that would not have been affected by the campus at the original location would be affected by the shift. Therefore, the change in campus location would not affect the severity or the significance of impacts previously evaluated in the SSEIR.

SITE SELECTION EIR IMPACTS	Level of Significance Prior to Mitigation	Level of Significance after/with Mitigation
Selection of a site and eventual development of a campus could expose people or property to risk associated with inundation during a 100-year flood event.	NI	N/A
Selection of a site, and eventual development of a campus, would increase impervious surface resulting in an increase in the rate and amount of surface water runoff, which could cause localized flooding on the site.	S	LS
Selection of a site, and eventual development of a campus, would increase impervious surface and could limit groundwater recharge potential and reduce available groundwater supply.	S	SU_1
Eventual development of a campus at the site would increase siltation during construction activities and could adversely affect receiving-water quality.	S	LS
Runoff from impervious surface associated with campus development could increase urban contaminants and adversely affect receiving-water quality.	S	LS
If effluent from wastewater treatment is used to irrigate agricultural, landscaping, or other lands, groundwater quality could be affected if the effluent is not treated to an acceptable level.	S	LS
Development in Merced, Madera, and Fresno Counties within the FEMA-designated 100-year floodplain would be subject to risk associated with flooding.	S	SU_2
Increased impervious surfaces associated with development on the campus site and in surrounding areas within the same drainage basins could cumulatively increase surface runoff, contributing to local and regional flooding.	S	SU_2
Increased impervious surfaces associated with development on the campus site and development in surrounding areas over the San Joaquin Valley Groundwater Basin would cumulatively reduce groundwater recharge potential and potentially reduce available groundwater supplies.	S	SU_2
Off-campus and cumulative development associated with a UC campus could be located in a dam inundation area and would be subject to risk associated with flooding.	S	SU_2
Increased impervious surfaces associated with development of a campus on a site and development in surrounding areas in the drainage basins would cumulatively increase urban contaminants in surface runoff, potentially reducing receiving-water quality.	S	SU_2

PS=Potentially Significant; S=Significant; LS=Less than Significant; B=Beneficial; NI=No Impact; N/A=Not Applicable; SU_1= Impacts that cannot be mitigated, or for which it is not certain that mitigation could reduce the impact to a less-than-significant level; SU_2= Impacts that could be reduced to less-than-significant levels but require action by a jurisdiction other than the University; SU_3= Impacts that even with mitigation, cannot, or might not, be reduced to a less-than-significant level and for which mitigation would not be under the University's jurisdiction.

Mitigation measures in the SSEIR include the following:

- **SSEIR Mitigation Measure 4.2-2—***During preparation of the LRDP and, as appropriate, during the design phase of each major campus development, a drainage study shall be conducted to determine pre- and postproject site runoff and the capacity of drainage infrastructure to ensure that post-project peak flows are equal to or less than preproject peak flows.*
- **SSEIR Mitigation Measure 4.2-3—***During development of the campus, necessary storm drainage facilities shall be implemented to reduce postproject runoff to pre-project levels. Such facilities include, but would not be limited to, the following: (a) The construction or expansion of storm drainage pipes, drains, or pumps. (b) Natural drainage swales incorporated into drainage facility design to the extent feasible. (c) Single-project detention or retention basins. (d) Multi-project storm water detention or retention basins.*
- **SSEIR Mitigation Measure 4.2-4—***The LDRP shall include policies that require the incorporation of the following, or equally effective, measures as part of project design to maximize percolation and infiltration of precipitation into the underlying groundwater: (a) The clustering of structures. (b) The use of single-project or multi-project detention or retention basins as described in Mitigation Measure 4.2-2(c) and (d). (c) The preservation and use of natural drainage areas as described in Mitigation Measure 4.2-3(b).*
- **SSEIR Mitigation Measure 4.2-10—***For construction operations that would disturb five acres or more of land, the University shall include in all construction contracts a requirement that contractors file a Notice of Intent for coverage under the State General Construction Activity Storm Water Permit, or any other applicable permit. The contractor shall comply with all applicable permit requirements.*
- **SSEIR Mitigation Measure 4.2-11—***For construction operations that would disturb fewer than five acres of land, the University shall include in all construction contracts a requirement that contractors prepare and retain on the site, an erosion control plan that includes a description of the construction site, erosion and sediment controls to be used, means of waste disposal, control of postconstruction sediment and erosion control measures and maintenance responsibilities, and non-storm water management controls. BMPs could be implemented as part of an erosion control plan may include, but would not be limited to, (a) Reduction of the area and length of time that the site is cleared and graded; (b) Revegetation/stabilization of cleared areas as soon as possible; (c) Implementation of comprehensive erosion, dust, and sediment control; (d) Implementation of a program to control potential construction activity pollutants such as cement mortar, paints and solvents, fuel and lubricating oils, pesticides and herbicides, and/or; (e) Implementation of a hazardous material spill prevention, control, and cleanup program.*
- **SSEIR Mitigation Measure 4.2-12—***The University shall require that specific project designs include a combination of BMPs to limit the concentrations of urban contaminants in surface water flows.*
- **SSEIR Mitigation Measure 4.2-13—***The University shall comply with all applicable permit requirements the EPA establishes as part of the municipal storm water permit program for small municipalities, or any other applicable state or federal storm water quality requirements, to manage urban storm water runoff.*

- **SSEIR Mitigation Measure 4.2-14—***If required, the University shall file a Notice of Intent for coverage and comply with any requirements established as part of the State General Industrial Storm Water Permit, or any other applicable permit.*
- **SSEIR Mitigation Measure 4.2-16—***The University shall comply with all applicable NPDES WDR permit requirements established for the wastewater treatment plant that receives campus wastewater. This may include the establishment of a pre-treated program to pre-treat wastewater to acceptable levels prior to being received at the plant.*
- **SSEIR Mitigation Measure 4.2-17—***If the University designs and constructs package wastewater treatment plants, the level of treatment provided shall comply with all Title 22 regulations established for land application of treated effluent.*

In compliance with SSEIR Mitigation Measures 4.2-2 and 4.2-3, a drainage study has been completed for the proposed site to determine pre- and postdevelopment flows and to design appropriate drainage facilities that include on-site detention and retention facilities, swales and storm drains to convey storm water, and other measures to remove pollutants in urban runoff.

SSEIR Mitigation Measure 4.2-4 requires measures to maximize percolation for groundwater recharge. Because of the low permeability of soils at the proposed site, percolation basins for purposes of groundwater recharge are not specifically proposed as part of the new campus. However, the onsite detention basins and the recreation fields which make up more than 1/3 of the campus site would allow infiltration and percolation and the LRDP includes a policy to maximize percolation and infiltration of precipitation to the extent feasible during planning and project design.

Compliance with SSEIR Mitigation Measures 4.2-10 through 4.2-14 will be achieved because the campus will be subject to Phase II NPDES regulations governing storm water discharges. The campus will therefore develop a Storm Water Management Plan to minimize urban runoff pollution from campus facilities. All campus construction projects would be required to prepare and implement storm water pollution prevention plans for construction activities.

The campus will also comply with SSEIR Mitigation Measures 4.2-16 and 4.2-17. As described below, campus wastewater would be discharged to the City of Merced Wastewater Treatment Plant. In the event that the City requires that a pretreatment program be implemented at campus facilities, such a program would be developed and implemented. In the event that a wastewater treatment facility is proposed on campus, it would comply with conditions in a waste discharge requirements permit issued by the Regional Board for that facility.

4.8.2 Environmental Setting

The discussion of water resources focuses on surface water resources, groundwater resources and recharge, flood control and drainage, and overall water quality. Information regarding these resources is presented both at a broader regional level and specifically for the project area.

4.8.2.1 Regional Setting

Surface Water Resources

The proposed UC Merced Campus would be located on the eastern side of the San Joaquin Valley, east of the City of Merced. The San Joaquin Valley is separated into two hydrologic basins by a divide that interrupts the lengthwise slope of the Valley. The two basins include the San Joaquin Subbasin to the north (including Merced County), which drains to the Pacific Ocean, and the Tulare Subbasin to the south, which has an outlet only when rare flood flows carry its water across the divide and into the San Joaquin Subbasin (Merced Co., 1990).

The Central Valley Water Quality Control Plan (Basin Plan) refers to the San Joaquin Basin as the San Joaquin River drainage basin. The San Joaquin River drainage basin covers 15,880 square miles and includes the entire area drained by the San Joaquin River. It includes all watersheds tributary to the San Joaquin River and the Delta south of the Sacramento River and south of the American River watershed. The principal streams in the basin are the San Joaquin River and its larger tributaries: the Consumnes, Mokelumne, Calaveras, Stanislaus, Tuolumne, Merced, Chowchilla and Fresno Rivers. Major reservoirs and lakes include Pardee, New Hogan, Millerton, McClure, Don Pedro, and New Melones (CVRWQCB Basin Plan, 1998).

USGS further divides the San Joaquin Basin into smaller basins, or watersheds, with hydrologic unit codes (HUCs) to identify each watershed. The proposed UC Merced Campus would be located in the Middle San Joaquin-Lower Chowchilla watershed (HUC #18040001), which is an area of approximately 2,704 square miles (www.epa.gov, 2000).

Thirty-eight percent of the surface water in the San Joaquin Subbasin is imported from the Sacramento-San Joaquin Delta through the Delta-Mendota Canal and the California Aqueduct (U.S. Bureau of Reclamation, 1990; California Department of Water Resources, 1991). Most of the rest of the surface water comes from the Sierra Nevada through the tributaries of the San Joaquin River and the San Joaquin River itself.

Groundwater Resources and Recharge

Groundwater in the San Joaquin Valley is supplied by runoff from foothills and mountains, which percolates through the soil into the underground aquifers. There are three general levels of aquifers in the San Joaquin Subbasin, and all levels are pumped for irrigation and drinking water supply. Irrigation is the largest source of recharge to the regional aquifers. Currently, groundwater withdrawals in the Valley exceed recharge (Merced Co., 1990). Consequently, subsidence of land throughout the San Joaquin Valley has occurred, especially on the west side. Subsidence can be halted or reduced if the groundwater table is replenished or if pumping is reduced; however, storage space within an aquifer can be reduced by subsidence.

All groundwaters in the San Joaquin Basin are considered as suitable or potentially suitable, at a minimum, for municipal and domestic water supply, agricultural supply, industrial service supply, and industrial process supply (CVRWQCB Basin Plan, 1998).

In the early 1990s the City of Merced and the Merced Irrigation District (MID) jointly commissioned a water supply study to identify urban, agricultural, and environmental water needs through the year 2030 and the facilities required for a safe, reliable water supply. One of the goals of the water supply plan is to manage groundwater resources, because groundwater makes up approximately 50 percent of the water supply for agriculture and 100 percent of the supply for urban uses in MID's sphere of influence (CH2M Hill, 1995).

The basin underlying MID's sphere of influence has a total stored volume of approximately 30 million acre-feet of water. Approximately 600,000 acre-feet of water discharges from this underlying area each year largely because of withdrawals by MID for agricultural and urban use, and pumping by others for agricultural and urban use. These withdrawals are approximately replaced by groundwater recharge. The components of groundwater recharge include (1) deep percolation of water applied for irrigation, (2) canal seepage, (3) deep percolation of precipitation, (4) subsurface inflow, (5) seepage from the Merced River, (6) seepage from the San Joaquin River, and (7) seepage from the Chowchilla River. The components of groundwater discharge include (1) private agricultural pumpage, (2) urban pumping, (3) pumpage by MID, and (4) seepage to the Merced River.

Flood Control and Drainage

Because the Central Valley is a natural drainage basin for thousands of acres of Sierra and Diablo foothill and mountain lands, flooding is a natural occurrence in the San Joaquin Basin. Merced County and the Central Valley experience two types of floods: (1) general rainfall floods occurring in the late fall and winter in the foothills and on the valley floor, and (2) snowmelt floods occurring in the late spring and early summer. Most floods are produced by extended winter rainfall, but flooding can also be due to dam failure (Merced Co., 1990).

Merced County requires the construction of individual storm water percolation detention basins with new development. Detention basins are designed to temporarily collect runoff so it can be metered for release at acceptable rates into canals and streams. They also serve to collect storm water and filter it before it is absorbed into the soil and reaches groundwater tables.

The Merced County Flood Damage Prevention Ordinance contains specific requirements for development in various flood zones designated on Flood Insurance Rate Maps (FIRMs). Generally, development should be limited and discouraged in flood-prone areas (Merced Co., 1990).

