

4.7 HYDROLOGY AND WATER QUALITY

This section of the EIR describes the existing hydrology and water quality on campus and analyzes the potential physical environmental effects related to drainage and hydrology, water quality, and water hazards that may occur due to implementation of the 2007 LRDP. The hydrologic setting in the section is based on UCI's Storm Drain Master Plan prepared in May 2003. Effects to groundwater and from flooding are also addressed. Impacts of the 2007 LRDP on existing and future water supply sources and wastewater treatment are described and analyzed in Section 4.13.

4.7.1 ENVIRONMENTAL SETTING

4.7.1.1 SURFACE WATER DRAINAGE

Regional Drainage

The UCI Campus is located within the Santa Ana River Hydrologic Unit (801), as shown on Figure 4.7-1. The Santa Ana River Hydrologic Unit covers approximately 300 square miles within Orange County. Within the Santa Ana River Hydrologic Unit there are four watersheds, including the San Diego Creek Watershed within which the UCI campus is located (Figure 4.7-2). The San Diego Creek Watershed covers approximately 112 square miles in central Orange County and includes portions of the cities of Costa Mesa, Irvine, Laguna Woods, Lake Forest, Newport Beach, Orange, Santa Ana, and Tustin. The San Diego Creek Watershed consists of two primary drainages consisting of San Diego Creek and Peters Canyon Wash. The drainage area is bounded on the northeast by hilly coastal uplands, on the east by steep foothill uplands, on the southeast and southwest by rolling to steep coastal uplands, and on the west by level alluvium. San Diego Creek and Peters Canyon Wash join as they leave the gently sloping lowlands of the watershed to form the main channel of San Diego Creek, which flows southwest approximately 4 miles through flat lowlands to Upper Newport Bay. The entire drainage ranges in elevation from sea level to about 1,700 feet above mean sea level (MSL).

Approximately two-thirds of the San Diego Creek Watershed is covered by dense development consisting of a variety of land uses including high density commercial and residential uses, medium density residential areas, and open space areas. The majority of the creeks and drainages within the watershed, including the San Diego Creek and Peters Canyon Wash have been modified for flood control purposes. The San Diego Creek and Peters Canyon Wash have been channelized and hydrologically improved to accommodate projected storm water flows from 100-year flood events. Other creeks and drainages consist of engineered channels and culverts.

UCI Drainage

The San Diego Creek Watershed has been divided into 15 subwatersheds: San Diego Creek, Lower Newport Bay, Bonita Creek, Sand Canyon Wash, San Joaquin Channel, Santa Ana Delhi Channel, Serrano Creek, Borrego Wash, Bee Canyon, Mashburn Channel, Central-Irvine Channel, Agua Chinon Wash, Hicks and Rattlesnake Canyons, Peter's Wash, and El Modena-Irvine Channel (Newport Bay/San Diego Creek Watershed Management Study, 2001).

The UCI campus is located within the San Diego Creek and Bonita Creek subwatersheds. The San Diego Creek subwatershed includes the majority of the UCI campus and the surrounding areas and consists primarily of commercial, industrial, institutional, and residential development. The southern part of the campus is located within the Bonita Creek subwatershed and is primarily undeveloped.

The drainage areas on the UCI campus can be divided into five general areas each containing several different drainage paths. The majority of the campus, including the Main Campus, South Campus, and West Campus all drain to the north into San Diego Creek. The East Campus drains toward the northeast and intercepts off-site flows from the Turtle Rock Community. Drainage patterns located in between SR-73 and the West campus, which includes the University Research Park, and the south side of campus, drains to the southeast and south directly into culverts and natural channels that run along Bison Road and Culver Drive and from there flow into Bonita Creek. Drainage from the North Campus occurs in a southeasterly direction into the SJFM.

4.7.1.2 WATER QUALITY

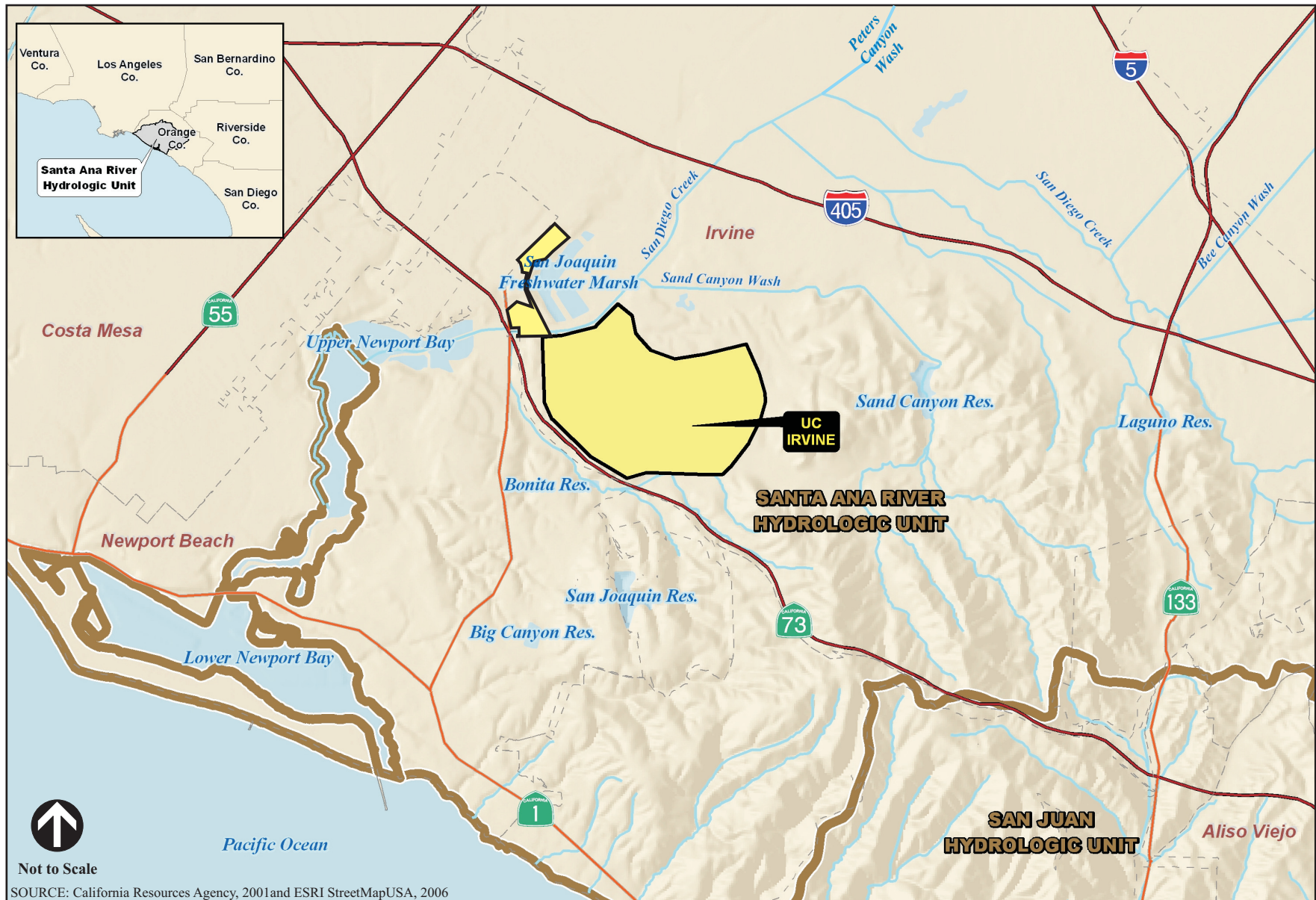
This section discusses the existing water quality of the runoff from UCI and the measures that UCI is implementing to prevent or reduce pollutants from entering its runoff.

Runoff is a term used to describe any water that drains or runs off of a defined land area into a waterway. Runoff can be the result of rain, in which case it is also sometimes referred to as storm water. Runoff can also result from various other sources or activities such as irrigation, hosing down of areas, errant wash water from cleaning, leaks in pipes, and air conditioner condensation. When runoff is not the result of natural precipitation, it is sometimes referred to as non-storm water. This section describes the existing water quality of the runoff that is discharged from UCI campus as storm water and non-storm water.

General hydrologic characteristics, land uses, and activities that involve pollutants have the greatest influence on the water quality runoff from a given area. The UCI campus includes a variety of land uses and activities that have potential to produce pollutants that could adversely affect water quality. Table 4.7-1 summarizes the activities and sources of pollutants for the UCI campus and their associated pollutants. If improperly managed, these pollutants can be deposited in areas such as streets, parking lots, and walkways, and when exposed to precipitation or non-storm water runoff can be washed downstream to the drainage system and receiving waters.

