4.7 HYDROLOGY AND WATER QUALITY

4.7.1 INTRODUCTION

This section describes existing hydrologic conditions at the campus site and in its vicinity, and analyzes the potential for campus development under the proposed Master Plan to affect water quality, groundwater supplies, groundwater recharge, site drainage, and flooding.

No public or agency comments related to hydrology and water quality were received in response to the Notice of Preparation (NOP) issued for the Master Plan Environmental Impact Report (EIR). Comments received in response to the revised NOP issued for the Pioneer Heights IV and Harder Road Parking Structure projects related to hydrology and water quality are summarized and addressed in **Volume 2**.

4.7.2 ENVIRONMENTAL SETTING

4.7.2.1 Study Area

The study area for direct impacts on hydrology and water quality includes the Hayward campus. The Hayward campus includes a total of 364 acres; of these, 180 acres are developed and 184 acres are undeveloped.

4.7.2.2 Campus and Local Setting

The Hayward campus is located on a hilly terrain within the northwest area of the Hayward hills. The hilly terrain makes the flow of stormwater multidirectional and rapid in places. The natural topography of the developed portion of the Hayward campus has been altered by grading and filling operations, manmade structures, and the removal and placement of vegetation. The hilltops in the vicinity of the campus are mostly open and covered by grass, brush, and trees. The steep-sided creeks in the vicinity generally have very thick growths of brush and trees.

Surface Water Features

No natural creeks, wetlands, riparian areas, or other surface water features are present within the portion of the campus that would be developed under the proposed Master Plan. A small drainage and associated bay woodland in the far western portion of the Hayward campus, and two seasonal drainages and associated oak woodlands extend onto the California State University East Bay (CSUEB) property. These areas are located well outside of the proposed development areas.

To accommodate development, many creeks in Hayward, such as Ward Creek, were engineered into underground culverts that allow the transport but limit the natural treatment of stormwater. Ward Creek is part of the Alameda Creek Watershed, which is considered one of the largest watersheds (approximately 700 square miles) in the East Bay (Jones and Stokes 2007). Ward Creek is a tributary to Alameda Creek, flowing west from the hills northeast of the Hayward campus and then south through the City of Hayward. The Ward Creek Branch runs under the parking lot located in the northern section of the Hayward campus and historically connected with the main channel of Ward Creek located just to the north of the campus.

Stormwater runoff that does not infiltrate into the ground in undeveloped portions of the Hayward campus is collected by the campus storm drain system and conveyed into creeks on the west side of the campus. Further, downstream, the creeks discharge their flows into the City of Hayward municipal storm water collection and conveyance system, which conveys stormwater through the city to ultimately discharge into the bay.

Surface Water Quality

The developed portion of the Hayward campus includes buildings, athletic fields, an amphitheatre, quads and courtyards, surface parking lots, and paved roads, as well as open space with grasses and trees. These land uses suggest that the area likely contributes pollutants commonly found in urban runoff such as oil, grease, and metal brake dust. Additionally, under the 2002 Clean Water Act (CWA) Section 303(d), Alameda Creek is listed as an impaired water body due to the presence of the pesticide diazinon. Sources of this pesticide are urban runoff and storm sewers. A Total Maximum Daily Load (TMDL) for diazinon was approved in 2005 for all Bay Area urban creeks, including Alameda Creek (Jones and Stokes 2007). Because Ward Creek is a tributary to Alameda Creek, implementation of the TMDL plan may be required as part of the National Pollutant Discharge Elimination System (NPDES) Permit. Section 303(d) of the CWA and NPDES regulations are described in detail under **Subsection 4.7.5**, **Regulatory Setting**.

Climate

The Hayward campus experiences a Mediterranean climate, with almost all precipitation falling between the months of October and April. The climate is mild during the summer, when temperatures tend to be in the 60s (degrees Fahrenheit), and cool during winter, when temperatures tend to be in the 50s. The average temperature range is 41 to 76 degrees Fahrenheit in December and September, respectively. Nighttime cooling is moderate, with a drop of 21 and 17 degrees during the summer and winter, respectively. The annual average precipitation in Hayward is 26.30 inches. Winter months tend to be wetter than summer months; the wettest month of the year is January, with an average rainfall of 5.20 inches (SWA Group 2007).

Soils

According to the US Department of Agriculture National Resources Conservation Service, the soil types present on the Hayward campus are conducive for stormwater infiltration and represent a mixture of several soil types, as listed in **Table 4.7-1**, **Soil Types at California State University East Bay Hayward**, below.