Water Quality

Beneficial uses of surface waters and groundwaters are critical to water quality management in California. State law defines beneficial uses of California's waters that may be protected against quality degradation to include (and not be limited to) ". . . domestic; municipal; agricultural and industrial supply; power generation; recreation; aesthetic enjoyment; navigation; and preservation and enhancement of fish, wildlife, and other aquatic resources or preserves" (Water Code Section 13050(f)). The Regional Water Quality Control Board is required to establish water quality objectives for surface waters per the Porter-Cologne Water Quality Control Act. The CVRWQCB Basin Plan states that protection and enhancement of existing and potential beneficial uses are primary goals of water quality planning. The Basin Plan lists beneficial uses for surface waters and groundwaters within the San Joaquin River Basin. The Basin Plan also lists water quality objectives for both surface waters and groundwaters within the San Joaquin River Basin.

The National Water-Quality Assessment (NAWQA) Program is a water quality assessment performed by the U.S. Geological Society (USGS), evaluating more than 50 of the Nation's largest river basins and aquifers. The San Joaquin-Tulare Basins NAWQA Study Unit includes the San Joaquin Valley, the eastern slope of the Coast Ranges, and the western slope of the Sierra Nevada. A report, which summarized major findings that emerged between 1992 and 1995 from the water quality assessment of the San Joaquin-Tulare Basins Study Unit, noted the following:

- Toxicity to aquatic organisms in streams is attributed to pesticides. A wide variety of pesticides occur in the San Joaquin River and its tributaries, some at concentrations high enough to adversely impact aquatic life.
- There is potential for adverse effects on biota from pesticides in bed sediment and biota. Long-banned organochlorine insecticides continue to be transported to streams by soil erosion of contaminated agricultural fields, resulting in contamination of suspended sediment, bed sediment, and aquatic organisms.
- Nutrient concentrations in the San Joaquin River generally support the beneficial uses. Some nitrate and ammonia concentrations exceed criteria in some small tributaries, but generally do not limit beneficial uses in the main stem of the San Joaquin River. Nitrate concentrations in the San Joaquin River have been increasing over the last 40 years, but concentrations are still well below the drinking-water standard. None of the ammonia samples collected in the main stem of the San Joaquin River exceeded criteria during 1993–95.
- Habitat disruption and water chemistry have adversely affected native fish populations. Fish communities in the San Joaquin River and its tributaries change in response to water chemistry and habitat quality in a pattern suggesting that human activities, including agriculture, are important factors in controlling the distribution and abundance of fish species. Fish communities in the lower San Joaquin River were highly degraded compared with other NAWAQ study units, as was stream habitat at some sites.
- Drinking-water supplies from groundwater have been degraded by fertilizers and pesticides. Nitrate concentrations in groundwater frequently exceed drinking-water standards; however, pesticide concentrations rarely exceed drinking-water standards, with the exception of 1,2-dibromo-3-chloropropane (DBCP).

The U.S. EPA Website (www.epa.gov) provides information regarding overall aquatic health within particular watersheds. The Middle San Joaquin-Lower Chowchilla watershed is listed as having "more serious water quality problems with low vulnerability." The classification for the watershed is based on indicators of current condition and future vulnerability. The current-condition indicators are designed to show existing watershed health. These indicators include such things as waters meeting state or tribal designated uses, contaminated sediments, ambient water quality, and wetland loss. The current-condition indicators for designated use attainment, fish and wildlife consumption advisories, source water condition, ambient water quality data (based on four toxic pollutants), and wetland loss index are listed as "more serious" for this watershed. The current-condition indicator for contaminated sediments is listed as "better." The vulnerability indicators are designed to indicate where pollution discharges and other activities put pressure on the watershed. These could cause future problems to occur. Activities in this category include such things as pollutant loads discharged in excess of permitted levels, pollution potential from urban and agricultural lands, and changes in human population levels. The vulnerability indicators for the Middle San Joaquin-Lower Chowchilla watershed that are listed as "high future vulnerability" include aquatic species at risk, population change, and hydrologic modification. The future vulnerability for the index of agricultural runoff potential is listed as moderate. Low future vulnerability indexes include toxic loads over permitted levels, conventional loads over permitted limits, urban runoff potential, and air deposition.

Surface water quality in Merced County differs from east to west and from north to south, because of varying degrees of turbidity, color, odor, and chemical characteristics. The differences in surface water quality are caused by the climate and the differences in the physical character of the geology in the smaller watersheds. The Sierra Nevada dispense low amounts of dissolved solids into east side streams and rivers, while the west side streams have a much higher salinity rate because of the sediments that comprise the Diablo Range of the Coastal Mountains. Similarly, the stream flow into the Merced River in the northern part of the County is of very good quality, but gradually decreases south through the Valley because of the inflow of excess irrigation waters (Merced Co., 1990).

4.8.2.2 Local Setting

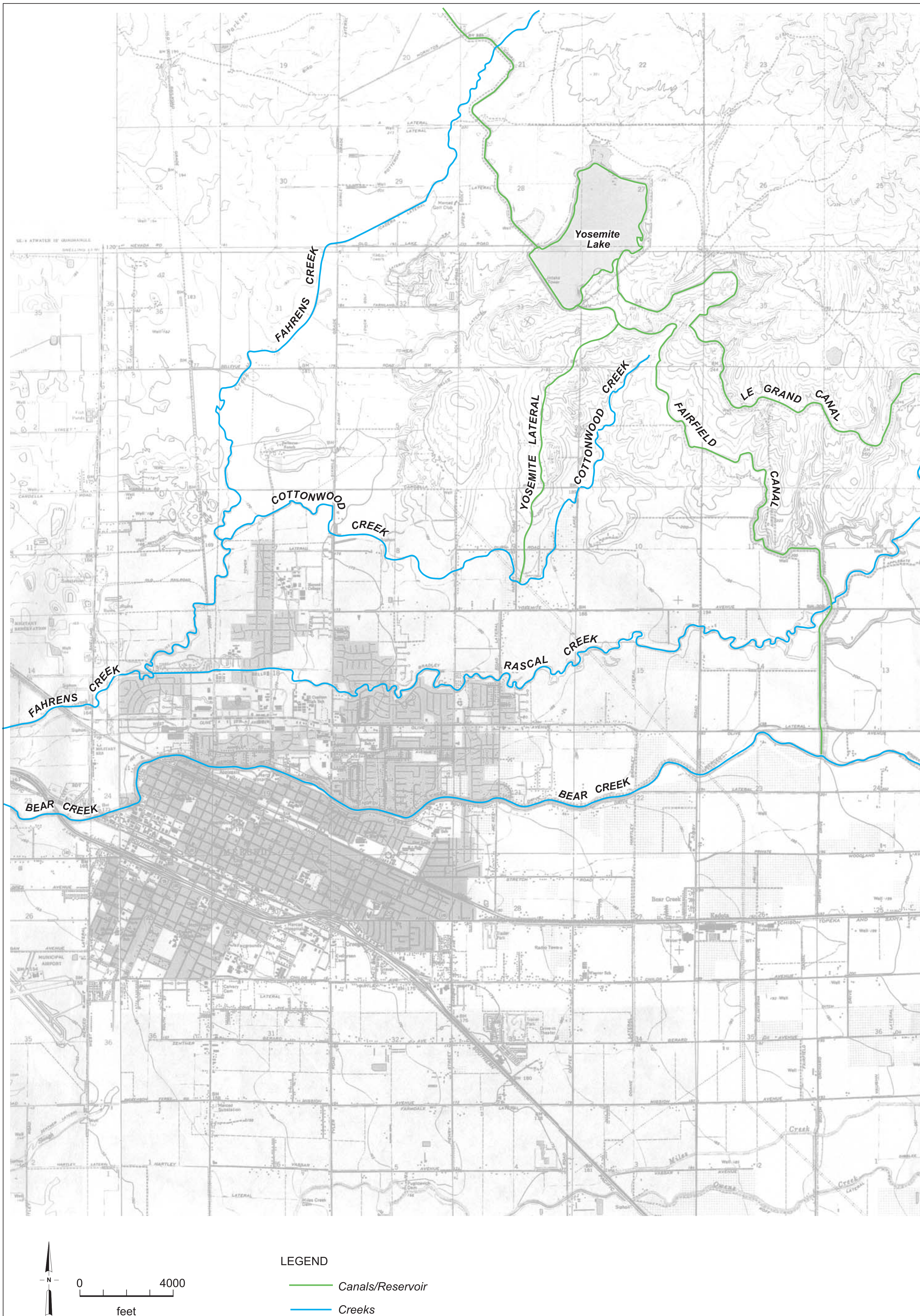
Surface Water Resources

The proposed UC Merced campus site is located northeast of the city of Merced adjacent to Lake Yosemite. Surface waters on and in the vicinity include rivers and creeks, irrigation canals, and a reservoir (Figure 4.8-1). The Merced River flows east to west and is located approximately 7 miles northwest of the proposed campus site. The Merced River flows directly into the San Joaquin River.

Cottonwood Creek is a natural drainage channel in the project area. The stream, as it exists today, begins at the south edge of the Le Grand Canal. Cottonwood Creek would have originally been a seasonal stream, but the development of the Merced Hills Golf Course, seepage from the Le Grand and Fairfield irrigation canals, and the center-pivot irrigation systems have transformed this stream into a semiperennial stream with herbaceous vegetation typical of seasonal marshes. Only a small portion of Cottonwood Creek is within the proposed campus site. Cottonwood Creek drains into Fahrens Creek, a stream that originates in higher elevations north of the proposed campus site. The majority of flood flows from Fahrens Creek and intercepted local drainages discharge into Lake Yosemite via the Main Canal. Bear Creek, an east-west-flowing stream approximately six miles south of the proposed UC Merced campus, receives drainage from both Rascal Creek and Fahrens Creek southwest of the site.

Rascal Creek is a natural creek, which generally flows east to west and is a tributary to Bear Creek, which ultimately drains into the San Joaquin River. Local drainage flow and flood flows released from Lake Yosemite drain into Rascal Creek via Le Grand Canal. During the winter, the right bank of Le Grand Canal is breached, allowing floodwater to flow into Rascal Creek. The rest of the year, water released to the southern portion of Rascal Creek is regulated (EIP, 2000).

The Main Canal is generally a north-to-south-flowing irrigation canal that feeds Lake Yosemite, a constructed reservoir. Both Main Canal and Lake Yosemite are operated and maintained by the Merced Irrigation District (MID). The capacity of Lake Yosemite is approximately 7,425 acre-feet (MID, 2001). The CVRWQCB Basin Plan lists beneficial uses of Lake Yosemite as



URS	Project No. 51-00067044.00 University of California at Merced	REGIONAL HYDROLOGY	Figure 4.8-1

51-00067044.00-00042/071901/gos

contact and other noncontact recreational, warm and cold freshwater habitat, and wildlife habitat. The CVRWQCB Basin Plan does not list Lake Yosemite as an irrigation beneficial use; however, MID has stated that it operates and maintains Lake Yosemite as a surface water regulating reservoir that is a vital part of MID's distribution system (MID, 2001).

Lake Yosemite feeds two MID irrigation canals, the Fairfield and Le Grand canals. The proposed campus site includes portions of both the Fairfield and Le Grand canals. The two irrigation canals generally flow north to south, although on the campus site they are generally aligned east-west. Both canals are unlined and are 50 to 60 feet wide at maximum water level. Le Grand Canal intercepts all runoff between Lake Yosemite and Rascal Creek. Two box barrel siphons, with a capacity of 500 cubic feet per second (cfs), allow the creek to be bypassed. Floodwater released from Lake Yosemite or collected as local drainage is released into Rascal Creek at the creek crossing (HDR Engineering, Inc., 1998). The storm drainage collected from the area between the Le Grand and Fairfield canals is intercepted by the Fairfield Canal (MID, 2001). Fairfield Canal also helps to drain excess floodwater from Lake Yosemite. Floodwater released into Fairfield Canal, along with intercepted local drainage from between the Le Grand and Fairfield canals, empties into Bear Creek just downstream of the Rascal Diversion Channel (HDR Engineering, Inc., 1998).

The operational regime of the MID system is to open the irrigation gates at Lake Yosemite on March 31 and close them on October 31. The Fairfield and Le Grand canals deliver irrigation water to downstream agricultural users in the Merced area during this time. During the winter months, Lake Yosemite acts as flood control detention, releasing excess flows to Le Grand Canal. Water levels in Lake Yosemite can be increased to serve demand by importing water from the Merced River via an upstream canal.