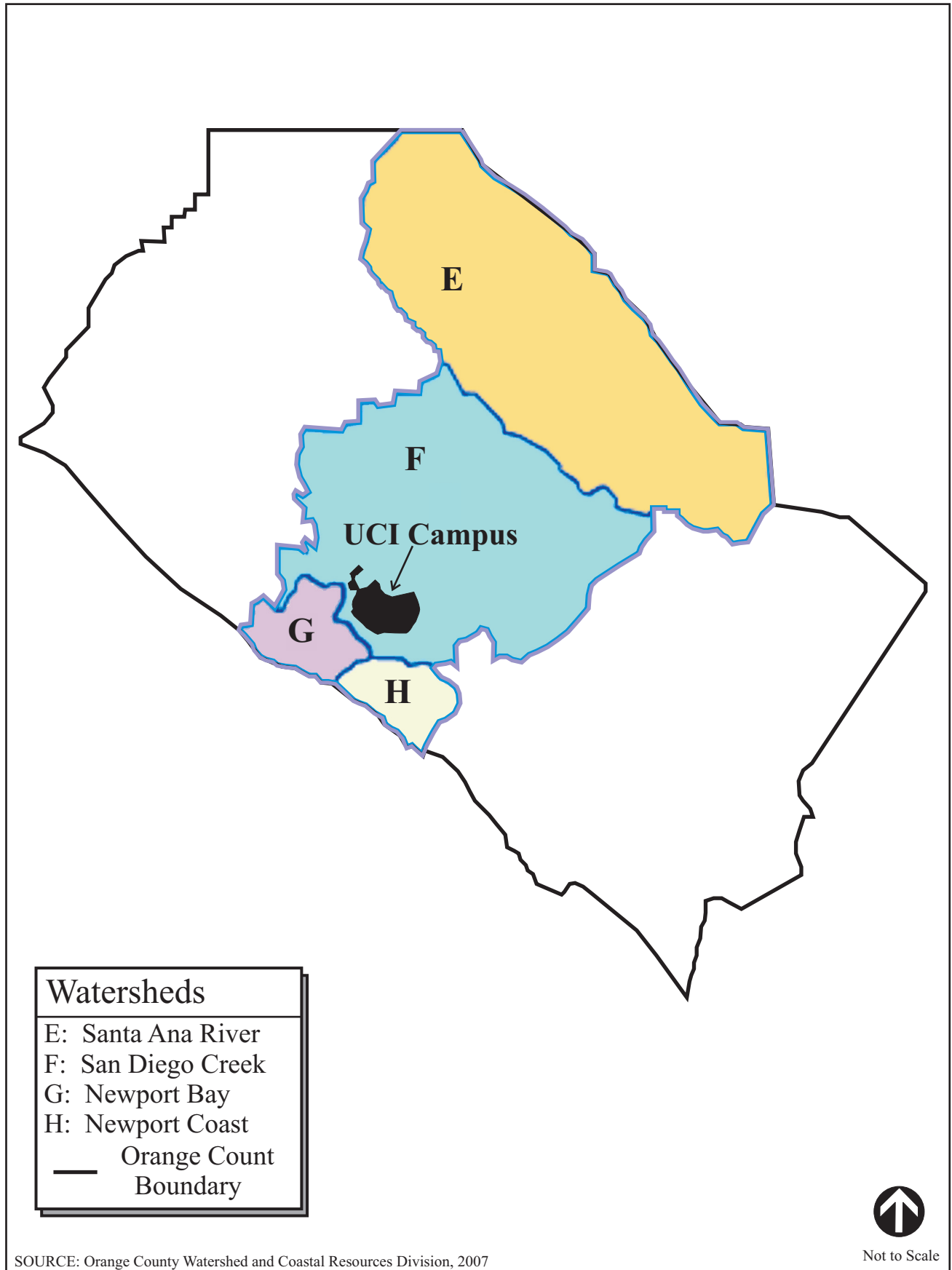
Measures that UCI are taking to reduce the discharge of the pollutants are documented in its Storm Drain Master Plan (SDMP) and Storm Water Management Plan (SWMP). Both plans were prepared to comply with the General Small MS4 Storm Water Permit issued by the SWRCB under the Phase II National Pollutant Discharge Elimination System (NPDES) requirements. These regulations are described further below in Section 4.7.2. The plans identify pollutant sources potentially affecting the quality and quantity of storm water discharges, provide Best Management Practices (BMPs) for campus operational and construction activities implemented by UCI staff and contractors, and provide measurable goals for the implementation of the plans to reduce the discharge of the identified pollutants into the storm drain system and associated waterways. BMPs include treatment controls, operating procedures, training and education, and practices to control site runoff, spill, leaks, and waste disposal. BMPs are required to be updated accordingly to comply with any additions and/or modifications to the NPDES permit requirement or site conditions.

As part of its storm water management program, and to facilitate compliance with the General Construction Storm Water Permit, UCI requires contractors to prepare a Storm Water Pollution Prevention Plan (SWPPP) for construction activities. The SWPPP is required to identify pollution sources and provide related control measures or BMPs, particularly for erosion control, non-storm water management, waste management, and water pollution. The SWPPP also covers other required elements such as training and a construction BMP maintenance, inspection, and repair program. Storm water pollution prevention drawings (SWPPD) specific to the project would be added to illustrate the locations, application, and deployments of the required BMPs, as well as on-site drainage patterns.



REGIONAL HYDROLOGY IN VICINITY OF UCI CAMPUS

FIGURE 4.7-1



SANTA ANA RIVER HYDROLOGIC UNIT WATERSHEDS

FIGURE 4.7-2

Table 4.7-1. Potential Pollutant Activity or Sources List

Activity/Source	Pollutants of Concern
Building maintenance (i.e., washing, graffiti abatement)	Waste water, paint chips, cleaning products, dirt and sediment, detergents
Chemical spills	Various cleaning compounds, diesel, paint, hazardous materials, vehicle fluids, hydrocarbons, oil and grease
Construction activities	Concrete, drywall, paint, sediment
Erosion	Sediment, organic matter
Food service operations	Wash water, food residue, bacteria, oil and grease
Grounds maintenance	Green waste, fuel, oil, pesticides, herbicides, fertilizers, sediment
Impervious areas	Increased flows and pollutant loading
Irrigation runoff	Chloramines, fertilizers, pesticides, sediment
Litter and debris	Litter and debris
Loading/unloading areas	Petroleum products, fertilizers, pesticides, herbicides, cleaning solutions, paint
Outdoor storage of raw materials	Sand, asphalt, soil, pesticides, herbicides, fertilizer, paint, solvents, fuel
Painting (indoor)	Paint or rinse water (oil and water based), paint thinner
Parking lot runoff	Oil and grease, hydrocarbons, litter, heavy metals
Roof runoff	Particulate matter and associated pollutants
Sewer line blockages	Raw sewage, bacteria
Trash storage areas	Organic materials, hazardous materials
Utility line maintenance and repairs (domestic water/irrigation/sewer)	Chloramines, chlorine, sediment, adhesive cements, primers
Vehicle and equipment washing (staff)	Cleaning products, oil and grease, vehicle fluids
Pet feces	Coliform bacteria

Source: University of California, Irvine Stormwater Management Plan, March 2003.

Two sensitive areas exist within the drainage area of the campus: San Diego Creek and the Upper Newport Bay Ecological Reserve and the SJFM Reserve.

Water quality assessments conducted by Regional Board staff have identified San Diego Creek and the Upper Newport Bay Ecological Reserve as impaired waterbodies for sedimentation/siltation, nutrients, metals, unknown toxicity, pathogens, and pesticides (USACOE, 2001). Impaired water bodies are those that do not meet state water quality standards as defined by the California State Water Resources Board (SWRB). Increases in urbanization coupled with agricultural uses have been attributed to the cause of the impairment of San Diego Creek and the Upper Newport Bay Ecological Reserve. San Diego Creek serves as the main contributing water body, or tributary, that drains into the Upper Newport Bay Ecological Reserve. However, despite the fact that the lower San Diego Creek watershed flows through a highly urbanized region, the watershed contains a substantial amount of biological resources.

The SJFM Reserve is one of the last remaining remnants of freshwater wetlands found in Orange County. The marsh is approximately 500 acres in size, of which 300 acres is owned by the Irvine Ranch Water District and 200 acres is owned by the University of California Natural Reserve System (UCNRS). The Marsh is managed as an ecological preserve to support a variety of wetland habitats. According to the 1995 California Coastal Conservancy's Wetland Profile for the Marsh, the water quality of the Marsh was

impaired due to high salinity and heavy metal concentrations found in the soils and ground water. However, the Marsh is no longer listed on the State's 2006 updated 303(d) list of impaired water bodies. The Marsh is hydrologically separated from its parent stream, San Diego Creek, and therefore water levels in the Marsh are artificially supported through pumping and by the discharge of tertiary wastewater from the IRWD. The Marsh also receives run-off from the North Campus directly through culverts or surface flow.

4.7.1.3 RECEIVING WATERS

Receiving waters is a general term typically used to describe any water body such as a creek, river, lake, bay, or ocean, which receives runoff. In the context of the 2007 LRDP, it refers to those water bodies that would receive runoff located downstream from any project that is associated with the implementation of the 2007 LRDP. There are several potential receiving waters for UCI, which include SJFM, San Diego Creek, and the Upper Newport Bay Ecological Reserve. Each of the receiving waters potentially affected by implementation of the 2007 LRDP is described below. The beneficial uses designated for each receiving water by the RWQCB are provided in Table 4.7-2 and the definitions for the beneficial uses are provided in Table 4.7-3. In general, beneficial uses are those uses, users, or activities that benefit from the presence of water and could be adversely impacted if water quality were degraded.