Table 4.7-1
Soil Types at California State University East Bay Hayward

Soil Type	Percent Slope	Characteristics
Clear Lake Clay	0 to 2 percent slopes, drained	The soil is slowly permeable; runoff is very slow; erosion is not a problem.
Altamont Clay	30-50 percent slopes	Soil is well drained and slowly permeable; runoff is medium; susceptible to severe erosion.
Rincon Clay	0 to 2 percent slopes	Permeability is moderately slow to slow; runoff is slow; erosion hazard is slight when soil is cultivated.
Diablo Clay	9 to 15 percent slopes	Permeability is generally slow; runoff is medium, and erosion is moderate.
Xerorthents–Los Osos Complex	30 to 50 percent slopes	Runoff is rapid and erosion is high.
Los Osos silty Clay Loam	30 to 50 percent slopes	Runoff is rapid and erosion is severe.
Xerorthents-Millsholm Complex	30 to 50 percent slopes	Runoff is rapid and erosion is high.
Millsholm Silt Loam	30 to 75 percent slopes	Runoff is rapid and erosion is very severe.
Urban Land	0 to 50 percent slopes	Moderately porous, mixture of Xerorthents–Los Osos complex, imported planting soil and fertilizers; runoff is expected to be slow.

The urban land soil type is composed of a mix of Xerorthents–Los Osos complex, imported planting soil, and fertilizers. This mixture of native and imported soils makes the campus grounds more porous, allowing more stormwater to infiltrate into the ground.

Groundwater

The Hayward campus and the surrounding areas do not have any significant groundwater resources, although localized shallow springs in the upper Harder Road area periodically cause problems of roadway deterioration. Field research indicates the groundwater supply to be marginal and barely adequate to support scattered livestock and single-family domestic use. The City of Hayward does not depend on local water supplies to meet domestic and industrial needs. This demand is met by the Hetch Hetchy water system. Additionally, no groundwater was encountered from borings performed by Cooper-Clark and Associates during a geological and soils investigation on the Hayward campus (Earth Metrics 1987).

Flooding

No portion of the campus is located within a 100-year flood hazard zone as mapped by the Federal Emergency Management Agency (Earth Metrics 1987).

4.7.3 REGULATORY SETTING

This section describes the federal, state, and local regulatory context to be considered for the expansion of the Hayward campus, and addresses hydrology and water quality concerns, including development strategies, stormwater pollution prevention plans, and stormwater management practices.

4.7.3.1 Federal and State Regulations

Federal Water Pollution Control Act

The Federal Water Pollution Control Act of 1972, often referred to as the CWA, is the nation's primary law for regulating discharges of pollutants into waters of the United States. The objective of the CWA is to restore and maintain the chemical, physical, and biological integrity of the nation's waters. The regulations adopted pursuant to the CWA deal extensively with the permitting of actions in waters of the United States, including wetlands. CWA's statutory sections and implementing regulations provide more specific protection for riparian and wetland habitats than any other federal law. The US Environmental Protection Agency (US EPA) has primary authority under the CWA to set standards for water quality and for effluents, but the US Army Corps of Engineers (USACE) has primary responsibility for permitting the discharge of dredge or fill materials into streams, rivers, and wetlands.

California Porter-Cologne Act

The California Porter-Cologne Act of 1970 is largely responsible for creating the state's extensive regulatory program for water pollution control. As discussed above, preparation of water management plans has been delegated to the individual states by the US EPA. Pursuant to the Porter-Cologne Act, the responsibility for protection of water quality in California rests with the State Water Resources Control Board (SWRCB). The SWRCB in turn has delegated to the nine Regional Water Quality Control Boards the authority to regulate the nine hydrologic basins in the state. The Porter-Cologne Act gives the SWRCB and Regional Water Quality Control Boards broad powers to protect water quality by regulating waste discharges to water and land by requiring cleanup of hazardous conditions.

The State Water Board provides oversight and coordination while the Regional Boards guide and regulate water quality in streams and aquifers through development of Water Quality Control Plans, or Basin Plans. The Hayward campus drains to waters regulated by the Region 2 (San Francisco Bay) Basin Plan, which was approved in 1995 and updated in 2006. The latest version of the Basin Plan is effective as of December 22, 2006.