Yosemite Lateral is a small irrigation and drainage channel that is located along the access road to the Merced Hills Golf Course clubhouse. This MID-controlled channel serves minor irrigation users and eventually discharges into Cottonwood Creek just north of Yosemite Avenue. A portion of the northwestern campus, near the county park, would discharge an estimated maximum of 10 cubic feet per second of storm water to the lateral during significant storms.

Groundwater Resources and Recharge

Groundwater is generally found at shallow depths throughout Merced County. At the proposed UC Merced campus site, however, depths to unconfined groundwater have been measured that range from approximately 50 to 150 feet below ground surface, depending on the season of the year and the amount of precipitation that fell during the winter rainy season.

Soils on the proposed UC Merced campus site are characterized with a high runoff potential because there is a relatively thin layer of soil overlaying impervious rock and because of the presence of clay hardpans. No evidence of land subsidence has been identified on or within 15 miles of the proposed UC Merced campus site (UC SSEIR, 1994). Currently, there are two known wells on site on the Merced Hills Golf Course. The domestic well is located behind the golf course maintenance building. The irrigation well is located just north of the golf course pond and supplements the pond water, which in turn is pumped out for irrigation purposes.

Flood Control and Drainage

The proposed UC Merced campus site is not located within the Bear Creek 100-year floodplain as defined by the Federal Emergency Management Agency's (FEMA) Flood Insurance Rate Map (FIRM) program. There are several small drainages in the north and northeast parts of the proposed campus site that have a 1 percent chance of annual flooding, but those areas are planned for open space and drainage and, as such, would not have any buildings.

Reservoirs and dams in the vicinity of the proposed UC Merced campus site could affect areas surrounding the site if dam failure occurs. Lake Yosemite and Bear Reservoir are existing reservoirs with dams that could possibly fail. Their inundation areas are located to the west and south, respectively, of the proposed UC Merced campus site. The proposed UC Merced campus site is not located in a potential dam failure inundation area of these reservoirs.

The "Merced County Streams Group Project" consists of the construction or modification of several dams in eastern Merced County. Three of these projects are "dry dams," dams that would not ordinarily have standing water and are used to regulate the release of storm water for downstream flood protection. The second phase of the stream groups project includes the construction of Haystack Mountain Dam, a dry dam on Rascal Creek, enlargement of the existing Bear Dam east of Lake Yosemite, and channel improvements on Fahrens Creek. The U.S. Army Corps of Engineers is modifying these projects based on current economic and environmental considerations. The reformulated project was scheduled for 1999, but to date construction has not yet begun (rubicon.water.ca.gov/FEATReport120.fdr/fcsib1g.html). The proposed Haystack Reservoir would inundate approximately 650 acres at an elevation of 309 feet msl and, if filled to capacity, would inundate a large area of the southeastern portion of the Virginia Smith Trust property but would not inundate any part of the proposed UC Merced campus site. Although a dam failure inundation study has not yet been completed for the proposed Haystack Dam, the proposed reservoir's location suggests that, if the dam failed, the inundation path would correspond to Rascal Creek and would not affect the proposed UC Merced campus site (UC SSEIR, 1994).

The topography of the proposed UC Merced campus site consists of flat to rolling terrain with slopes generally less than 5 to 10 percent. The central portion of the site is relatively flat and drains to Le Grand Canal. A small portion of the site in the southwest end drains directly to Cottonwood Creek. Swales—elongated depressions that direct overland flow into a defined drainage channel—are common throughout the proposed campus site. Swales are often vegetated and do not normally have flowing water (UC SSEIR, 1994).

Water Quality

The County of Merced General Plan addresses groundwater quality and shows a map (Map No. 23) of areas experiencing water quality problems. The proposed campus is not located in an area of known groundwater quality problems. Overall, groundwater quality in Merced County is generally similar to surface water quality—it is good to excellent in the higher foothill areas and decreases in quality toward the Valley center low areas. The major land use–related pollution problem in Merced County appears to be nitrates that are present in both surface waters and groundwaters throughout the county as a result of past and present cattle grazing (Merced Co., 1990).

1995 Merced Water Supply Plan

The City of Merced and the MID jointly commissioned a water supply study that would identify urban, agricultural, and environmental water needs through the year 2030 (CH2M Hill, 1995). The 1995 Merced Water Supply Plan has five goals:

- Manage groundwater resources,
- Provide a high-quality, reliable supply of water for the cities,
- Protect and Enhance the Economic Base,
- Protect MID’s Merced River water rights, and
- Maintain consensus on water supply plan.

Three key water demand and supply conclusions were important in the development of the Merced Water Supply Plan and for long-term water management throughout MID’s sphere of influence (approximately 500,000 acres).

- Agricultural water needs, currently met by surface water deliveries and pumped groundwater, will remain the dominant water factor; although the demand is projected to decline by 10 percent by 2030, nearly 2/3 of water use will be for agricultural uses.
- Urban water demands will increase three to four times by 2030 (100 percent of the demand supplied from groundwater).
- Environmental and instream uses of water will increase three to four times by 2030.

By 2030, urban water demand was projected to increase to 121,000 acre-feet per year (afy). Of this projected total, the amount attributed to the proposed UC Merced campus and associated businesses and activities accounted for 20 percent, or 24,200 afy (CH2M Hill, 1995). Although businesses and activities associated with the campus are included in the 1995 Water Supply Plan, the actual University Community was not a concept in 1995 and was not separated out in the water demand figures.

Several alternatives and strategies were examined to achieve the five goals of the plan. Table 5-1 of the 1995 Water Supply Plan shows the results of several combinations of groundwater strategies. The table shows that there would need to be intentional groundwater recharge in order to maintain groundwater at 1992 levels.

To manage the groundwater resources, the recommended strategy in the 1995 Water Supply Plan was to stabilize groundwater elevations at 1992 levels. The activities/facilities needed to do this were to provide for phased construction of direct recharge facilities throughout the region, focusing first on areas with more serious declines. Under a specific set of combination of planning strategies, several figures in Chapter 5 of the 1995 Water Supply Plan show that the area that would have the most serious declines without intentional recharge would be beneath the City of Merced and in the southeast portion of the MID service area (CH2M Hill, 1995).

According to the MID web site, MID engineers have begun a pilot project involving intentional groundwater recharge. One test basin has already been constructed at City of Merced property near Fahren’s Park. Over the next few years MID will study how much water disappears from the basin from evaporation and percolation. If the experiment is successful, the Merced Water

Supply Plan would fund the construction of other recharge basins throughout eastern Merced County to assist in groundwater recharge (www.mercedid.org/recharg.htm).

The 1995 Merced Water Supply Plan is currently being updated, and publication of a status report is anticipated in September 2001 (CH2M Hill 2001, pers. comm.). Some of the key points of the updated plan are as follows:

- The five goals of the 1995 plan have not changed.
- The planning horizon for the updated Merced Water Supply Plan goes through 2040.
- Some of the strategies used in the development of planning scenarios have changed, including stabilizing the groundwater elevation at 1999 levels (which are similar to the 1992 elevations).
- Other elements of the planning scenarios include projections for and ramifications of possible restrictions on diversions from the Merced River. These restrictions were based on existing studies as well as generic flow requirements representing a potential future regulatory requirement.
- The study area that the plan now covers is approximately 582,000 acres (an approximate 16 percent increase).

The projected demand for urban water use has declined to approximately 118,000 afy in 2040 (as compared to 121,000 afy in 2030). The 1995 plan projected water demand for the UC Merced campus and associated development was approximately 20 percent of the total urban use; the projected demand for both the UC Merced campus and University Community is now estimated at about 6,500–7,000 afy).

The projected agricultural demand has increased to 1,042,000 afy (as compared to 788,000 projected in 2030; most of the increase is due to agricultural demands outside the MID service area). In contrast to the 1995 plan, the updated groundwater model now covers a larger area and takes into account pumping north of the Merced River. In part, therefore, the increase can be attributed to the increased acreage considered in the updated plan area. While trends over the last 30 years indicate that private groundwater pumping has increased in MID’s service area, MID is currently offering incentive programs to encourage growers to use MID surface water for irrigation rather than groundwater when surface water is available. In doing so, increased use of surface water for irrigation and less groundwater pumping will help protect the groundwater basin.

Trends in the Department of Water Resources data from 1974 through 1995 indicate that, while the urban lands have increased in MID’s service area, previously unirrigated lands have been put into production outside their area, thus resulting in an approximate “little net loss” of agricultural land in the water supply plan study area. This trend is assumed to continue through 2040. This projection is a conservative one in that it is projected that a similar quantity of agricultural lands will require irrigation in 2040 as in 2000.

The progress of the water supply plan update has been presented to agencies and the public beginning in August 2000. In addition, several newsletters and press releases have been issued regarding the planning process.

4.8.2.3 Water Quality Regulations

The campus would be subject to federal and state water quality regulations. These are summarized below.

Clean Water Act

The CWA is a 1977 amendment to the Federal Water Pollution Control Act of 1972 (United States Code, Title 33), which established the basic structure for regulating pollutant discharges to navigable waters of the United States. The CWA provides two general types of pollution control limits:

- Effluent limits that are technology-based and limit the quantity of pollutants discharged from a point source such as a pipe, ditch, tunnel, etc. into a navigable waterbody (nonpoint source pollution is subject to state control)
- Ambient water quality standards that are based on beneficial uses and limit the concentration of pollutants in navigable waters

The primary focus of the 1977 CWA amendment was toxic substances. In 1987, the CWA was reauthorized and again focused on toxic substances, mandating an urban storm water runoff National Pollutant Discharge Elimination System (NPDES) permit program.

Management of nonpoint source discharges is regulated under Section 319 of the CWA. Section 319 requires the states to submit an assessment report that identifies navigable waters that are not expected to achieve applicable water quality standards or goals, identify categories of nonpoint sources or specific sources that add significant pollution to contribute to non-attainment of water quality standards or goals, and describe the process to develop best management practices and measures to control each category of nonpoint source or specific sources. The states are then required to develop a management program that proposes to implement the nonpoint source control program.

Section 305(b) of the CWA requires the states to perform a biennial assessment of the water quality of navigable waters within each state. The assessment is required to analyze the extent to which beneficial uses are supported and provide an analysis of the extent to which elimination of pollution and protection of beneficial uses had been achieved. The assessment is also required to describe the nature and extent of nonpoint sources of pollution and provide recommendations for control programs including costs.

Section 303(d) of the CWA requires the states to identify waters that are not expected to meet water quality standards after application of effluent limitations for point sources, develop a priority ranking and determine the total maximum daily load of specific pollutants that may be discharged into the water and still meet the water quality standards.

Section 402(p) of CWA (U.S. Code, Title 33, Chapter 26, Section 1342) requires a NPDES permit for storm water discharges from municipal separate storm sewer systems, industrial activities, construction activities, and designated dischargers that are considered significant contributors of pollutants to waters of the United States. The Phase I permitting program, which was promulgated in 1990, generally addressed storm water runoff from (1) municipal separate storm sewer systems serving populations of 100,000 or greater, (2) construction activity disturbing 5 acres of land or greater, and (3) 10 categories of industrial activity. The Phase II program was published in the Federal Register on December 8, 1999. Phase II will regulate storm water discharges associated with small construction activity (sites disturbing between 1 and 5 acres of land), and small municipal separate storm sewer systems (serving populations less than 100,000). By December 8, 2002, NPDES permitting authorities (Regional Water Quality Control Boards [RWQCBs] in California) will be required to issue general permits for Phase II regulated small municipal separate storm sewer systems and small construction activity. By March 2003, operators of Phase II regulated municipal separate storm sewer systems (MS4s) and small construction activities will be required to apply for NPDES permit coverage.

Merced County falls under the Phase II permit coverage and is not yet required to follow a specific NPDES program. Beginning in March 2003, the County will be required to apply for NPDES permit coverage and will have 5 years to implement the Phase II rules. While the Phase II rules allow up to 5 years for implementation, the EPA already has two model permits available for large and small construction activities and for regulated small MS4s. In addition, the SWRCB is currently drafting a new general permit and could implement it prior to 2003.

As required under Section 122.34(d)(2) of the storm water Phase II rule, on October 27, 2000, the EPA released a draft menu of Best Management Practices (BMPs) that address six minimum control measures that most regulated MS4s will need to implement under the Phase II rule. The six minimum control measures include: (1) public education and outreach on storm water impacts, (2) public involvement/ participation, (3) illicit discharge detection and elimination, (4) construction site storm water runoff control, (5) postconstruction storm water management in new development and redevelopment, and (6) pollution prevention/hood housekeeping for municipal operations (www.epa.gov/npdes/menuofbmps/menu.htm).