Table 4.7-2. Beneficial Uses of UCI Receiving Waters

Inland Surface Streams	Hydrologic Unit	Beneficial Use*																	
		MUN	AGR	GWR	COMM	NAV	REC1	REC2	BIOL	EST	WARM	COLD	WILD	RARE	MAR	AQUA	SPWN	SHELL	IND
San Diego Creek Drainage																			
San Diego Creek																			
Reach 1 – below Jeffrey Road	801.11	+										• ¹	•						
Reach 2 – above Jeffrey Road to Headwaters	801.11	+		X															
Other Tributaries: Bonita Creek, Serrano Creek, Peters Canyon Wash, Hicks Canyon Wash, Bee Canyon Wash, Borrego Canyon Wash, Aqua Chinon Wash, Lagina Canyon Wash, Rattlesnake Canyon Wash, Sand Canyon Wash, and other Tributaries to these Creeks	801.11	+		X															
Bays, Estuaries, and Total Prisms																			
Lower Newport Bay	801.11	+			•	•	•	•										•	•
Upper Newport Bay	801.11	+			•		•	•	•	•								•	•
Wetlands (Inland)																			
San Joaquin Freshwater Marsh	801.11	+																	

Source: RWQCB, Santa Ana Region 1995.

• Existing or Potential Beneficial Use

X Intermittent Beneficial Use

+ Excepted From MUN in accordance with the criteria specified in the "Sources of Drinking Water Policy."

¹ Access prohibited in all or part by Orange County Environmental Management Agency (OCEMA)

* See Table 4.7-3 for definitions of the applicable beneficial uses.

Table 4.7-3. Applicable Beneficial Use Designations

Designation	Abbrev.	Definition
Municipal and Domestic Supply	MUN	Includes uses of water for community, military, or individual water supply systems including, but not limited to, drinking water supply.
Agricultural Supply	AGR	Includes uses of water for farming, horticulture, or ranching including, but not limited to, irrigation, stock watering, or support of vegetation for range grazing.
Groundwater Recharge	GWR	Includes uses of water for natural or artificial recharge for groundwater for purposes that may include, but are not limited to future extraction, maintaining water quality or halting saltwater intrusion into freshwater aquifers.
Commercial and Sport Fishing	COMM	Includes the uses of water for commercial or recreational collection of fish, shellfish, or other organisms including, but not limited to, uses involving organisms intended for human consumption or bait purposes.
Navigation	NAV	Includes uses of water for shipping, travel, or other transportation by private, military, or commercial vessels.
Contact Water Recreation	REC1	Includes uses of water for recreational activities involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, swimming, wading, water-skiing, skin and SCUBA diving, surfing, white water activities, fishing, or use of natural hot springs.
Non-contact Water Recreation	REC2	Includes the uses of water for recreational activities involving proximity to water, but not normally involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, picnicking, sunbathing, hiking, beachcombing, camping, boating, tidepool and marine life study, hunting, sightseeing, or aesthetic enjoyment in conjunction with the above activities.
Preservation of Biological Habitats of Special Significance	BIOL	Includes 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.
Estuarine Habitat	EST	Includes uses of water that support estuarine ecosystems including, but not limited to, preservation or enhancement of estuarine habitats, vegetation, fish, shellfish, or wildlife (e.g., estuarine mammals, waterfowl, shorebirds).
Warm Freshwater Habitat	WARM	Includes uses of water that supports warm water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates.
Cold Freshwater Habitat	COLD	Includes uses of water that support cold water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates.
Wildlife Habitat	WILD	Includes uses of water that support terrestrial ecosystems including, but not limited to, preservation and enhancement of terrestrial habitats, vegetation, wildlife, or wildlife water and food sources.
Rare, Threatened, or Endangered Species	RARE	Includes uses of water that support habitats necessary, at least in part, for the survival and successful maintenance of plant or animal species established under state or federal law as rare, threatened or endangered.
Marine Habitat	MAR	Includes uses of water that support marine ecosystems including, but not limited to, preservation or enhancement of marine habitats, vegetation such as kelp, fish, shellfish, or wildlife (e.g., marine mammals, shorebirds).
Aquaculture	AQUA	Includes the uses of water for aquaculture or mariculture operations including, but not limited to, propagation, cultivation, maintenance, or harvesting of aquatic plants and animals for human consumption or bait purposes.
Migration of Aquatic Organisms	MIGR	Includes uses of water that support habitats necessary for migration, acclimatization between fresh and salt water, or other temporary activities by aquatic organisms, such as anadromous fish.
Spawning, Reproduction, and/or Early Development	SPWN	Includes uses of water that support high quality aquatic habitats suitable for reproduction and early development of fish. This use is applicable only for the protection of anadromous fish.
Shellfish Harvesting	SHELL	Includes uses of water that support habitats suitable for the collection of filter-feeding shellfish (e.g., clams, oysters, and mussels) for human consumption, commercial, or sport purposes.
Industrial Service Supply	IND	Includes uses of water for industrial activities that do not depend primarily on water quality. These uses may include but are not limited to, mining, cooling water supply, hydraulic conveyance, gravel washing, fire protection, and oil well repressurization.

Source: RWCQB, Santa Ana Region, 1995.

San Diego Creek

San Diego Creek is located to the northwest of the main campus and lies between the SJFM and the Crawford Athletic Complex and Mesa Court Housing. Runoff from the campus with the exception of the North Campus and the south portion of the South Campus discharges into San Diego Creek, just before it flows into the Upper Newport Bay and then to the Pacific Ocean (see Figure 4.7-1 n). San Diego Creek also receives runoff from many of its tributaries such as Peters Canyon Wash and Borrego Wash. In addition, runoff from the cities of Santa Ana, Orange, Costa Mesa, and Tustin drain into San Diego Creek through a number of urban channels including El Modena-Irvine channel, the Tustin channel, the Santa Fe channel, the Red Hill channel, the Como channel, and the Barranca channel. The UCI campus represents less than two percent of the total area of the San Diego Creek Watershed. Therefore, UCI's runoff accounts for only a small portion of the watershed's flow.

Reach 1 of the San Diego Creek, which extends from Upper Newport Bay to Jeffrey Road, is identified as an impaired water body on the 2002 CWA Section 303(d) list for fecal coliform and pesticides. Reach 2 of San Diego Creek, which extends from Jeffrey Road to the headwaters, is also identified as impaired on the list for metals and unknown toxicity.

San Joaquin Freshwater Marsh

The Marsh is approximately 500 acres in size and is a tributary to San Diego Creek. Water levels in the Marsh are artificially supported through pumping and by the discharge of tertiary wastewater from the Irvine Ranch Water District. Storm water runoff along Jamboree Boulevard, Interstate 405, and Fairchild Road, as well as the North Campus drains into the Marsh through culverts or by surface flow eventually draining into San Diego Creek. This water body is not listed on the State's 2006 updated 303(d) list of impaired water bodies.

Upper Newport Bay

San Diego Creek is a tributary to the Upper Newport Bay which is located approximately 2 miles west of the UCI campus. The Bay includes the Upper Newport Bay Ecological Reserve that supports threatened and endangered species. Runoff from the UCI campus and surrounding area is transported via San Diego Creek, deposited into the Bay, and then carried to the Pacific Ocean. Portions of the City of Costa Mesa and Santa Ana drain into Newport Bay via the Santa Ana-Delhi channel and its tributary and the Poularino channel (USACOE, 2001). UCI makes up less than one-percent of the runoff that is transported to the Bay. Other channels that drain into the Newport Bay are East Costa Mesa, Santa Isabel, and other smaller channels.

Historically, channelization of San Diego Creek due to urbanization increased the quantity and efficiency of freshwater and sediment transport to Newport Bay. As a result, the "San Diego Creek Comprehensive Stormwater Sedimentation Control Plan" was prepared and initiated in the early 1980's to address sedimentation entering into the Upper Newport Bay via San Diego Creek. The plan implemented best management practices for construction and agricultural sites within the watershed. Three in-channel sediment basins are located within the lower reach of San Diego Creek. These basins act as sediment "traps" which are designed to retard the flow of water coming through Irvine prior to its discharge into Newport Bay. By slowing the velocity of water, sediment is able to drop out of suspension and deposit in the basins rather than being carried to the bay (USACOE, 2001). Through this process, sedimentation within Newport Bay was greatly reduced yet deposition continues to adversely affect estuarine species and habitat. In addition, erosion problems in many of the main and tributary channels of San Diego Creek still continue to persist.

In 1999, a water quality use impairment study was conducted for the Upper Newport Bay and its tributaries and found that the Upper Newport Bay is experiencing impaired water quality due to:

- Excessive bioaccumulation of hazardous chemicals in aquatic life tissue that cause the organisms to be a threat to those who use them as food;
- Excessive fertilization that causes alga growth that impairs the use of the Bay;
- Excessive siltation that causes shoaling which impairs boating and changes the distribution of aquatic plant communities that develop in the Bay;
- Excessive litter that impacts the use of bay near shorewaters and associated lands; and
- Impairment of the sanitary quality of Upper Newport Bay, which increases the risk of disease to those who work and contact recreate in Bay waters.

Upper Newport Bay is identified as an impaired water body on the 2002 CWA 303(d) list due to metals and pesticides.

4.7.2 REGULATORY FRAMEWORK

4.7.2.1 FEDERAL

Clean Water Act

The Clean Water Act (CWA) was designed to restore and maintain the chemical, physical, and biological integrity of the waters in the United States. The CWA also directs states to establish water quality standards for all waters of the United States and to review and update such standards on a triennial basis. Other provisions of the CWA related to basin planning include Section 208, which authorizes the preparation of waste treatment management plans, and Section 319, which mandates specific actions for the control of pollution from nonpoint sources. The EPA has delegated responsibility for implementation of portions of the CWA to the State Water Resources Control Board (SWRCB) and the Regional Water Quality Control Boards (RWQCBs), including water quality control planning and control programs, such as the National Pollutant Discharge Elimination System (NPDES) program. The NPDES program is a set of permits designed to implement the CWA that apply to various activities that generate pollutants with potential to impact water quality.

Section 303 of the CWA requires states to adopt water quality standards for all surface waters of the United States. Section 304(a) requires the EPA to publish water quality criteria that accurately reflect the latest scientific knowledge on the kind and extent of all effects on health and welfare that may be expected from the presence of pollutants in water. Where multiple uses exist, water quality standards must protect the most sensitive use. Water quality standards are typically numeric, although narrative criteria based upon biomonitoring methods may be employed where numerical standards cannot be established or where they are needed to supplement numerical standards. Section 303(c)(2)(b) of the CWA requires states to adopt numerical water quality standards for toxic pollutants for which EPA has published water quality criteria and which reasonably could be expected to interfere with designated uses of a water body.

NPDES Permit Program – Phase I

In November 1990, under Phase I of the urban runoff management strategy, the EPA published National Pollutant Discharge Elimination System (NPDES) permit application requirements for municipal,

industrial, and construction storm water discharges. The application requirements for municipalities were directed at municipalities which own and operate separate storm drain systems serving populations of 100,000 or more, or which contribute significant pollutants to waters of the United States, and required such agencies to obtain coverage under municipal storm water NPDES permits.

Municipalities were required to develop and implement an urban runoff management program to address activities to reduce pollutants in urban runoff and storm water discharges that were contributing a substantial pollutant load to their systems. Rather than establishing numeric effluent limits, the EPA established narrative effluent limits for urban runoff, including the requirement to implement appropriate BMPs.

The Phase I regulations were also directed at certain facilities that discharged storm water associated with industrial activity, and construction activities that disturbed five or more acres. Only the industrial and construction activity components of the Phase I program are applicable to UCI, while the municipal regulations are not.

NPDES Permit Program – Phase II

The Phase II Final Rule, published in the Federal Register on December 8, 1999, requires NPDES permit coverage for storm water discharges from:

- Certain regulated small municipal separate storm sewer systems (MS4s); and
- Construction activity disturbing between one and five acres of land (i.e., small construction activities).

In addition to expanding the NPDES Program, the Phase II Final Rule included minor revisions for certain industrial facilities. As with Phase I, the Phase II Program requires the development and implementation of storm water management plans to reduce pollutant discharges. The MS4 and construction components of the Phase II program are both applicable to UCI.

4.7.2.2 STATE

Porter-Cologne Water Quality Control Act

The Porter-Cologne Water Quality Control Act authorizes the SWRCB to adopt, review, and revise policies for all waters of the state (including both surface and groundwaters) and directs the RWQCB to develop regional Basin Plans. Section 13170 of the California Water Code also authorizes the SWRCB to adopt water quality control plans on its own initiative. The Water Quality Control Plan for the Santa Ana River Basin (Region 8) is designed to preserve and enhance the quality of water resources in southern Orange County, and the western portions of San Bernardino and Riverside counties for the benefit of present and future generations. The purpose of the plan is to designate beneficial uses of the Region's surface and ground waters, designate water quality objectives for the reasonable protection of those uses, and establish an implementation plan to achieve the objectives.

All projects resulting in discharges, whether to land or water, are subject to Section 13263 of the California Water Code and are required to obtain approval of Waste Discharge Requirements (WDRs) from the RWQCBs. Land and groundwater related WDRs (i.e., non-NPDES WDRs) regulate discharges of process and wash-down wastewater and privately or publicly treated domestic wastewater. WDRs for discharges to surface waters also serve as NPDES permits.

Wastewater treatment plants are, themselves, subject to WDRs and are responsible for implementing federal rules governing industrial categorical pre-treatment standards. UCI, as a campus, discharges all of its wastewater to the Irvine Ranch Water District (IRWD). Prior to discharging wastewater to the Orange County sanitation district, IRWD conducts pre-treatment to ensure the wastewater discharge limits are not exceeded.

National Pollution Discharge Elimination System (NPDES) Permits

In California, the SWRCB and its RWQCBs administer the NPDES permit program. The NPDES permits cover all construction and subsequent drainage improvements that disturb one acre or more, industrial activities, and municipal separate storm drain systems. Construction and industrial activities are typically regulated under statewide general permits that are issued by the SWRCB. The SWRCB also issues statewide general small MS4 storm water NPDES permits for public agencies that fall under that Phase II NPDES regulations. The NPDES permit system was established in the CWA to regulate both point source discharges (a municipal or industrial discharge at a specific location or pipe) and nonpoint source discharges (diffuse runoff of water from adjacent land uses) to surface waters of the United States. For point source discharges, each NPDES permit contains limits on allowable concentrations and mass emission of pollutants contained in the discharge. For nonpoint source discharges, the NPDES program establishes a comprehensive storm water quality program to manage urban storm water and minimize pollution of the environment to the maximum extent practicable (MEP). The NPDES program consists of characterizing receiving water quality, identifying harmful constituents, targeting potential sources of pollutants, and implementing a comprehensive storm water management program.

The reduction of pollutants in urban storm water discharge to the MEP through the use of structural and nonstructural BMPs is one of the primary objectives of the water quality regulations for MS4s. BMPs typically used to manage runoff water quality include controlling roadway and parking lot contaminants by installing filters with oil and grease absorbents at storm drain inlets, cleaning parking lots on a regular basis, incorporating peak-flow reduction and infiltration features (such as grass swales, infiltration trenches, and grass filter strips) into landscaping, and implementing educational programs.

Industrial Storm Water Permits

Pursuant to Phase I of the NPDES permit program, storm water runoff from industrial facilities with certain Standard Industrial Classification (SIC) Codes is governed by the SWRCB under Water Quality Order 97-03-DWQ/NPDES Permit #CAS000001. These regulations prohibit discharges of polluted storm water unless the discharge is in compliance with the general NPDES permit requirements. The nine individual RWQCBs also enforce the General Industrial Storm Water Permit within their respective regions.

To receive coverage under the General Industrial Storm Water Permit, the owner or operator of an industrial facility must submit a Notice of Intent (NOI) to comply with the permit to the SWRCB, prepare a Storm Water Pollution Prevention Plan (SWPPP), and conduct monitoring and reporting. An industrial facility has the option to request an individual, site-specific NPDES permit instead of the general permit. RWQCBs, however, typically only adopt individual permits when the facility has exceptional characteristics or poses a considerable threat to storm water.

Under the General Industrial Storm Water Permit, dischargers are required to control and eliminate sources of pollutants in storm water through the development and implementation of a SWPPP. The SWPPP is to be used as a tool for recognizing and evaluating potential sources of pollutants associated with industrial activities that may affect the quality of storm water discharges and authorized non-storm water discharges from the facility. The SWPPP is also used as a guide to help identify site-specific BMPs,

which are to be implemented to reduce or prevent pollutants associated with industrial activities in storm water discharges and authorized non-storm water discharges.

UCI has obtained coverage under the General Industrial Storm Water Permit for discharge associated with the North Campus landfill site. To comply with the General Industrial Permit, UCI's EH&S Department implements and maintains the campus Storm Water Management Plan (SWMP) in compliance with NPDES Phase II requirements, along with the San Joaquin Landfill Storm Water Pollution Prevention Plan (San Joaquin Landfill SWPPP), including Best Management Practices (BMPs).

Construction Storm Water Permits

Storm water runoff from construction activity that results in soil disturbances of at least one acre of total land area (and projects that meet other specific criteria) is governed by the SWRCB under Water Quality Order 99-08-DWQ. These regulations prohibit discharges of polluted storm water from construction projects that disturb one or more acres of soil unless the discharge is in compliance with the general NPDES permit requirements. The nine individual RWQCBs enforce the General Permit for Construction Activity for projects within their region. The Santa Ana RWQCB oversees permits at UCI.