Contractors will be required to file a Notice of Intent (NOI) to be covered under the California General Construction Activities Storm Water NPDES Permit (Order No. 99-08-DWQ) if the construction project area is greater than 5 acres or part of a development that is greater than 5 acres. Before construction begins, an NOI to comply with the permit must be submitted to the State Water Resources Control Board. Coverage under the permit will not occur until the applicant develops an adequate Storm Water Pollution Prevention Plan (SWPPP) for the construction project. Upon completion of construction and when final stabilization of the site has been achieved, a Notice of Termination (NOT) must be filed. If the construction project is less than 5 acres, coverage under the Order will not be necessary if construction begins before March 2003. After March 2003, an NPDES permit will be required for construction areas over 1 acre.

The General Industrial Storm Water NPDES Permit (Order No. 97-03-DWQ) regulates storm water associated with industrial activity that discharges either directly to surface waters or indirectly through municipal separate storm sewers. Industrial facilities include federal, state, municipally owned, and private facilities from the following categories: (1) facilities subject to storm water effluent limitations guidelines, new source performance standards, or toxic pollutant effluent standards; (2) manufacturing facilities; (3) oil and gas/mining facilities; (4) hazardous waste treatment, storage, or disposal facilities; (5) landfills, land application sites, and open dumps; (6) recycling facilities; (7) steam electric power generating facilities; (8) transportation facilities; (9) sewage or wastewater treatment works; and (10) manufacturing facilities where industrial materials, equipment, or activities are exposed to storm water.

Section 303(c)(2)(B) of the CWA requires that states adopt numeric criteria for priority pollutants as part of the states' water quality standards. In 1991, the SWRCB adopted the Inland Surface Waters Plan (ISWP) and the Enclosed Bays and Estuaries Plan (EBEP), in part, to comply with the Clean Water Act. The SWRCB amended the plans in 1993. In 1994, the SWRCB rescinded the ISWP and the EBEP in response to a court ruling invalidating the plans. In order to bring California into compliance with the CWA, the SWRCB and the EPA agreed to a two-phased approach. Phase I consisted of the EPA promulgating numeric water quality criteria for priority pollutants for California in accordance with the CWA, and the SWRCB adopting statewide measures to implement those criteria in a statewide policy. In Phase II, the SWRCB will consider the adoption of appropriate statewide water quality objectives for toxic pollutants.

On May 18, 2000, the EPA published the California Toxics Rule (CTR) in the Federal Register, adding Section 131.38 to Title 40 of the C.F.R. On May 22, 2000, the Office of Administrative Law approved, with modifications, the *Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (Phase 1 of the Inland Surface Waters Plan and Enclosed Bays and Estuaries Plan)*. The Policy establishes implementation procedures for three categories of priority pollutant criteria or water quality objectives. These are (1) criteria promulgated by the EPA in the National Toxics Rule that apply in California; (2) criteria proposed by EPA in the California Toxics Rule; and (3) water quality objectives contained in RWQCB water quality control plans (basin plans).

Porter-Cologne Water Quality Control Act

The Porter-Cologne Water Quality Control Act of 1969, which became Division 7 of the California Water Code, authorized the SWRCB to provide comprehensive protection for California's waters through water allocation and water quality protection. The SWRCB implements the requirement of CWA Section 303 that water quality standards be set for certain waters by adopting water quality control plans under the Porter-Cologne Act. In addition, the Porter-Cologne Act established the responsibilities and authorities of the nine RWQCBs, which include preparing water quality plans for areas within the region (Basin Plans), identifying water quality objectives, and issuing NPDES permits pursuant to the Waste Discharge Requirements (WDRs). Water quality objectives are defined as limits or levels of water quality constituents and characteristics established for reasonable protection of beneficial uses or prevention of nuisance. The Porter-Cologne Act was later amended to provide the authority delegated from EPA to issue NPDES permits. Under the Porter-Cologne Act, discharges of subsurface agricultural drainage, tailwater, and storm water from agricultural lands to surface water do not require NPDES permits[1].

NPDES permits, issued by RWQCBs pursuant to the CWA, also serve as WDRs issued pursuant to the Porter-Cologne Act. Generally, WDRs are issued for discharges that are exempt from the CWA NPDES permitting program, discharges that may affect waters of the state that are not waters of the United States (i.e., groundwater), and/or wastes that may be discharged in a diffused manner. WDRs are established and implemented to achieve the WQOs for receiving waters as established in the Basin Plans. Sometimes they are combined WDRs/NPDES permits.

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[1] In adopting the Clean Water Act's NPDES permit program, the Porter-Cologne Act also has adopted the Clean Water Act's exception for agricultural return flows. 33 U.S.C. 1342(d)(1).

The Central Valley RWQCB has adopted an Antidegradation Implementation Policy pursuant to the antidegradation directives of Section 13000 of the Water Code and State Water Board Resolution No. 68-16 ("Statement of Policy with Respect to Maintaining High Quality of Waters in California"). These directives require that high quality waters of the State shall be maintained "consistent with the maximum benefit to the people of the State." The Regional Water Board will apply Resolution No. 68-16 in considering whether to allow a certain degree of degradation to occur or remain by evaluating the nature of any proposed discharge, existing discharge, or material change of the discharge, that could affect the quality of waters within the region. Pursuant to this Policy, a Report of Waste Discharge, or any other similar technical report required by the Board under Water Code Section 13267, must include information regarding the nature and extent of the discharge and the potential for the discharge to affect surface or ground water quality in the region. As explained in detail below, campus development is not anticipated to result in degradation of the waters in the region. Additionally, as further explained below, if future campus development includes a wastewater recycling plant, the plant will treat wastewater to tertiary levels and any discharges will comply with Title 22 standards, preventing a condition of pollution or nuisance from occurring and ensuring consistency with the RWQCB's antidegradation policy.

1998 Central Valley RWQCB Basin Plan

The UC Merced Campus is within the jurisdiction of the Central Valley Region of the RWQCB (Region 5). The CVRWQCB has the authority to implement water quality protection standards through the issuance of permits for discharges to waters at locations within its jurisdiction. Water quality objectives for the Sacramento River and its tributaries are specified in *The Water Quality Control Plan for the Sacramento River Basin and San Joaquin River Basin* (Basin Plan) prepared by the CVRWQCB in compliance with the federal CWA and the state Porter-Cologne Water Quality Control Act. The Basin Plan establishes water quality objectives and implementation programs to meet stated objectives and to protect the beneficial uses of water in the Sacramento-San Joaquin River Basin. Because the UC Merced Campus is located within the CVRWQCB's jurisdiction, all discharges to surface water or groundwater are subject to the Basin Plan requirements (CVRWQCB Basin Plan, 1998).

Beneficial uses are critical to water quality management in California. State law defines beneficial uses of California's waters that may be protected against quality degradation to include (and not be limited to) ". . . domestic, municipal; agricultural and industrial supply; power generation; recreation; aesthetic enjoyment; nagivation; and preservation and enhancement of fish, wildlife, and other aquatic resources or preserves" (Water Code § 13050(f)). Protection and enhancement of existing and potential beneficial uses are primary goals of water quality planning.

Beneficial use designation (and water quality objectives, see Chapter III) must be reviewed at least once during each three-year period for the purpose of modification as appropriate (40 C.F.R. § 131.20). The beneficial uses listed below are relevant to the project.

- **Municipal and Domestic Supply (MUN)**—Uses of water for community, military, or individual water supply systems including, but not limited to, drinking water supply.

- **Agricultural Supply (AGR)—**Uses of water for farming, horticulture, or ranching including, but not limited to, irrigation (including leaching of salts), stock watering, or support of vegetation for range grazing.
- **Groundwater Recharge (GWR)—**Uses of water for natural or artificial recharge of groundwater for purposes of future extraction, maintenance of water quality, or halting of saltwater intrusion into freshwater aquifers.
- **Freshwater Replenishment (FRSH)—**Uses of water for natural or artificial maintenance of surface water quantity or quality.
- **Noncontact Water Recreation (REC-2)—**Uses of water for recreational activities involving proximity to water, but where there is generally no body contact with water, nor any likelihood of ingestion of water. These uses include, but are not limited to, picnicking, sunbathing, hiking, beachcombing, camping, boating, tidepool and marine life study, hunting, sight-seeing, or aesthetic enjoyment in conjunction with the above activities.
- **Warm Freshwater Habitat (WARM)—**Uses of water that support warm water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including vertebrates.
- **Wildlife Habitat (WILD)—**Uses of water that support terrestrial or wetland ecosystems including, but not limited to, preservation and enhancement of terrestrial havitats or wetlands, vegetation, wildlife (e.g., mammals, birds, reptiles, amphibians, invertebrates), or wildlife water and food sources.
- **Preservation of Biological Habitats of Special Significance (BIOL)—**Uses of water that support designated areas or habitats, such as established refuges, parks, sanctuaries, ecological reserves, or Areas of Special Biological Significance (ASBS), where the preservation or enhancement of natural resources requires special protection.
- **Rare, Threatened, or Endangered Species (RARE)—**Uses of water that support aquatic habitats necessary, at least in part, for the survival and successful maintenance of plant or animval species established under state or federal law as rare, threatened, or endangered.

The mitigation measures that are designed to protect beneficial uses are described in Section 4.8.3, and compliance with the Basin Plan is discussed in Section 4.8.4.

4.8.2.4 Reclaimed Water Regulations

Reuse of treated wastewater is regulated by federal and state laws and is under the jurisdiction of several state and local agencies. Federal and state laws provide regulation of reclamation and reuse through the Clean Water Act and the California Water Code, respectively. The Clean Water Act specifically encourages water reclamation as an integral part of water pollution control projects. The California Water Code (Section 13576) declares that the environmental benefits of recycled water include a reduced demand for water in the Sacramento-San Joaquin Delta which is otherwise needed to maintain water quality, reduced discharge of waste into the ocean, and the enhancement of groundwater basins, recreation, fisheries, and wetlands.

Regulation of reclaimed water in California is governed by RWQCBs and the Department of Health Services. The California Water Code establishes the SWRCB as the agency with primary authority for water reclamation. The nine RWQCBs administer this authority. The SWRCB provides reuse plans and policy guidelines, while the RWQCBs establish regulations for specific projects. Section 13521 of the California Water Code states that the Department of Health Services shall establish uniform statewide recycling criteria for each varying type of use of recycled water where the use involves the protection of public health. These criteria appear in the California Code of Regulations, Title 22, Division 4, Chapter 3. Additional design criteria appear in the California Code of Regulations, Title 17, Division 1, Chapter 5.

The Department of Health Services publishes several documents to aid in reclaimed water planning and design such as *Guidelines for Use of Reclaimed Water, Guideline for the Preparation of an Engineering Report on the Production, Distribution, and Use of Reclaimed Water*, *Guidelines for the Use of Reclaimed Water for Construction Purposes, Demonstration of Equivalency to Full Title 22 Treatment*, and *Criteria for Mosquito Prevention in Wastewater Reclamation or Disposal Projects.* The American Water Works Association also publishes several reclaimed water guidelines. The SWRCB publishes a guidance manual which includes water quality parameters and the effects on soils and plants titled, *Irrigation With Reclaimed Municipal Wastewater, a Guidance Manual,* Report No. 84-1, July 1984.

The proposed campus may include the use of reclaimed water for irrigation and non-residential toilet flushing. The tertiary wastewater treatment system and distribution systems will be regulated by the above agencies throughout the planning, design and implementation phases. To obtain a permit for the proposed tertiary wastewater treatment system or distribution system, an "Engineer's Report" must be filed with the Central Valley RWQCB per Section 13522.5 of the California Water Code. The RWQCB, after consulting with and receiving the recommendations of the State Department of Health Services, and after any necessary hearing, will prescribe water reclamation requirements for water that is used or proposed to be used as reclaimed water. The requirements may be placed upon the person reclaiming the water, the user, or both.

4.8.3 Impacts and Mitigation

4.8.3.1 Standards of Significance

The following standards of significance are based on Appendix G of the CEQA Guidelines. For the purposes of this EIR, impacts are considered significant if the implementation of the LRDP would

- violate any water quality standards or waste discharge requirements;
- substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of preexisting nearby wells would drop to a level that would not support existing land uses or planned uses for which permits have been granted);
- substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or off-site;

- substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner that would result in flooding on- or off-site;
- create or contribute runoff water that would exceed the capacity of existing or planned storm water drainage systems or provide substantial additional sources of polluted runoff;
- otherwise substantially degrade water quality.