It is the responsibility of the construction site owner or landowner to obtain coverage under this Construction General Permit prior to commencement of construction activities. To obtain coverage, the operator or owner must file a NOI with a vicinity map and the appropriate fee with the SWRCB. The Construction General Permit outlines the requirements for preparation of a SWPPP. To comply with its general construction permit, UCI EH&S reviews all construction and renovation plans from Design and Construction Services (D&CS) and Facilities Management to identify any new point and non-point water discharge sources; and provides training resources and consultative services to campus entities. For every construction project, an NOI is submitted to the SWRCB prior to the commencement of construction and a Notice of Termination (NOT) is submitted once construction has been completed.

On March 2, 2007 the SWRCB issued a preliminary Draft Construction General Permit which identifies 13 significant revisions to the current Construction General Permit. The SWRCB is in the process of receiving public input on the preliminary draft, and plans to issue a formal Draft General Construction Permit later in 2007. SWRCB will hold a public hearing prior to adoption of a final Construction General Permit. Once the revised Construction General Permit requirements are finalized, UCI will revise its existing compliance process to comply with the new provisions.

The Construction General Permit also prohibits the discharge of materials other than storm water and authorized non-storm water discharges. It is recognized that certain non-storm water discharges may be necessary for the completion of construction projects. Such discharges include, but are not limited to irrigation of vegetative erosion control measures, pipe flushing and testing, street cleaning, and dewatering. Such discharges are allowed by the Construction General Permit provided they are not relied upon to clean up failed or inadequate construction or post-construction BMPs designed to keep materials onsite. These authorized non-storm water discharges shall (1) be infeasible to eliminate; (2) comply with BMPs as described in the SWPPP; and (3) not cause or contribute to a violation of water quality standards. In addition, the Santa Ana RWQCB issued Order No. R8-2003-0061, and the Amending Orders No. R8-2005-0041 and R8-2006-0004, which regulate discharges to surface waters that pose an insignificant (de minimus) threat to water quality, including construction dewatering wastes. Such de minimus discharges complying with the provisions and requirements of the General Permit are not expected to violate applicable water quality standards. Order No. R8-2005-0041 allows short-term groundwater-related discharges within the San Diego Creek/Newport Bay watershed, which were previously excluded in Order No. R8-2003-0061. This Order will be amended once again by Tentative

Order 2007-0041 which is expected to be adopted on October 30, 2007, and will address revised discharge requirements for the San Diego Creek/Newport Bay watershed.

Small MS4 Storm Water Permits

As part of Phase II of the NPDES permit program, the SWRCB adopted a General Permit for the Discharge of Storm Water from Small MS4s (WQ Order No. 2003-0005-DWQ) to provide permit coverage for smaller municipalities, including non-traditional small MS4s, which are governmental facilities such as military bases, public campuses (such as UCI), and prison and hospital complexes. The main objectives of the Phase II regulations are to reduce the amount of pollutants being discharged to the maximum practical extent and protect the quality of the receiving waters. In order to meet this requirement, permittees are required to prepare a Storm Water Management Program to address the following six minimum control measures:

1. Public education and outreach;
2. Public participation and involvement;
3. Illicit discharge detection and elimination;
4. Construction site storm water runoff control for sites greater than one acre;
5. Post-construction storm water management in new development and redevelopment; and
6. Pollution prevention and good housekeeping for municipal operations.

These control measures are typically addressed through the development of BMPs. To comply with MS4 Discharge Permits, UCI's EH&S Department identifies and eliminates any illicit connections between polluting activities and storm water run-off routes; conducts individual or group monitoring of storm water run-off for pollutants annually during each wet season; and reports results of the past year's monitoring and certifying compliance with BMPs each year, pursuant to the Annual Storm Water Reports to the Regional Water Quality Control Board.

4.7.2.3 REGIONAL

Santa Ana River Basin Plan

The Water Quality Control Plan for the Santa Ana River Basin (Basin Plan) sets forth water quality objectives for constituents that could potentially cause an adverse effect or impact on the beneficial uses of water. The beneficial uses of the receiving waters relevant to the 2007 LRDP are listed in Table 4.7-2. Specifically, the Santa Ana River Basin Plan is designed to accomplish the following:

- Designate beneficial uses for surface and ground waters,
- Set the narrative and numerical objectives that must be attained or maintained to protect the designated beneficial uses and conform to the state's antidegradation policy
- Describe implementation programs to protect the beneficial uses of all waters within the region, and
- Describe surveillance and monitoring activities to evaluate the effectiveness of the Basin Plan.

The Basin Plan incorporates by reference all applicable SWRCB and RWQCB plans and policies.

4.7.2.4 CAMPUS

Storm Water Management Plan and Storm Water Pollution Prevention Plan

The UCI Storm Water Management Plan (SWMP) is designed to comply with MS4 permits and is as of June 2007 is in its fourth year of its 5-year implementation schedule. The purpose of the SWMP is to identify pollutant sources potentially affecting the quality and quantity of storm water discharges; provide BMPs for municipal and small construction activities implemented by UCI staff and contractors; and provide measurable goals for implementation of this SWMP to reduce the discharge of the identified pollutants into the storm drain system and associated waterways. The SWMP was developed with input from various campus departments including EH&S, Design and Construction Services (D&CS), Parking and Transportation, Housing Administrative Services, Campus and Environmental Planning (CEP), and Facilities Management.

The SWMP lists activities which routinely occur on campus and the potential pollutants that could occur from the activity. The SWMP then outlines specific "minimum control measures" such as education and outreach, good housekeeping, construction site runoff control, and illicit discharge detection and elimination. Within each "minimum control measure," the SWMP lists standards and measurable goals. The Plan also provides a comprehensive list of BMPs to assist in obtaining the goals.

The SWMP includes the criteria for developing Storm Water Pollution Prevention Plans (SWPPP) which must be developed prior to soil disturbing activities as part of compliance with the General Permit for Construction Activities. The SWPPP must include the project location and site features; controls that will be implemented during construction; an inspection and maintenance program for BMPS; a sampling and analysis plan for sediment discharge; and post-construction controls to be implemented after construction activities are completed.

4.7.3 PROJECT IMPACTS AND MITIGATION

4.7.3.1 ISSUE 1 – DRAINAGE AND HYDROLOGY

Hydrology and Water Quality Issue 1 Summary

Would implementation of the 2007 LRDP alter the existing drainage or hydrology of a site or area in a manner which would result in flooding, exceed the capacity of storm water drainage systems, or result in substantial erosion or siltation?

Impact: Implementation of 2007 LRDP projects that would disturb 1 acre or more of land, and all future development occurring in the SJMF watershed, would have the potential to substantially alter drainage patterns and hydrology which could significantly increase runoff volumes resulting in flooding, exceedance of the existing storm water drainage system capacity, and erosion and siltation at downstream water bodies (Hyd-1).

Significance Before Mitigation: Significant

Mitigation: Conduct project specific drainage studies and implement recommended site design and flow control features if necessary (Hyd-1A).

Significance After Mitigation: Less than significant

Standards of Significance

Based on Appendix G of the CEQA Guidelines, implementation of the 2007 LRDP may have a significant adverse impact if it would:

- Substantially alter the existing drainage pattern of the site or area, including the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on or off site;
- Create or contribute runoff water which would exceed the capacity of existing or planned storm water drainage systems or provide substantial additional sources of polluted runoff;
- Require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects; or
- Substantially alter the existing drainage pattern of the site or area, including 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.

Impact Analysis

Impacts from Construction Activities

Land disturbing construction activities associated with implementation of the 2007 LRDP, such as grading and excavation of project sites and construction of new building foundations, roads, driveways, and trenches for utilities, could result in the localized alteration of drainage patterns. These alterations may result in the capacity of the storm drain facilities temporarily exceeding capacity, if substantial drainage is rerouted. Temporary ponding and/or flooding could also result from such activities, from temporary alterations of the drainage system (reducing its capacity of carrying runoff), or from the temporary creation of a sump condition due to grading. Alterations may temporarily result in erosion and siltation if flows were substantially increased or routed to facilities or channels without capacity to carry the flow.

Under the NPDES permit program, SWPPPs are prepared and BMPs identified in the SWPPPs are implemented for construction sites greater than one acre, which reduce the likelihood of alterations in drainage to result in these impacts. In compliance with applicable construction permits, the campus would continue to implement BMPs, such as the following:

- Minimizing disturbed areas. Clearing of land is limited to that which will be actively under construction in the near term, new land disturbance during the rainy season is minimized, and disturbance to sensitive areas or areas that would not be affected by construction is minimized.
- Stabilizing disturbed areas. Temporary stabilization of disturbed soils is provided whenever active construction is not occurring on a portion of the site, and permanent stabilization is provided by finish grading and permanent landscaping.
- Protecting slopes and channels. Outside of the approved grading plan area, disturbance of natural channels is avoided, slopes and crossings are stabilized, and increases in runoff velocity caused by the project is managed to avoid erosion to slopes and channels.
- Controlling the site perimeter. Upstream runoff is diverted around or safely conveyed through the project and is kept free of excessive sediment and other constituents.

- Controlling internal erosion. Sediment-laden waters from disturbed, active areas within the site are detained.

Implementation of appropriate BMPs, as part of compliance with construction permits for construction sites greater than one acre, would protect the quality of storm water runoff by controlling runoff and by ensuring that the quality of storm water flows meets the applicable requirements of the RWQCB. In addition, all construction sites, including sites less than one acre, are managed under the campus's Storm Water Management Plan in compliance with the Phase II regulations. Therefore, short-term impacts resulting from alterations of drainage and hydrology during construction would be less than significant.

Impacts Following Construction.

Implementation of the 2007 LRDP would result in the construction of new buildings, redevelopment, landscaping, and other features on the UCI campus. These projects may result in minor alterations to existing drainage patterns of individual sites within the campus, but would not result in substantial alterations to the drainage courses of the campus as a whole. However, implementation of the 2007 LRDP would convert some areas of the campus from softscape to hardscape which could increase runoff from certain areas.

Increased runoff associated with implementation of the 2007 LRDP may have detrimental effects on and off campus. Potential impacts associated with increased runoff include:

- Exceeding capacity of on-site storm water conveyance systems;
- Exceeding capacity of off-site storm water conveyance systems;
- Exceeding capacity of storm drain inlets and catch basins;
- Causing new erosion and worsening existing erosion problems on-site; and
- Causing new erosion and worsening existing erosion problems off-site.

One area of concern is the North Campus which borders the SJFM. A Memorandum of Understanding (MOU) between UCI and the UC Natural Reserve System (UCNRS) was developed in 1989 to mitigate impacts to the Marsh caused by development of the North Campus. The MOU states that UCI "shall pursue mitigation with the goal of assuring an equal quantity of water of comparable quality in the [Marsh] before and after the projects have been completed, that is, assuring that there is no net loss of water supply and no net decrease in the quality of surface water discharge." Development of the North Campus would result in additional impervious surfaces (e.g., buildings, walkways, parking lots) which would increase the amount of runoff entering the Marsh, possibly resulting in significant impacts due to erosion damage and/or siltation (sediment buildup) within the Marsh.

According to UCI's Storm Water Management Program (SWMP), smaller projects located on the Main Campus, which are defined as those that would disturb less than 1-acre of land, would not substantially affect runoff volumes and, therefore, would result in a less than significant impact to hydrology and drainage patterns. Larger projects, those greater than 1-acre, could result in substantial increased runoff volumes. Increased runoff has the potential to overload the campus storm drain system and increase flows and velocity which could result in flooding at inlets and increased erosion and siltation impacts at downstream water bodies. Therefore, future LRDP projects of 1-acre or more may have significant impacts to hydrology and drainage patterns.

Impact Hyd-1 Implementation of 2007 LRDP projects that would disturb 1 acre or more of land, and all future development occurring in the SJMF watershed, would have the potential to

substantially alter drainage patterns and hydrology which could significantly increase runoff volumes resulting in flooding, exceedance of the existing storm water drainage system capacity, and erosion and siltation at downstream water bodies.

Mitigation Measures

Implementation of the following mitigation measures would reduce impacts associated with drainage and hydrology alteration, and the resulting potential for flooding, exceedance of the existing storm water drainage system capacity, and erosion and siltation at downstream water bodies, to a level that is less than significant.

Hyd-1A As early as possible in the planning process of future projects that implement the 2007 LRDP and would result in land disturbance of 1 acre or greater, and for all development projects occurring on the North Campus in the watershed of the San Joaquin Freshwater Marsh, a qualified engineer shall complete a drainage study. Design features and other recommendations from the drainage study shall be incorporated into project development plans and construction documents. Design features shall be consistent with UCI's Storm Water Management Program, shall be operational at the time of project occupancy, and shall be maintained by UCI. At a minimum, all drainage studies required by this mitigation measure shall include, but not be limited to, the following design features:

- i. Site design that controls runoff discharge volumes and durations shall be utilized, where applicable and feasible, to maintain or reduce the peak runoff for the 10-year, 6-hour storm event in the post-development condition compared to the pre-development condition, or as defined by current water quality regulatory requirements.
- ii. Measures that control runoff discharge volumes and durations shall be utilized, where applicable and feasible, on manufactured slopes and newly-graded drainage channels, such as energy dissipaters, revegetation (e.g., hydroseeding and/or plantings), and slope/channel stabilizers.

4.7.3.2 ISSUE 2 – WATER QUALITY

Hydrology and Water Quality Issue 2 Summary

Would implementation of the 2007 LRDP violate any water quality standards or waste discharge requirements, or otherwise substantially degrade water quality?

Impact: Implementation of the 2007 LRDP would have the potential to generate storm water runoff pollutants during construction and post-construction activities that could significantly impact downstream water quality, if not properly controlled (Hyd-2).

Mitigation: Prepare and implement an erosion control plan for construction sites less than one acre (Hyd-2A); and implement site design and treatment control design measures to reduce pollutants of concern in runoff (Hyd-2B).

Significance Before Mitigation: Significant

Significance After Mitigation: Less than significant

Standards of Significance

Based on Appendix G of the CEQA Guidelines, implementation of the 2007 LRDP may have a significant adverse impact if it would violate any water quality standards or waste discharge requirements,

or otherwise substantially degrade water quality. Waste discharge requirements are requirements that are developed as part of permits issued by the SWRCB or RWQCB.

Impact Analysis

Applicable water quality standards developed by the SWRCB or RWQCB for storm water are set forth in applicable storm water permits (which also serve as waste discharge requirements). Storm water permits that are applicable to UCI and the 2007 LRDP include the General Construction Storm Water Permit, the General Industrial Storm Water Permit, and the General Small MS4s Storm Water Permit. All of these permits control pollutants in runoff from campus properties. The campus would continue to comply with these permits during implementation of the 2007 LRDP; therefore, no impact would occur with regard to violation of storm water standards or waste discharge requirements.

With regard to general water quality impacts from storm water and other runoff, the various pollutants potentially generated at UCI could adversely affect water quality in a variety of ways. A summary of the general adverse environmental effects that can result from the most common pollutant categories is provided below and potential 2007 LRDP impacts related to construction and post construction conditions are described in the following sections.

- **Sediments** – Sediments are soils or other surficial materials eroded and then transported or deposited by the action of wind, water, ice, or gravity. Sediments can increase turbidity, clog fish gills, reduce spawning habitat, lower young aquatic organisms survival rates, smother bottom dwelling organisms, and suppress aquatic vegetation growth.
- **Nutrients** – Nutrients are inorganic substances, such as nitrogen and phosphorus. They commonly exist in the form of mineral salts that are either dissolved or suspended in water. Primary sources of nutrients in urban runoff are fertilizers and eroded soils. Excessive discharge of nutrients to water bodies and streams can cause excessive aquatic algae and plant growth. Such excessive production, referred to as eutrophication, may lead to excessive decay of organic matter in the water body, loss of oxygen in the water, release of toxins in sediment, and the eventual death of aquatic organisms.
- **Metals** – Metals are raw material components in non-metal products such as fuels, adhesives, paints, and other coatings. Primary sources of metal pollution in storm water are typically commercially available metals and metal products. Metals of concern include cadmium, chromium, copper, lead, mercury, and zinc. Lead and chromium have been used as corrosion inhibitors in primer coatings and cooling tower systems. At low concentrations that naturally occur in soils, metals are not toxic. However, at higher concentrations, certain metals can be toxic to aquatic life. Humans can be impacted from contaminated groundwater resources and bioaccumulation of metals in fish and shellfish. Environmental concerns regarding the potential for release of metals to the environment have already led to restricted metal usage in certain applications.
- **Organic Compounds** – Organic compounds are carbon based. Commercially available or naturally occurring organic compounds are found in pesticides, solvents, and hydrocarbons. Organic compounds can, at certain concentrations, indirectly or directly constitute a hazard to life or health. When rinsing off objects, toxic levels of solvents and cleaning compounds can be discharged to storm drains. Dirt, grease, and grime retained in the cleaning fluid or rinse water may also adsorb levels of organic compounds that are harmful or hazardous to aquatic life.

- **Trash and Debris** – Trash (such as paper, plastic, polystyrene packing foam, and aluminum materials) and biodegradable organic matter (such as leaves, grass cuttings, and food waste) are general waste products that may have a significant impact on the recreational value of a water body and aquatic habitat. Excess organic matter can create a high biochemical oxygen demand in a stream and thereby lower its water quality. Also, in areas where stagnant water exists, the presence of excess organic matter can promote septic conditions resulting in the growth of undesirable organisms and the release of odorous and hazardous compounds such as hydrogen sulfide.
- **Oxygen Demanding Substances** – This category includes biodegradable organic material as well as chemicals that react with dissolved oxygen in water to form other compounds. Proteins, carbohydrates, and fats are examples of biodegradable organic compounds. Compounds such as ammonia and hydrogen sulfide are examples of oxygen demanding compounds. The oxygen demand of a substance can lead to depletion of dissolved oxygen in a water body and possibly the development of septic conditions.
- **Oil and Grease** – Oil and grease are characterized as high molecular weight organic compounds. Primary sources of oil and grease are petroleum hydrocarbon products, motor products from leaking vehicles, esters, oils, fats, waxes, and high molecular-weight fatty acids. Introduction of these pollutants to the water bodies is typical due to the wide uses and applications of some of these products in municipal, residential, commercial, industrial, and construction areas. Elevated oil and grease content can decrease the aesthetic value of the water body, as well as the water quality.
- **Bacteria and Viruses** – Bacteria and viruses are ubiquitous microorganisms that thrive under certain environmental conditions. Their proliferation is typically caused by the transport of animal or human fecal wastes from the watershed. Excessive bacteria and viruses in water can alter the aquatic habitat and create a harmful environment for humans and aquatic life. The decomposition of excess organic waste causes increased growth of undesirable organisms in the water.
- **Pesticides** – Pesticides (including herbicides) are chemical compounds commonly used to control nuisance growth or prevalence of organisms. Excessive application of a pesticide may result in runoff containing toxic levels of its active component.