CEQA Checklist Items Not Analyzed in the Impact Discussion

The following checklist items under Appendix G of the CEQA Guidelines, Hydrology and Water Quality, do not directly apply to the proposed UC Merced campus and, therefore, are not discussed in the following impact analysis.

- Place housing within 100-year flood hazard area as mapped on a Federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map;

  The UC Merced campus housing is not located within a 100-year-flood hazard area as designated by FEMA; therefore, no impact would occur.

- Place within a 100-year-flood hazard area structures that would impede or redirect flows; or

  Structures on the UC Merced campus site are not located within a 100-year-flood hazard area as designated by FEMA; therefore, no impact would occur.

- Expose people or structures to a significant risk of loss, injury, or death involving flooding, including flooding as a result of the failure of a levee or dam, or inundation by seiche, tsunami, or mudflow.

  In the comments received from MID following the NOP, MID requested several public safety improvements to canal levees. The University will stabilize the levees along the Le Grand and Fairfield canals to prevent the possibility of levee failure where necessary. Both the Le Grand and Fairfield canals were designed as irrigation canals, but they also convey storm drainage and help drain excess floodwater from Lake Yosemite. Because the canals have been operated to convey storm water runoff, the possibility that there would be a levee failure is minimal. The potential for levee failure due to seismic shaking is discussed in Section 4.6.

  Seiches are standing waves created by seismically induced groundshaking (or volcanic eruptions or explosions) that occur in large, freestanding bodies of water. A tsunami is a series of waves that are caused by earthquakes that occur on the seafloor or in coastal areas. There are no large bodies of surface water that would sustain a seiche at the proposed UC Merced campus site, and the UC Merced campus site is not located along the coast. In addition, mudflows would require steep slopes, and there are no steep slopes within the boundaries of the UC Merced campus site.

4.8.3.2 Analytical Method

Available literature was reviewed on regional and local hydrology and water quality. Pre- and post-development runoff from the site was calculated based on a 100-year, 24-hour storm. Table 4.8-1 presents these pre- and post-development runoff values.

Table 4.8-1
Pre- and Post-Development Storm Water Runoff Volumes

Watershed	Acres	Pre-Development 100-YR 24-Hr. Runoff Vol. (1,000 ft^3)	Post-Development 100-YR 24-Hr. Runoff Vol. (1,000 ft^3)	Detention Pond	Pond Volume 1,000 ft^3	Acre-feet
LG1.2	33	174.27	240.82	LG 1.2.P1	243	5.6
LG1.3	128	675.96	934.10	LG 1.3.P1	965	22.2
LG2.3	33	174.27	182.83	LG 2.4.P1		
LG2.4	142	749.89	786.73	LG 2.4.P1	1,346	30.9
LG3.2	45	237.64	300.20	LG 3.2.P1	46	1.0
LG3.3	35	184.83	233.49	LG 3.2.P1	53	1.2
LG3.4	23	121.46	153.43	LG 3.4.P1	46	1.1
LG3.5	12	63.37	80.05	LG 3.5.P1	590	13.5
LG3.6	10	52.81	66.71	LG 3.5.P1	510	11.7
LG4	133	702.36	809.49	LG 3.5.P1	1,079	24.8
LG5	107	565.06	713.80	NO POND[a]		
LG10	41	216.52	326.78	LG 10.P1	193	4.4
LG12.1	39	205.96	248.57	LG 12.1.P1	896.8	20.6
LG12.2	68	359.10	433.41	GOLF COURSE POND[b]	386	8.9
LG12.3	11	58.09	73.38	COTTONWOOD CREEK[c]	NA	NA
LG13	22	116.18	140.22	NO POND. UCP[d]		
LG14.1	37	195.39	235.83	LG 14.1.P1	2,027.6	46.5
LG14.2	59	311.57	376.05	LG 14.2.P1	424.1	9.7
LG14.5	25	132.02	159.34	LG 14.5.P2	200	4.6
LG15.1	59	311.57	359.10	EXISTING DEPRESSION(P1)	83	1.9
LG15.2	11	58.09	66.95	LG 14.5.P1 AND P2		
Composite	1,073	5,608.34	6,921.28		9,088.19	208.64
Acre-feet		128.75	158.89		208.64	
Volume Differential			1313			

Source: Sandis Humber Jones, 2001. UC Merced Conceptual Storm Water Management Plan, Second Draft, July 17.

[a] Northern portion of watershed developed, piped to LG4.
[b] Could discharge 0.17 cfs into Cottonwood Creek.
[c] Could discharge 0.03 cfs into Cottonwood Creek.
[d] If University Community were not developed, on-site storage would be developed.

4.8.3.3 Project Impacts and Mitigation

4.8-1 Implementation of the LRDP could affect the quality of surface runoff water quality but would not result in a violation of water quality standards. This is considered a *less-than-significant* impact.

As discussed in Section 4.8.2.1, the CVRWQCB Basin Plan states that protection and enhancement of existing and potential beneficial uses are primary goals of water quality planning. The Basin Plan lists beneficial uses for surface waters and groundwaters within the San Joaquin River Basin. The beneficial uses, described in Section 4.3.2.3 under the CVRWQCB Basin Plan, include Municipal and Domestic Supply (MWN) and Agricultural Supply (AGR). The Basin Plan also lists water quality objectives for both surface waters and groundwaters within the San Joaquin River Basin.

The proposed project would not inject any water into the ground, so there would not be any direct impacts to groundwater quality. Groundwater quality and surface water quality could be affected if pollutants were introduced into surface waters from urban sources. Several design and operational features are included in the proposed project to reduce the discharge of pollutants in site runoff into surface waters. As explained in the Project Description, grassy swales and biofilters would be used throughout the campus for storm water conveyance, which would remove pollutants from the runoff. Site runoff would be collected in on-site detention and retention ponds from where it would be slowly discharged into Fairfield Canal. Storm water runoff would be directed to 19 on-site detention and two retention ponds ranging in capacity from 1.1 to 46.5 acre-feet (see Table 4.8-1). These detention/retention ponds would be designed to hold runoff from a 100-year, 24-hour storm. Based on MID requirements, the campus would release no more than the volume of water from a 10-year, 24-hour storm over a period of no less than 48 hours. The water would be required to drop to zero velocity before it could be discharged. If the water is pumped into Fairfield Canal, the campus would ensure that the pond is never less than 12 inches deep so that the bottom sediments are not drawn into the water discharged to the canal. If the water is released via a controlled structure, the campus would be required to ensure that no trash, oil, or grease is released into the canal. The detention of storm water and its slow release would ensure that sediments in the storm water would settle out and that the quality of water would be appropriate for discharge to Bear Creek, which is the final discharge point for Fairfield Canal. Therefore, design features included in the LRDP and the manner in which the site drainage would be collected and discharged would address pollutants in urban runoff, and surface water quality would not be impacted by runoff from the proposed UC Merced Campus. Furthermore, the campus would be subject to NPDES Phase II regulations that require development and implementation of urban runoff pollutant control programs. The impact to surface and groundwater quality would therefore be *less than significant*.

<u>Mitigation Measures</u>

No mitigation required.

4.8-2 Implementation of the LRDP would not substantially affect groundwater supplies. This is considered a *less-than-significant* impact.

The water demand at the full development of the campus would be approximately 3,620 acre-feet of water per year (see Section 4.15). This includes both potable water for indoor use and irrigation water for outdoor use. The campus may in the future develop an on-campus recycled water facility that would reclaim water from wastewater and used it for irrigation and toilet flushing. Based on estimates of the volume of wastewater at full development, it would be possible to meet the entire non-potable water needs of the campus using recycled water. The campus drainage design also includes on-site retention facilities to store storm water runoff from winter storms for irrigation use later in the year. Therefore, the estimated 3,620 acre-feet of water demand may not necessarily be supplied with potable water. However, the amount of storm water that would be available for irrigation would vary with rainfall and it is not certain at this time as to when the recycled water plant would come on line. Therefore, this EIR conservatively assumes that all of the water demand of the campus would be met with potable water. It should be noted that approximately 600 acre-feet per year of ground and surface water are used on the Merced Hills Golf Course for course maintenance within the portion of the golf course that would be developed with campus facilities. However, the analysis below conservatively does not discount for that existing usage.

The City of Merced has committed to supplying the campus with the required water by constructing groundwater wells on campus (Smith, 2001). The specific localized effect of groundwater wells is evaluated under Impact 4.8-4 below. The analysis presented here focuses on the region-or groundwater basin-wide impact of groundwater pumping necessitated by the project. Because the effects on groundwater levels and aquifer volume tend to be regional rather than localized impacts, this evaluation is presented in the context of regional water supply planning efforts and project impacts on these planning efforts.

MID and the City of Merced are the two main water agencies in eastern Merced County. The City provides potable water to residents and businesses within its Sphere of Influence by pumping from the Merced groundwater basin, which is bounded by the San Joaquin River, the Merced River, the Stanislaus County line, and the Chowchilla River. MID serves residents and agricultural users in its service area and utilizes diversions from Merced River and groundwater wells for this purpose. Surface water diverted from Merced River is stored in MID facilities and then conveyed via canals and irrigation laterals to the users. Area residents, businesses and agricultural users also draw groundwater from private wells and do not use water supplied by the City or MID.

In 1992, by a memorandum of understanding, the City of Merced and MID entered into a cooperative agreement to develop a long-range water resources plan. Pursuant to this agreement, the agencies prepared the 1995 Water Supply Plan that would help the agencies achieve five goals of: (1) managing groundwater resources, (2) providing a reliable supply of water to the cities, (3) protecting and enhancing the region’s economic base, (4) protecting MID’s Merced river water rights, and (5) maintaining consensus on water supply plan. The plan recommended that the groundwater elevations should be stabilized at 1992 levels. Historical trends showed that the use of MID-supplied surface water had been decreasing, and growers had been increasing the use of privately pumped groundwater. This was due in part to droughts and associated shortages of surface water, the use of advanced irrigation technologies, such as drip irrigation systems, and the ease and speed of obtaining groundwater relative to surface water. The Water Supply Plan therefore developed solutions that emphasized intentional recharge and actions that would encourage private well users to convert to surface water use. Since the adoption of the plan, the cooperating agencies have implemented several of the strategies in the plan with success.

- In 1997, MID adopted a Groundwater Management Plan that involves monitoring, water quality protection, conjunctive use, and public information and involvement. Conjunctive use measures include water conservation, which involves voluntary adoption of on-farm water conservation practices, groundwater recharge and extraction, which may include in-lieu groundwater recharge through strategic use of available surface water, incidental recharge accomplished through use of existing MID facilities, and intentional recharge accomplished through construction and operation of new recharge facilities or modification of existing facilities; cooperation with sphere-of-influence pumpers; cooperative relationships to manage groundwater outflows; pumping restrictions, if necessary, and ground extraction fees, if necessary.
- Consistent with the Water Supply Plan, MID has developed its Surface/Groundwater Optimization Program. The goal of this program is to improve water management resulting in greater reliability during dry years to offset potential impacts from increased water flows provided for fisheries under the San Joaquin River Agreement. Program objectives include: (1) increase system efficiency, (2) stabilize the groundwater table consistent with the Merced Water Supply Plan, (3) reduce dependency on groundwater in normal years (in-lieu recharge), and (4) allow for adequate use of groundwater in drought years (conjunctive use). Under this program, MID has been implementing an incentive program to encourage private well users to convert to the use of surface water. The incentive program includes financial incentives on a per acre basis. This program has targeted lands that have installed drip, microspray, or sprinkler systems which use private well. As of 1999, more than 850 acres had been converted to MID surface water under this program. When the conversion of the total target acreage is complete, average in-lieu groundwater acreage will be realized in the amount between 20,000 to 27,000 acre-feet of groundwater annually (Selb, 1999).

  MID offers another incentive program that pays 50 percent of the cost of a surface water delivery gate to those who historically used surface water but have for some reason converted to the use of groundwater. More than 160 acres have converted to surface water under this program (Selb, 1999).
- MID is also implementing the Highlands pilot project which replaces MID and private wells in a certain area of the county with surface water in a manner that the growers could irrigate as needed without scheduling irrigation with the MID water order office (Selb, 1999).
- MID is also implementing passive and intentional recharge. Passive recharge occurs from seepage of surface water from the MID surface water conveyance system. Because of its contribution to groundwater recharge, no major changes to the canals are proposed and passive recharge is expected to continue for some time. With respect to intentional recharge, a pilot project has been implemented and land for a second recharge basin has been acquired by MID (Selb, 2001).
- MID has also taken several steps to promote on-farm water conservation. On-farm conservation methods are demanding on surface water conveyance systems, have a low tolerance for delays in delivery of water, and therefore growers either do not implement on-farm conservation or tend to use groundwater. To address this and promote use of surface water, in the early 1990s MID replaced its old irrigation rotation schedule method with a new system that allows growers with Special Accounts to order water when they want in the amount they need. MID has been working on its delivery system to ensure that no more than

a day's notice is necessary to get a delivery of irrigation water (Selb, 2001). In addition to special accounts, MID offers several other account options that assure growers of a continuous water flow. The On Demand Flow Account closely simulates private well use. By tailoring water irrigation to water demand, not only are the growers diverted from the use of groundwater, fewer diversions are required resulting in increased storage (Selb, 1999).

- MID has also instituted numerous system improvements to reduce surface water travel time to the grower thereby conserving water and meeting irrigation needs in a timely manner, and to reduce spills, resulting in less water diverted from the Merced River. These systems improvements include regulating basins, system automation, conveyance system automation, education of water distribution system operators, and system flow capacity enhancements (Selb, 1999).

Furthermore, in response to changes in several conditions in the study area since 1995, the cooperating agencies in conjunction with UC Merced have commenced an update of the 1995 Water Supply Plan. This update analyses (1) the changing regulatory demands on Merced River flows and the effects of potential reductions in diversion from Merced River to MID facilities, and (2) trends indicating that the changing cropping patterns and irrigation technologies could reduce demand for surface water and increase the demand from private wells. The Update addresses these by analyzing the availability of surface water under three planning/regulatory scenarios in conjunction with the projected demand for water in the study area through 2040. On the basis of this analysis, the Update recommends solutions that include base level actions that must be implemented regardless of the planning scenario, and additional actions that would be triggered only under certain conditions. These base level actions include intentional recharge, incentives and related systems improvements, surface water conservation and automation, agricultural capacity improvements, urban capacity improvements, urban water conservation, and urban groundwater to surface water conversion (CH2M Hill, 2001). Several of these base level actions have been successfully implemented by MID over the past several years as described above.

Intentional recharge accounts for a substantial portion of the groundwater stabilization strategy of the cooperating agencies and is within the control of the cooperating agencies to implement. A very large area in the county has been identified as possessing the right geologic conditions for recharge. To address the issue of seasonally reduced flows from Merced River under certain regulatory conditions, the Update recommends additional recharge during wet years when more water is available from the Merced River (Eldridge, 2001). The Update shows that if the plan recommendations are implemented, groundwater levels would be stabilized at 1999 levels and impacts associated with overdraft of the groundwater basin on a regional (basinwide) basis would be avoided (CH2M Hill, 2001).

The implementation of the proposed project would not adversely affect the regional planning efforts and would therefore not result in an impact on the Merced groundwater basin. The project would not create a demand for water that was not anticipated in the Plan and it would not interfere with the Plan's reliance on recharge of the groundwater basin. The 1995 Water Supply Plan included UC Merced in its estimate of water demand, allowing for about 24,200 acre-feet per year of water for the campus and campus-related businesses. The Update also includes 7,400 to 11,700 acre-feet of water per year for the proposed campus (CH2M Hill, 2001). Both estimates are much greater than the amount of water that would be needed by the campus. The impacts to groundwater supplies due to the proposed project were taken into account during water supply planning for the region and have been accounted for at a greater value than the 3,620 acre-feet per year projected currently.

The project would not interfere with the groundwater recharge efforts of the water agencies. The project would not line or otherwise alter the MID canals on the campus site. To the extent feasible, given the site geologic conditions, the project would encourage groundwater recharge through the use of detention and retention basins as well as grassy swales for the conveyance of site runoff (as opposed to the use of underground storm drains). The University is also currently supporting the water agencies in their planning efforts through participation in the Water Supply Plan Update process and is committed to implementing water conservation and other measures as these are identified through the planning process to minimize the use of groundwater. For all of these reasons, it is concluded that the project would not interfere with or cause the depletion of the groundwater basin and that the impact on groundwater supplies would be *less than significant.*

Mitigation Measures

No mitigation required.

4.8-3 Implementation of the LRDP would increase impervious surfaces at the site, but would not substantially affect groundwater recharge. This is considered a *less-than-significant* impact.

Soils in the proposed UC Merced Campus location are characterized with a high runoff potential because there is a relatively thin layer of soil overlaying impervious rock. There is therefore currently limited recharge of groundwater at the site from the percolation of rainwater. Estimates of the amount and rate of runoff associated with development of the campus demonstrate an increase of 30 acre-feet (see Table 4.8-1) when compared to existing conditions.

Although the potential for significant recharge on the campus site is limited because of the high runoff potential of the soils and relatively thin layer of soil overlaying impervious rock, in compliance with SSEIR Mitigation Measure 4.2-4, the LRDP contains a policy that encourages percolation and recharge of the groundwater aquifer. In designing the campus, the University has provided for open space areas and detention basins that would provide for groundwater recharge on site to the maximum extent feasible. Because groundwater recharge on site without the project is limited, the addition of impervious surface on the campus would not significantly alter current groundwater recharge patterns, or interfere with groundwater recharge, and therefore the impact on groundwater recharge is considered *less than significant*.

Mitigation Measures

No mitigation required.

4.8-4 Implementation of the LRDP would require installation of groundwater wells on the campus site, which would not result in impacts on adjacent well yields or subsidence. This is considered a *less-than-significant* impact.

It is anticipated that water supply wells would be installed and operated on the campus by the City of Merced. Currently there are two known wells on the Merced Hills Golf Course. The domestic well is located behind the course maintenance building, and the irrigation well is located just north of the golf course pond. If a groundwater well is located within approximately 800 feet of another well (in the cone of depression), there could be interference in groundwater pumping that could affect the existing well's water quality or ability to supply water at existing rates. The existing wells on the golf course may continue to be used or may be replaced with new wells. Any effects on these wells would not be a concern. The nearest off-site wells are located in the Rural Residential Center area along Bellevue Road and on Lake Yosemite Regional Park. Because some of these wells would be less than 800 feet from the campus, the location of the groundwater well planned for Phase 1 Campus, and any future wells, would be determined with the location of existing wells taken into account and would be determined after test wells have been developed and analyzed. The project would therefore not result in impacts on the yields of adjacent wells. There are two major cones of depression located in the vicinity of the City of Merced. One is centered approximately 13 miles southeast of Merced in the Le Grand-Athlone area, and the second is located approximately 17 mile northwest of Merced. Neither of these known cones of depression is in the vicinity of the proposed UC Merced campus site. Consequently, installation of wells on the campus site would not affect known cones of depression.

Land subsidence in the San Joaquin Valley has occurred mostly in areas that are confined by the Corcoran Clay, where pressure changes caused by groundwater pumping promote greater compressive stress than in the unconfined zone. This condition does not exist in the Merced ground water basin and ground subsidence is not currently a significant problem in the Merced groundwater basin. Furthermore, groundwater extraction on the campus site would be monitored by the City of Merced to avoid excessive extraction that could lead to localized land subsidence. Therefore, the impacts related to subsidence due to the project would be considered *less than significant*.

Mitigation Measures

No mitigation required.

4.8-5 Implementation of the LRDP would alter site drainage patterns resulting in minimal erosion or siltation on or offsite. This is considered a *less-than-significant* impact.

As discussed in Section 4.6, most of the soils at the proposed campus site are characterized by moderate to slight erosion potential. Therefore, the potential for erosion or siltation on site due to altered site drainage is minimal. The site, in general, slopes from northeast to southwest. Cottonwood Creek headwaters are located on the site, in the southwestern corner. Historically, runoff would have collected and discharged via Cottonwood Creek. However, construction of the two canals has altered site drainage patterns. The bulk of runoff from the site is intercepted on the upslope side of Le Grand Canal, resulting in localized ponding and discharge of runoff into the canal. The runoff from the area between the two canals generally seeps or flows into Fairfield Canal. Some of this water then seeps under the canals and runs into the Cottonwood Creek drainage. Because the canals are unlined, some of the canal water also drains into Cottonwood Creek.

Site drainage patterns would be altered as a result of the construction of the proposed campus because site runoff would be directed into detention and retention ponds and then into the Fairfield Canal for final discharge into Bear Creek, about 6 miles south of the campus. To ensure that Cottonwood Creek is not adversely affected, a small amount of site runoff (about 5 cubic feet per second [cfs]) after detention would be discharged into Cottonwood Creek below Fairfield Canal. Thus, Cottonwood Creek would continue to receive as much water as it has in the recent past. During large storms, additional water (up to 15 cfs) could be discharged into Cottonwood Creek via Yosemite Lateral, a small irrigation feature on the campus site. Because Cottonwood Creek would not receive substantially increased volumes of storm water from the site, the potential for downstream erosion or siltation would be reduced. An analysis was conducted of estimated existing discharges in Cottonwood Creek at its confluence with Yosemite Lateral and the incremental water that would be added to the creek by the campus during large storms. The analysis showed that the 15 to 20 cfs added by the project would represent less than 3 percent of the flows in Cottonwood Creek at the discharge point, which would be an insignificant increase and would not cause downstream erosion or flooding.

The detention ponds would be managed in such a manner that the water would be required to drop to zero velocity before it could be discharged to Fairfield Canal, keeping erosion and siltation in the canal to a minimum as well. Under the new NPDS Phase II rules there would be requirements under the minimum control measures to present erosion and siltation and BMPs would be implemented to address these requirements. Therefore, impacts due to altered site drainage patterns on or offsite that could result in erosion or siltation are considered *less than significant*.

Mitigation Measures

No mitigation required.

4.8-6 Implementation of the LRDP would alter site drainage patterns but would not result in significant on or off site flooding. This is considered a *less-than-significant* impact.

The proposed project site is not located in the 100-year floodplain of Bear Creek. As discussed above, storm water runoff from the campus would be directed to 21 on-site retention and detention ponds ranging in capacity from 1.1 to 46.5 acre-feet (see Table 4.8-1) located mostly in the central portions of the campus, where it would be detained and then discharged at a predetermined flow rate into the Fairfield Canal. Because the canal is used to release water for irrigation during spring and summer and is not used in fall and winter, the campus would normally be able to discharge into the canal during the wet season.

Off-Site Flooding. As described above, the discharge of storm water into the canal would be metered. MID would install water elevation detectors in the canal, which would determine when releases to the canal would be allowed. MID has been monitoring and coordinating its canal discharges to Bear Creek with discharges from other facilities including the Army Corps of Engineers facilities at Bear Creek and Burns reservoirs. This coordination ensures that releases to Bear Creek from major regional sources do not exceed the creek's capacity and result in downstream flooding. MID would continue with its current practice of coordinating canal discharges. It would not allow campus storm water to be discharged when the water surface in the canal is at a certain elevation and when that volume of water combined with other regional flows could cause downstream flooding (Selb, 2001).

On-Site Flooding. MID has indicated that there may be occasions during the wet season when the campus may not be allowed to discharge to the canal because the canal is full with water released for flood control reasons. At such times, the campus would need to retain the entire volume of site runoff until such time that the canal becomes available for discharge. To provide for this contingency, the total volume of site runoff from a 100-year, 24-hour storm was estimated, and the capacity of the detention basins, drainage swales, and the recreational fields to retain this water was evaluated. The analysis showed that during such storms the recreational fields in the central portions of the campus that surround the detention ponds would be temporarily flooded and the use of those areas would be temporarily lost. However, there would be adequate capacity, up to 209 acre-feet, to retain the entire volume of runoff (162 acre-feet) on site, and there would be no impacts to on-site structures or off-site flooding impacts. Therefore, the impacts due to altered site drainage pattern that could result in on- or off-site flooding are considered *less than significant*.

Mitigation Measures

No mitigation required.

4.8-7 Implementation of the LRDP would create runoff from the site that would not exceed the capacity of storm drainage systems. This is considered a *less-than-significant* impact.

The campus storm drainage system is designed and sized to adequately accommodate surface runoff from the campus site. The requirement of releasing a limited amount of runoff over a 48-hour period has been imposed by MID to ensure that the capacity of the canal is not overwhelmed by the campus discharge, and the safety of the canal is not compromised. Furthermore, as discussed above, MID will not allow discharges into the canal when the canal water elevation is at a predetermined level, which would also be protective of the canals. Therefore, any impacts to the capacity of the storm drainage system would be *less than significant*.

Mitigation Measures

No mitigation required.