Impacts from Construction Activities

Project construction could result in substantial additional sources of polluted runoff which could have short-term impacts on surface water quality through activities such as demolition, clearing and grading, stockpiling of soils and materials, concrete pouring, painting, and asphalt surfacing. Construction of projects implemented under the 2007 LRDP would involve various types of equipment such as dozers, scrapers, backhoes, and other earth moving equipment, dump trucks, cranes, trucks, concrete mixers, and generators. Stockpiled soils and other construction materials for use during later construction phases would be stored outdoors during construction. Pollutants associated with these construction activities that could result in water quality impacts include soils, debris, other materials generated during demolition and clearing, fuels and other fluids associated with the equipment used for construction, paints, other hazardous materials, concrete slurries, and asphalt materials.

These pollutants could impact water quality if they are washed off site by storm water or non-storm water, or are blown or tracked off site to areas susceptible to wash off by storm water or non-storm water. Depending on the location of the construction site at its discharges, pollutants are likely to drain to one or

more of the receiving waters identified for the UCI campus. Sediment is the most common pollutant associated with construction sites because of the associated earth moving activities and areas of exposed soil. Sediment that is washed off site can result in turbid waters in receiving waters which can impact aquatic species. In addition, when sediment is deposited in a receiving water it can smother species, alter the substrate and habitat, and alter the drainage course. Hydrocarbons such as fuels, asphalt materials, oils, and hazardous materials such as paints and concrete slurries, which are discharged from the site, could impact aquatic plants and animals downstream. Debris and trash discharged from the site could be deposited in nearby canyons or receiving waters and could impact wildlife as well as aesthetics.

Landscaping when installed could also result in water quality impacts due to the use of fertilizers. If fertilizers are discharged, they could adversely affect aquatic plants and animals downstream in receiving waters through a reduction in oxygen levels and an increase in eutrophication. Eutrophication is the process of over-enrichment of nutrients in a water body fostering an increase in biotic life that results in a significant loss of dissolved oxygen.

Due to the extent of construction that is anticipated under the 2007 LRDP, implementation of the 2007 LRDP could result in significant short-term impacts to water quality from uncontrolled sediment and pollutants from construction sites. However, the campus's continued compliance with General Construction Storm Water Permit would mitigate impacts on sites of one acre and more to a level that is less than significant. The General Construction Storm Water Permit requires the development and implementation of a Storm Water Pollution Prevention Plan (SWPPP). The SWPPP must contain a site map which shows the construction site perimeter, existing and proposed buildings, lots, roadways, storm water collection, and discharge points, general topography both before and after construction, and drainage patterns across the project. The SWPPP must list BMPs the discharger will use to protect storm water runoff and the placement of those BMPs. Construction BMPs typically include, and are not limited to:

- Proper storage, use, and disposal of construction materials;
- Removal of sediment from surface runoff before it leaves the site by silt fences or other similar devices around the site perimeter with particular attention to protecting water bodies listed on the 303(d) list for sediment, such as the San Diego Creek and Upper Newport Bay;
- Protection of all storm drain inlets on site or downstream of the construction site to eliminate entry of sediment;
- Stabilization of cleared or graded slopes;
- Diversion of runoff from uphill areas around disturbed areas of the site;
- Prevention of tracking soil off site through use of a gravel strip or wash facilities at exit areas;
- Protection or stabilization of stockpiled soils; and
- Continual inspection and maintenance of all specified BMPs through the duration of construction.

Additionally, the SWPPP shall contain a visual monitoring program.

Impacts Following Construction

Following construction, the development of individual project areas with structures, concrete, asphalt, and landscaping would reduce the potential for erosion on the site and sediment discharges. Also, equipment and hazardous materials associated with construction would be removed from the site, which would reduce the potential for pollutants to be discharged from the site. However, use and operation of the

projects would generate pollutants that could impact water quality in other ways. When it rains these pollutants can be washed from developed sites and into the storm drain or adjacent drainages. In addition, implementation of the 2007 LRDP could result in increased development on the campus, and associated impacts such as non-storm water discharges, non-storm water connections to the storm drainage system, and accidental spills, could also occur.

Impacts that could result from pollutants discharged to receiving waters were discussed previously in this section. San Diego Creek and the Upper Newport Bay as previously mentioned are listed as impaired waterbodies for fecal coliform (an indicator of pathogens), metals, and pesticides. Pollutants discharged into these waterbodies are caused by several factors: subsequent farming activities such as fertilizers, dairy waste, and septic tanks; extensive grading for development especially in the foothill areas; and increased runoff and channel erosion due to urbanization. Implementation of the 2007 LRDP could result in additional impacts to San Diego Creek and the SJFM. However, with the implementation of mitigation measure Hyd-2B, potential significant impacts for post-construction activities would be reduced to below a level of significance.

Non-storm water discharges, non-storm water connections to the storm drainage system, accidental spills, and other operational impacts are anticipated to be less than significant; however, they would be further reduced through the continued implementation of the UCI Storm Water Management Plan. The generation of pollutants from activities associated with new development and redevelopment projects under the 2007 LRDP is considered a significant impact. This impact is addressed in the UCI Storm Water Management Plan; however, law does not yet mandate implementation of the plan's components relating to new development and redevelopment. Therefore, impacts from new development and redevelopment projects are considered significant and mitigation is proposed.

Impact Hyd-2 Implementation of the 2007 LRDP would have the potential to generate storm water runoff pollutants during construction and post-construction activities that could significantly impact downstream water quality, if not properly controlled.

Mitigation Measures

Implementation of the following mitigation measures would reduce water quality impacts associated with construction sites and post-construction activities at new development and redevelopment projects to a level of Less than Significant. Because regulations regarding hydrology and water quality may change in the future, these mitigation measures may be revised as needed in the future, pending regulatory changes.

Hyd-2A Prior to initiating on-site construction for future projects that implement the 2007 LRDP, UCI shall approve an erosion control plan for project construction. The plan shall include, but not be limited to, the following applicable measures to protect downstream areas from sediment and other pollutants during site grading and construction:

- i. Proper storage, use, and disposal of construction materials.
- ii. Removal of sediment from surface runoff before it leaves the site through the use of silt fences, gravel bags, fiber rolls or other similar measures around the site perimeter.
- iii. Protection of storm drain inlets on-site or downstream of the construction site through the use of gravel bags, fiber rolls, filtration inserts, or other similar measures.

- iv. Stabilization of cleared or graded slopes through the use of plastic sheeting, geotextile fabric, jute matting, tackifiers, hydro-mulching, revegetation (e.g., hydroseeding and/or plantings), or other similar measures.
- v. Protection or stabilization of stockpiled soils through the use of tarping, plastic sheeting, tackifiers, or other similar measures.
- vi. Prevention of sediment tracked or otherwise transported onto adjacent roadways through use of gravel strips or wash facilities at exit areas (or equivalent measures).
- vii. Removal of sediment tracked or otherwise transported onto adjacent roadways through periodic street sweeping.
- viii. Maintenance of the above-listed sediment control, storm drain inlet protection, slope/stockpile stabilization measures.

Hyd-2B Prior to project design approval for future projects that implement the 2007 LRDP and would result in land disturbance of 1 acre or more, the UCI shall ensure that the projects include the design features listed below, or their equivalent, in addition to those listed in mitigation measure Hyd-1A. Equivalent design features may be applied consistent with applicable MS4 permits (UCI's Storm Water Management Plan) at that time. All applicable design features shall be incorporated into project development plans and construction documents; shall be operational at the time of project occupancy; and shall be maintained by UCI.

- i. All new storm drain inlets and catch basins within the project site shall be marked with prohibitive language and/or graphical icons to discourage illegal dumping per UCI standards.
- ii. Outdoor areas for storage of materials that may contribute pollutants to the storm water conveyance system shall be covered and protected by secondary containment.
- iii. Permanent trash container areas shall be enclosed to prevent off-site transport of trash, or drainage from open trash container areas shall be directed to the sanitary sewer system.
- iv. At least one treatment control is required for new parking areas or structures, or for any other new uses identified by UCI as having the potential to generate substantial pollutants. Treatment controls include, but are not limited to, detention basins, infiltration basins, wet ponds or wetlands, bio-swales, filtration devices/inserts at storm drain inlets, hydrodynamic separator systems, increased use of street sweepers, pervious pavement, native California plants and vegetation to minimize water usage, and climate controlled irrigation systems to minimize overflow. Treatment controls shall incorporate volumetric or flow-based design standards to mitigate (infiltrate, filter, or treat) storm water runoff, as appropriate.