4.8-8 Implementation of the LRDP would not adversely affect water quality from the discharge of wastewater or use of reclaimed water. This is considered a *less-than-significant* impact.

The campus would generate wastewater that would require treatment and disposal. Potential water quality impacts could result if the campus related wastewater is inadequately treated before the effluent is discharged, or if inadequately treated wastewater is reused for purposes such as campus grounds irrigation.

Impacts from Discharge of Wastewater. The City of Merced would provide wastewater treatment services to the campus in the initial phases of development and may continue to serve the campus through full development if a new recycled water facility to treat the campus' wastewater is not constructed. The City treats wastewater at its wastewater treatment plant (WWTP) located to the south of Merced. After advanced secondary treatment, the City discharges 75–80 percent of its treated effluent for agricultural purposes via a City-owned canal to Hartley Slough, approximately one-third mile upstream of its confluence with Owens Creek. In addition, approximately 20–25 percent of the reclaimed wastewater is diverted from the effluent channel to maintain a 385-acre mitigation wetland area and is occasionally used as a supplemental irrigation source for 580 acres of City-owned crops.

The effluent is discharged to Hartley Slough pursuant to a Waste Discharge Requirements (WDRs) from the Regional Board. Potential concern relative to campus wastewater would be whether the volume and/or quality of wastewater from the campus could affect the ability of the City's WWTP to meet its WDRs. The City has indicated that it has adequate capacity to handle the flows from the campus through 2011 and if these flows are added to the influent treated by the WWTP, the combined volume would not affect the ability of the WWTP to meet its WDRs. Although the WWTP is currently under a cease and desist order, the City is constructing improvements necessary to address the ammonia exceedances that were responsible for triggering the cease and desist order. These improvements will be completed by spring 2002 (Stroud, 2001).

The campus would be required to meet effluent limits established by the City that would in turn ensure that treated effluent would not adversely affect surface or groundwater quality. These limits could potentially require that as lab space is added to the campus, a pretreatment program is implemented to avoid impacts from hazardous materials in campus effluent.

Impacts from Potential Use of Recycled Water. Approximately 365 acres of the 910-acre Main Campus would require irrigation. Additional areas would be landscaped with drought-resistant landscaping that would not require irrigation. The full campus would require 1,310 acre-feet of irrigation water per year. In later phases of campus development, it is envisioned that reclaimed water may be used for grounds irrigation and possibly toilet flushing in non-residential buildings. Therefore during the later phases of campus development, some of the campus wastewater may be treated on site at a recycled water plant with the aim of producing recycled water for campus irrigation and other nonpotable water uses. Such a recycled water plant would be constructed for purposes of reclaiming water, as well as for demonstration and environmental education. It is estimated that by using on-campus wastewater, such a facility could produce all the irrigation water needed by the campus at full development. This would be a tertiary treatment facility that would produce the reclaimed water that meets Title 22 requirements (i.e., full body contact with the water is considered safe). Because the treated water would meet Title 22 requirements, the use of the water for irrigation and nonresidential toilet flushing would not affect surface water quality. By complying with Title 22 standards, no adverse impacts to groundwater quality and related beneficial uses would be anticipated. The potential impact is considered to be *less than significant*.

Mitigation Measures

No mitigation required.

4.8-9 Implementation of the LRDP will increase silt and sedimentation during construction but will not adversely affect water quality. This is considered a *less-than-significant* impact.

Development of the proposed UC Merced Campus would require construction and construction-related activities such as grading and excavation for several new building foundations, roads, and driveways, and trenches for utilities. Temporary impacts from the project could include increased erosion during construction, which could eventually be transported into nearby creeks and storm drains with storm runoff. The potential also exists for spills and leaks of lubricants and other fluids associated with equipment during the construction phase.

Contractors will be required to file a Notice of Intent (NOI) to be covered under the California General Construction Activities Storm Water NPDES Permit (Order No. 99-08-DWQ) for project construction sites greater than 5 acres. Before construction begins, an NOI to comply with the permit must be submitted to the State Water Resources Control Board. Coverage under the permit will not occur until the applicant develops an adequate Storm Water Pollution Prevention Plan (SWPPP) for the construction project. Upon completion of construction and when final stabilization of the site has been achieved, a Notice of Termination (NOT) will be filed. For construction activities that begin after March 2003, an NPDES permit will be required for construction sites greater than 1 acre.

Required elements of a SWPPP would include a site description addressing the elements and characteristics specific to the UC Merced campus site, descriptions of BMPs for erosion and sediment controls, BMPs for construction waste handling and disposal, implementation of approved local plans, proposed postconstruction controls (including a description of local post-construction erosion and sediment control requirements), and non–storm water management.

BMPs to eliminate or reduce non–storm water discharges to receiving waters include (1) scheduling or limiting activities to certain times of year, (2) prohibiting certain construction practices, (3) implementing equipment maintenance schedules and procedures, (4) implementing other management practices to prevent or reduce pollution, such as using straw bales, dikes, silt fences, sediment traps, mulching, or vegetation maintenance, and (5) implementing a monitoring program.

Because the proposed UC Merced Campus would be required by state law to comply with construction management procedures as stipulated in the CVRWQCB's General Construction Activity Storm Water Permit, the water quality effects associated with construction activities are considered to be *less than significant*.

Mitigation Measures

No mitigation required.

4.8.3.4 Cumulative Impacts

4.8-10 Increased impervious surfaces associated with development within the drainage basin could cumulatively increase surface runoff, but would not substantially increase local and regional flooding. This cumulative impact is considered to be *less than significant*.

Campus, University Community, and Campus Parkway. Development of the University Community in conjunction with the proposed campus would increase the total amount of impervious surface and increase the amount of runoff from the areas overlain by these impervious surfaces in comparison with current conditions. However, as discussed above (see discussion of Impacts 4.8-3 and 4.8-5), the permeability of the soils on the campus site is low, and as a result, the existing runoff potential of the site is high. In comparison with existing conditions, the increase in the amount of runoff associated with development of the campus is estimated at 30 acre-feet (see Impact 4.8-3). The permeability of the soils within the University Community area is also generally low to moderate. In comparison with existing conditions, the amount of runoff associated with development of the University Community is 58 acre-feet. Both projects would therefore increase surface runoff within the watersheds of Cottonwood Creek, which eventually drains to Bear Creek. The Campus Parkway project would also increase the amount of impervious surfaces in this portion of the county and increase storm water discharges to Bear Creek. Cumulative effects below are therefore discussed in terms of localized effects on the Cottonwood Creek watershed, and the more regional effects on Bear Creek.

The campus site is located in the area comprising the headwaters of Cottonwood Creek. The parts of the Cottonwood Creek watershed downgradient from the campus include the Flying M Ranch and the area east of Lake Road that includes the University Community. Storm water that could flow to Cottonwood Creek would be detained in the southwest corner of the campus site in detention basins in subwatersheds LG 12.1 and LG 12.2 (see Figure 2-12, Site Drainage Plan). Outdoor recreation facilities are planned in this area and therefore it would not be paved and would be similar to existing conditions. The basins in this area could not contain the volume from a 100-year, 24-hour storm, however, and an estimated 10 to 15 cfs would flow to Cottonwood Creek through the University Community. The University Community has calculated that 100-year, 24-hour peak flow at Lake Road within the Cottonwood Creek drainage would be 395 cfs. The postdevelopment drainage infrastructure in the University Community would redirect a significant amount of water into the Fairfield Canal rather than into Cottonwood Creek. It is not anticipated that the additional runoff from the campus would significantly alter the Community's postdevelopment drainage patterns and thus would not have a cumulative effect on the Cottonwood Creek watershed.

In addition to the storm water runoff that could flow to Cottonwood Creek, runoff from LG 13 would flow to the University Community. If this area of the Community is not developed, additional storage would be designed on the campus site to capture the runoff. If the Community is developed in this area, the runoff would be retained in the University Community's detention basins for discharge to Fairfield Canal. This water would eventually be discharged to Bear Creek.

Both the campus and the University Community would release storm water flows to the Fairfield Canal, which is tributary to Bear Creek. As discussed with respect to Impacts 4.8-5 and 4.8-6 above, the storm water control system for the campus would include on-site detention ponds and other storm water retention areas (designed to capture the entire 100-year, 24-hour storm event) that would be operated so that storm flows would be detained and discharged into the Fairfield Canal at rates that would be determined and controlled by MID. This would preclude downstream flooding. The drainage plan for the University Community also provides for storm water runoff from the Community to be discharged to the Fairfield Canal system. As with the campus, the storm water control system specified in the University Community plan calls for detention and retention basins that will be operated to regulate the flow of storm water conveyed to the Fairfield Canal, but the storm water system in the Community would be sized to capture only the 10-year, 24-hour storm volume.

Thus, in the event of a storm greater than the 10-year, 24-hour event, storm water runoff from the University Community could exacerbate flooding conditions by increasing water surface elevations in areas subject to 100-year flood hazard. With mitigation, the University Community would reduce this impact to a *less-than-significant* level.

Because the campus has the ability to retain the storm water in on-site detention and retention basins designed to hold the volume from a 100-year, 24-hour storm event, there would not be a contribution from the campus to increased surface water elevations in Fairfield Canal. During storms less than a 10-year event, both the campus and University Community would have control systems that would be operated to regulate the flow of storm water to Fairfield Canal, and the discharges from both projects would be coordinated and overseen by MID. In storms greater than a 10-year event, the campus could continue to coordinate with MID to control discharges to Fairfield Canal and no cumulative downstream flooding impacts would occur. The cumulative impact is therefore considered to be *less than significant.*

Other Cumulative Development. The broader geographic area for analysis of cumulative impacts to local and regional flooding includes the storm water flows that would continue through Fairfield Canal into Bear Creek and on into the San Joaquin River. As explained under Impact 4.8-6, MID regulates its canal discharges and coordinates with discharges from other major sources. These combined efforts of MID and other agencies in the area including the Army Corps of Engineers are expressly designed to avoid impacts from the flooding of Bear Creek and other major waterways in the region. The project's contribution of storm water would be controlled and would not contribute to a cumulative regional impact related to flooding. The cumulative impact is therefore considered to be *less than significant.*

4.8-11 Increased impervious surfaces associated with development of the campus and other development overlying the groundwater basin would not substantially reduce groundwater recharge potential. This cumulative impact is considered to be *less than significant.*

Campus, University Community, and Campus Parkway. The existing groundwater recharge potential of the Campus, Community, and Campus Parkway project sites is low because of the relative impermeability of the underlying soils. Groundwater recharge within this area largely occurs within stream channels and unlined canals. These development projects will not interfere with recharge from stream channels and canals.

Nevertheless, development of the Campus together with the University Community and Campus Parkway could, by increasing the amount of impervious surface, reduce recharge to the groundwater basin to some degree in comparison with existing conditions. However, both the proposed campus and the University Community will contain retention and detention basins, swales, and open space areas that would detain rainwater and allow percolation and infiltration into the underlying groundwater basin. The Campus Parkway may also include detention basins within the right-of-way to hold roadway runoff. Therefore, because the existing groundwater recharge potential of both sites is already low and the UC Merced Campus and University Community and possibly Campus Parkway would add detention basins, the cumulative impacts to groundwater recharge potential are considered *less than significant*.

Other Cumulative Development. The broader geographic area for analysis of cumulative impacts to groundwater recharge is the Merced groundwater basin. Growth and development within the County will increase the amount of impervious surfaces overlying this basin, reducing the surface area available for groundwater recharge.

MID's 1995 Water Supply Plan and Update include groundwater management as one of its goals. As a component of this Plan, MID is implementing a groundwater recharge and management program that will maintain the basin's groundwater supply at either 1992 or 1999 levels through the year 2030 or 2040 (using either the 1995 Water Supply Plan or the updated plan projections). This program is designed to stabilize groundwater levels after taking account of projected cumulative growth in the region and its effect on groundwater supplies including the very small relative reduction in recharge due to cumulative urban development. The cumulative impact of development reducing groundwater recharge potential is accordingly considered to be *less than significant*.

4.8-12 Increased demand for groundwater from the development of the campus, University Community, and other development would not substantially affect the groundwater basin. This cumulative impact is considered to be *less than significant.*

The groundwater in the basin underlying this portion of Merced County has a total stored volume of approximately 30 million acre-feet of water. Cumulative withdrawals include withdrawals by the MID for agricultural and urban use, and pumping by the City of Merced and others for agricultural and urban use. The basin is recharged by deep percolation of irrigation water, deep percolation of precipitation, subsurface inflow, and seepage from irrigation canals, rivers, and creeks in the basin.

Campus, University Community, and Campus Parkway. At full development, the campus will require 3,620 acre-feet of water per year (afy). Potable water demand for the University Community at buildout is estimated at 3,583 afy. Maximum total cumulative demand on groundwater would thus be 7,203 afy. If existing groundwater use on the two sites is deducted, total combined groundwater demand would be 5,559 afy.

By either 2030 or 2040 (using either the 1995 Water Supply Plan or the updated plan projections), urban water demand is projected to increase to approximately 120,000 afy. Of this projected total, the amount in the 1995 Water Supply Plan for the proposed UC Merced campus and associated businesses and activities accounted for 20 percent, or 24,000 afy. While businesses and activities associated with the campus are included, the actual University Community was not a concept in 1995 and was not separated out in the water demand figures. However, given that the recommended alternative in the 1995 Water Supply Plan was to maintain groundwater elevations at the 1992 levels using intentional recharge and other strategies, the 24,000 afy included in the 1995 Water Supply Plan for UC Merced should be more than adequate for cumulative demand for groundwater. The Water Supply Plan Update also takes into account 7,400 to 11,700 acre-feet of water as the projected demand for the campus at full development. Thus, with the implementation of the recommendations of the Water Supply Plan and its Update, cumulative impacts on groundwater supply are considered *less than significant*.

Other Cumulative Development. The Merced Water Supply Plan and Update estimate that by the year 2030 or 2040, the population served by MID will increase 300 percent. The Water Supply Plan estimates that the City of Merced would require 60,000 afy by 2030, and total urban water demand for Merced, Atwater, and Livingston, together with the unincorporated areas surrounding the City of Merced, would be 100,000 afy. The total yearly demand for water for urban use in 2030 or 2040 will be approximately 120,000 afy, an increase of 81,000 afy over 1990 levels. Because groundwater is used to supply all water needed for urban use within the City's sphere of influence, it is expected that this increase in urban demand will be supplied from groundwater.

In the 1995 Water Supply Plan, agricultural demand on groundwater supplies was projected to decrease due to greater efficiency in agricultural water use and a trend toward cultivation of crops that use less water together with urban growth on agricultural land irrigated with groundwater. However, trends in the Department of Water Resources data from 1974 through

1995 indicate that while urban lands have increased in MID's service area, unirrigated lands have been put into production outside the service area, thus resulting in an approximate "little net loss" of agricultural land in the water supply plan study area (CH2M Hill, 2001). Accordingly, urban growth will result in an increased demand for groundwater that will not necessarily be offset by a proportionate reduction in agricultural use due to these factors.

However, as noted under Impact 4.8-2 above, in accordance with its 1995 Water Supply Plan and the Plan Update, MID is implementing programs designed to maintain the basin's groundwater supply at either 1992 or 1999 levels through the year 2030 or 2040. With implementation of these programs by MID, the cumulative impact of development on groundwater supply will be mitigated to a *less-than-significant* level.

4.8-13 Increased impervious surfaces associated with the campus and other development could cumulatively increase urban contaminants in surface runoff, but would not adversely affect the quality of receiving water. This cumulative impact is considered to be *less than significant*.

Urban development could lead to the release of urban contaminants in storm water and their accumulation in regional drainages. Without proper management of such urban contaminants, the quality of receiving water could be adversely affected, limiting its ability to support designated beneficial uses.

Campus, University Community, and Campus Parkway. Development of the campus, University Community, and Campus Parkway would not contribute to a cumulative impact. As explained under Impact 4.8-1, storm water runoff from the campus would be directed to on-site detention ponds before it is pumped into the Fairfield Canal. Limitations on velocity of the inflow and the rate of release would ensure that sediments, heavy metals, and similar contaminants are not discharged into the canal. In addition, grassy swales and biofilters would be used throughout the storm water conveyance system to remove pollutants from runoff. Similarly, the University Community Plan requires implementation of a set of Best Management Practices (BMPs) for controlling releases of sediment and urban pollutants in storm water that will ensure no net deterioration of storm water quality. Because after 2008, Merced County would be required to comply with NPDES Phase II regulations, the Campus Parkway, as a county roadway, would also be required to include BMPs to control releases of sediment and urban pollutants in storm water that will ensure no net deterioration of storm water quality. This cumulative impact is accordingly considered to be *less than significant*.

Other Cumulative Development. The broader geographic area for analysis of cumulative impacts is the San Joaquin River Basin watershed within Merced County. All future development projects in both the unincorporated and incorporated areas of Merced County will be required to meet the requirements of the NPDES Phase II program, which requires that source control and nonpoint source BMPs be employed to control potential effects on water quality and that storm water quality control devices be incorporated into storm water collection systems to collect sediment and other pollutants.

Although Merced County will be required to apply for NPDES permits after March 2003, the fully implemented Phase II NPDES programs are not required to be implemented for approximately 5 years. Because the County would not necessarily be required to implement the Phase II rules in 2003, there could be a potential for urban contaminants to affect receiving water quality which could be a potentially significant impact. However, as stated in Section 4.8.2.3, Water Quality Regulations, the EPA already has a draft version of the Phase II rules available that describe BMPs to meet the minimum control measures. To mitigate for this potential impact, the County would prepare a SWPPP and a storm water quality-monitoring program in compliance with the Phase II NPDES requirements. The cumulative post-development impacts would, therefore, be less than significant with the County's compliance with Phase II NPDES requirements.

In addition, while significant water quality problems currently exist in the San Joaquin River and various tributaries to the river, this deterioration in water quality is largely the result of pollutants contained in storm flows and irrigation return flows associated with agricultural operations. Such flows from agricultural operations include silt and sediments containing salts, naturally occurring metals and minerals such as selenium, lead, copper, and zinc, as well as fertilizers and other nutrients, nitrates, bacteria, and other organic matter, and significant quantities of pesticides and herbicides. While similar contaminants can be found in urban storm waters, the relative concentrations of such contaminants found in urban storm flows are far lower than in storm flows and irrigation return flows from agricultural areas. Accordingly, to the extent cumulative growth and development in Merced County results in the conversion of agricultural land to urban uses, the relative quality of receiving waters will not decline and may improve in comparison with existing conditions. This cumulative impact is, therefore, considered to be *less than significant.*

4.8-14 Development of the campus and other development cumulatively would not substantially affect water quality because of the discharge of wastewater or use of reclaimed water. This cumulative impact is considered to be *less than significant.*

Campus, University Community, and Campus Parkway. For a period of time before full development of the campus, wastewater treatment would be provided to the campus by the City of Merced wastewater treatment plant. The University Community would employ a combination of decentralized wastewater management, relying on advanced process treatment and an underground drip irrigation disposal system, production of tertiary treated recycled water in a wastewater recycling plant, and conveyance of wastewater to a municipal wastewater treatment plant for treatment. The Campus Parkway would not result in wastewater discharges.

With respect to wastewater to be treated by the City's WWTP, the wastewater would be fully treated to advanced secondary standards. After treatment, effluent from the wastewater treatment plant is reclaimed for use in agricultural irrigation and for maintenance of a mitigation wetland area. All such reclaimed effluent discharged by the City's WWTP must meet Regional Water Quality Control Board Waste Discharge Requirements. Wastewater generated by the campus conveyed to the City's plant for treatment would be required to meet the wastewater quality limits established by the City for wastewater to be treated at the City's plant. Implementation of these standards will help to ensure that treated effluent discharged from the City's wastewater treatment plant will not adversely affect surface or groundwater quality.

Under applicable state regulations relating to use of recycled wastewater (Title 22 of the California Code of Regulations), any recycled wastewater used in irrigating landscaping by the campus and the University Community must be treated to tertiary standards and disinfected. Compliance with these regulatory standards will ensure that the quality of recycled wastewater would not have any adverse water quality impacts. The University Community would also use a decentralized wastewater system that would produce an effluent that would be used in an underground drip irrigation disposal system. While this water would not be required to meet Title 22 requirement, the RWQCB has determined that this water would not adversely affect water quality (Boxer, 2001). Therefore, no cumulative adverse impact on water quality from the use of reclaimed water is expected, and the cumulative impact is considered to be *less than significant*.

Other Cumulative Development. The City of Merced plans to expand its wastewater treatment plant to accommodate growth anticipated within the City's SUDP and SOI. The City's current plans call for additional capacity, to be constructed in two phases. This will be sufficient capacity to serve a projected population in the City's SUDP and SOI through 2030. Because the wastewater from the required growth would be treated to advanced secondary standards, the cumulative treated effluent from the campus, University Community, and the regional growth would not result in significant water quality impacts when discharged for disposal or applied to agricultural lands as irrigation water. This cumulative impact is therefore considered to be *less than significant*.

4.8.4 Compliance with the Basin Plan

The CVRWQCB has established water quality objectives for the Sacramento River and its tributaries in the Water Quality Control Plan for the Sacramento River Basin and San Joaquin River Basin (Basin Plan) in order to protect the beneficial uses of these waters. The CVRWQCB issues permits for discharges to waters within its jurisdiction. In issuing these permits, the CVRWQCB evaluates the project for its potential to impact beneficial uses of the receiving water. An analysis of the effects of the campus on the beneficial uses of affected waters is presented below.

Impacts to Lake Yosemite Beneficial Uses. Existing beneficial uses designated for Lake Yosemite include water contact recreation, non-contact water recreation, warm and cold freshwater habitat, and wildlife habitat (Basin Plan, Tbl. II-I.). To protect these uses, the Basin Plan's water quality objectives require, among other things, that water shall not contain excessive coliform concentrations, biostimulatory substances, floating materials, oil and grease, pesticides, or sediment, sediments, erosion, and urban contaminants generated by construction and operations activities. Lake Yosemite would not be adversely affected by the project because small amounts of stormwater runoff from the Campus would be discharged to Lake Yosemite via grassy swales that would remove pollutants.

Impacts to Cottonwood Creek, Bear Creek, and San Joaquin River. Drainages in the vicinity of the campus site such as Cottonwood Creek and Bear Creek ultimately drain into the San Joaquin River. The designated beneficial uses for the stretch of the San Joaquin River that could potentially be affected include potential uses for municipal and domestic supply, existing uses for irrigation and stock watering, process industry, contact recreation, canoeing and rafting, and other noncontact recreation, warm freshwater habitat, warm and cold migration, warm spawning and wildlife habitat, and potential uses for cold spawning (See Basin Plan, Tbl. II-1). The Basin Plan also provides that the beneficial uses of any specifically identified water body generally apply to its tributary streams. Accordingly, the beneficial uses designated for the San Joaquin River are considered to apply to its tributaries. Campus development would not result in a violation of surface water quality objectives for the San Joaquin River because the campus will manage its discharges as set forth above (see Impact 4.8-1) to prevent discharges of pollutants into drainages. For the same reasons, project impacts to Cottonwood Creek and Bear Creek water quality and their associated beneficial uses are expected to be less than significant.

Wetlands. The Basin Plan includes wildlife habitat as a beneficial use for the support of terrestrial or wetland ecosystems. The project would not violate any water quality objectives that apply to wetlands. As explained above (see Impact 4.8-1) grassy swales, filters, detention ponds and other management practices will be incorporated into the storm drainage system design to ensure that pollutants are removed from urban runoff. More importantly, the drainage facilities are designed to redirect surface runoff from developed areas to the on-site detention ponds and away from any wetland areas outside the boundaries of the Main Campus. Thus, the project is anticipated to result in a less-than-significant impact to wetlands water quality and their associated beneficial uses.

Groundwater Quality Beneficial Uses. To protect designated beneficial uses related to municipal and domestic water supply and agricultural water supply, the Basin Plan's groundwater quality objectives require, among other things, that groundwaters must not contain concentrations of chemical constituents that adversely affect these beneficial uses. The Basin Plan's groundwater quality objectives also require that groundwaters must be free of toxic substances in concentrations that produce detrimental physiological responses in human, plant, animal, or aquatic life associated with these beneficial uses. The project would not inject water into the ground, so no direct effects on groundwater quality would occur. Groundwater quality, however, could be affected if pollutants were introduced into surface waters from urban sources. For example, although the proposed campus is not located in an area of known groundwater quality problems, past studies have shown that high levels of nitrates exist in the groundwater because of present and past cattle grazing. If effluent from wastewater treatment were used to irrigate agricultural, landscaping, or other lands, groundwater quality could be affected if the effluent were not treated to an acceptable level. The University, however, proposes initially to discharge campus-generated wastewater to the City of Merced Wastewater Treatment Plant. The University would develop and implement a pretreatment program if required by the City of Merced prior to discharge.

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