4.7.3.3 ISSUE 3 – SEICHES, TSUNAMIS, AND MUDFLOWS

Hydrology and Water Quality Issue 3 Summary

Would implementation of the 2007 LRDP expose people or structures to a significant risk of loss, injury, or death involving inundation by seiche, tsunami, or mudflow?

Impact: Implementation of the 2007 LRDP would not likely expose people to structures to seiches, tsunamis, or mudflows due to the topography of the campus and the location of the campus from landlocked bodies of water, the Pacific Ocean, and the surrounding foothills.

Mitigation: No mitigation is required.

Significance Before Mitigation: Less than significant.

Significance After Mitigation: Less than significant.

Standards of Significance

Based on Appendix G of the CEQA Guidelines, implementation of the 2007 LRDP may have a significant adverse impact if it would expose people or structures to a significant risk of loss, injury, or death involving inundation by seiche, tsunami, or mudflow.

Impact Analysis

The campus is not subject to inundation by seiche as this phenomenon is typically associated with land locked bodies of water, none of which occur near the campus; thus, no impact is anticipated.

A tsunami (or seismic sea wave) is the secondary effect of a major earthquake. Waves are often generated in the ocean at a point near the earthquake source by the sudden movement of the sea floor. When a tsunami finally reaches a distant coastline, it may appear as a rapidly rising or falling tide, a series of breaking waves, or a bore (a step-like wave with a steep breaking front). Reefs, bays, entrances to rivers, undersea features and the slope of the beach all help to modify the tsunami as it approaches the shore. Tsunamis rarely become great, towering breaking waves and sometimes the tsunami may break far offshore or may not be visible at all. Because the UCI campus is over three miles from the Pacific Ocean, it is unlikely that it would be impacted by tsunami. In addition, due to organizational and scientific advances, it is likely that if a tsunami did occur, there would be sufficient notice to evacuate people from this relatively small area of concern. The West Coast and Alaska Tsunami Warning Center (WCATWC) monitors earthquakes and if the location and magnitude of an earthquake meet the known criteria for generation of a tsunami, a tsunami warning is issued; therefore, impacts are considered to be less than significant.

Inundation by mudflows across the developed portion of the majority of the campus is unlikely. This is due to the urbanized location, and the fact that most of the campus is located sufficiently away from the base of surrounding foothills. Therefore, it is considered unlikely for inundation by mudflows to occur as result of the proposed project and the impact is less than significant. Additional discussion of geotechnical issues can be found in Section 4.5.

Mitigation Measures

The 2007 LRDP would not result in a significant impact regarding the exposure of people or structures to a significant risk of loss, injury, or death involving inundation by seiche, tsunami, or mudflow; therefore, no mitigation measures are required.

4.7.4 CUMULATIVE IMPACTS AND MITIGATION

Hydrology and Water Quality Cumulative Issue Summary

Would implementation of the 2007 LRDP have a cumulatively considerable contribution to a cumulative hydrology and water quality impact considering past, present, and probable future projects?

<u>Cumulative Impact</u>	<u>Significance</u>	<u>LRDP Contribution</u>
Drainage and Hydrology: Increased development within the San Diego Creek Watershed would result in an increase of impervious surfaces and a potential increase of flooding and erosions.	Significant.	Not cumulatively considerable with implementation of mitigation measure Hyd-1A.
Water Quality: Increased development within the San Diego Creek Watershed would result in increases in pollutant sources that could adversely affect receiving waters.	Significant.	Not cumulatively considerable with implementation of mitigation measure Hyd-2A and 2B.
Seiches, Tsunamis, and Mudflows: These events are not likely to occur in the vicinity of the UCI campus and increased development in this area would not increase the likelihood of such events.	Less than significant	N/A

4.7.4.1 DRAINAGE AND HYDROLOGY

The geographic context for the cumulative impact analysis concerning drainage and hydrology is the San Diego Creek Watershed, within which the proposed project is located. Urban development within the San Diego Creek Watershed would increase impervious areas and consequently increase storm water runoff. These increases could result in flooding, drainage systems capacity issues, and erosion problems throughout the watershed. However, most future development projects in the City of Irvine would be subject to NPDES Phase I and II regulations, which now require that changes to hydrologic regime and mitigation for conditions of concern be addressed. In addition, most projects are reviewed by other jurisdictions for hydrologic impacts. Nevertheless, implementation of the mandated measures to control hydrology cannot be guaranteed by the University of California on these projects because they fall within other jurisdictions.

No severe flooding issues were identified to which campus drainage would contribute within the San Diego Creek area. Similarly, the campus drainage would also not contribute to erosion problems, but because erosion does occur within the foothills of the watershed, associated flooding is a potentially significant impact that could occur without appropriate drainage controls. Therefore, a significant cumulative impact could occur in the San Diego Creek Watershed due to an increase in impervious surfaces due to development.

Development under the 2007 LRDP could contribute to such impacts if they were to occur downstream of the campus. However, with implementation of mitigation measure Hyd-1A, it is anticipated that the hydrologic contribution resulting from the 2007 LRDP would not contribute to drainage impacts within the watershed; therefore, implementation of the 2007 LRDP would not result in a cumulatively considerable contribution to a significant cumulative impact.

4.7.4.2 WATER QUALITY

The geographic context for the cumulative impact analysis concerning water quality is the San Diego Creek Watershed, within which the proposed project is located. Urban development within the San Diego Creek Watershed would increase impervious areas and activities that generate pollutants, and consequently could result in additional impacts to receiving waters in the watershed. Most future development projects within Orange County would be subject to NPDES Phase I and II regulations, which would require that source control and non-point 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. Nevertheless, implementation of the mandated measures to control pollutants cannot be guaranteed by the University of California on these projects because they fall within other jurisdictions. Therefore, increased development that would generate pollutants in the San Diego Watershed would result in a significant cumulative impact.

Water quality impairments or problems within San Diego Creek in the vicinity of the campus are described in Section 4.7.1. Development under the 2007 LRDP that does not implement proper pollutant controls could contribute to the water quality impairments discussed if they were to occur to receiving waters downstream of the campus. However, with implementation of the mitigation measures Hyd-2A and Hyd-2B, it is anticipated that the 2007 LRDP's pollutant contribution would not result in a cumulatively considerable contribution to water quality impairment.

The campus's compliance with water quality standards and waste discharge requirements would not be affected by off-campus projects and is therefore not cumulatively relevant. The only issue that is cumulatively relevant is the IRWD compliance with the Michelson Water Reclamation Plant waste discharge requirements. Development throughout the City of Irvine is also treated by this plant and, therefore, development throughout the City could also impact the capacity of this plant and result in a significant cumulative impact. However, as further discussed in Section 4.14, because the IRWD manages the operations of the plant and provides for expansions to accommodate development and other measures when necessary, a significant and cumulatively considerable contribution impact is not expected to occur.

4.7.4.3 SEICHES, TSUNAMIS, AND MUDFLOWS

The geographic context for the cumulative impact analysis concerning seiches, tsunamis, and mudflows is the local area around the UCI campus, because these events are usually localized events. Development in the vicinity of the UCI campus would not increase the likelihood of an occurrence of a seiche, tsunami, or mudflow and would not likely result in increased exposure to the events. Therefore, exposure to such incidents is not considered a cumulative effect of implementation of the LRDP and other development in the area.

4.7.5 CEQA CHECKLIST ITEMS ADEQUATELY ADDRESSED IN INITIAL STUDY

Would the project 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 pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)?

No removal of groundwater is proposed, as the project would use potable water supplied by the Irvine Ranch Water District (IRWD) via existing lines on UCI's campus. The IRWD receives deliveries of

imported water from the San Diego County Water Authority (SDCWA) to satisfy potable water demand. No impacts to groundwater supplies would occur. No additional analysis is required.

Would the project place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?

According to the 1997 FEMA flood insurance rate maps, the campus is located in Zone X, which is outside of the 100-year and 500-year flood hazard areas; therefore no impact would occur and no further analysis is required.

Would the project place within a 100-year flood hazard area structures which would impede or redirect flood flows?

Development under the 2007 LRDP would not place structures within the 100-year flood hazard area, as the entire campus is located in Flood Zone X which is outside of the 100- and 500-year floodplains (FEMA 1997). Therefore, 2007 LRDP implementation will not impede or redirect flood flows. No impact would occur and no further analysis is required.

Would the project 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?

The main core of the campus is located at an elevation of approximately 100 feet above mean sea level. It is extremely unlikely that dam or levee failure occurring at remote inland Orange County locations would have any effect on elevated campus lands located near the Pacific Coast. Flood flows emanating from inland areas would likely travel to the coast via San Diego Creek and other waterways. San Diego Creek, in the vicinity of the campus, is located at approximately 10 feet above mean sea level. Therefore, it is unlikely that flooding as a result of dam failure would directly impact the UCI campus. No additional analysis is needed.

4.7.6 REFERENCES

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