Beneficial water uses are designated in the Basin Plan for local aquifers, streams, marshes, and rivers, as well as water quality objectives that must be met to protect these uses. Although beneficial uses have not been specifically designated for Ward Creek, they have been designated for Central San Francisco Bay to which it discharges, and it is the local Regional Board policy to protect uses that might reasonably apply to the tributaries of listed waters. Beneficial uses designated for Central San Francisco Bay include ocean, commercial, and sport fishing; estuarine habitat; industrial service supply; migration of aquatic organisms; navigation; industrial process supply; rare, threatened, or endangered species; contact water recreation; noncontact water recreation; shellfish harvesting; fish spawning; and wildlife habitat.

Water quality objectives established in the Basin Plan to protect the beneficial uses from the types of potential pollutants that could be generated by the proposed project are included in **Table 4.7-2**.

Table 4.7-2
Basin Plan Water Quality Objectives to Protect Beneficial Uses

Parameter	Objective
Dissolved Oxygen	7.0 mg/L minimum in cold water habitat (nontidal) 5.0 mg/L minimum in warm water habitat (nontidal) In the Bay: 5.0 mg/L minimum downstream of Carquinez Bridge 7.0 mg/L minimum upstream of Carquinez Bridge The median concentration for any three consecutive months shall not be less than 80 percent of the dissolved oxygen content at saturation.
Salinity	Controllable water quality factors shall not increase the total dissolved solids or salinity of waters so as to adversely affect beneficial uses, particularly fish migration and estuarine habitat.
Suspended Matter	Waters shall not contain suspended material in concentrations that cause nuisance or adversely affect beneficial uses.
Settleable Matter	Waters shall not contain suspended material in concentrations that result in the deposition of material that cause nuisance or adversely affect beneficial uses.
Sediment	The suspended sediment load and suspended sediment discharge rate of surface waters shall not be altered in such a manner as to cause nuisance or adversely affect beneficial uses. Controllable water quality factors shall not cause a detrimental increase in concentrations of toxic pollutants in sediments or aquatic life.
Turbidity	Waters shall be free of changes in turbidity that cause nuisance or adversely affect beneficial uses. Increases from normal background light penetration or turbidity relatable to waste discharge shall not be greater than 10 percent in areas where natural turbidity is greater than 50 NTU.
pH	The pH shall not be depressed below 6.5 nor raised above 8.5. This encompasses the pH range usually found in waters within the basin. Controllable water quality factors shall not cause changes greater than 0.5 unit in normal ambient pH levels.
Oil and Grease	Waters shall not contain oils, greases, waxes, or other materials in concentrations that result in visible film or coating on the surface of the water or on objects in the water, and cause nuisance, or otherwise adversely affect beneficial uses.
Floating Material	Waters shall not contain floating material, including solids, liquids, foams, and scum in concentrations that cause nuisance or adversely affect beneficial uses.
Temperature	Temperature objectives for enclosed bays and estuaries are as specified in the Water Quality Control Plan for Control of Temperature in Coastal and Interstate Waters and Enclosed Bays of California, including any revisions to the plan. In addition, the following temperature objectives apply to surface waters: • The natural receiving water temperature of inland surface waters shall not be altered unless it can be demonstrated to the satisfaction of the Regional Board that such alteration in temperature does not adversely affect beneficial uses. • The temperature of any cold or warm freshwater habitat shall not be increased by more than 5°F (2.8°C) above natural receiving water temperature.

Parameter	Objective
Toxic Pollutants	All waters shall be maintained free of toxic substances in concentrations that are lethal to or that produce other detrimental responses in aquatic organisms. Detrimental responses include, but are not limited to, decreased growth rate and decreased reproductive success of resident or indicator species. There shall be no acute toxicity in ambient waters. Acute toxicity is defined as a median of less than 90 percent survival or less than 70 percent survival, 10 percent of the time, of test organisms in a 96-hour static or continuous flow test. There shall be no chronic toxicity in ambient waters. Chronic toxicity is a detrimental biological effect on growth rate, reproduction, fertilization success, larval development, population abundance, community composition, or any other relevant measure of the health of an organism, population, or community. Attainment of this objective will be determined by analyses of indicator organisms, species diversity, population density, growth anomalies, or toxicity tests (including those described in Chapter 4 of the Basin Plan), or other methods selected by the State Water Board. The State Water Board will also consider other relevant information and numeric criteria and guidelines for toxic substances developed by other agencies as appropriate. The health and life history characteristics of aquatic organisms in waters affected by controllable water quality factors shall not differ significantly from those for the same waters in areas unaffected by controllable water quality factors. Numeral objectives for arsenic, cadmium, chromium III, chromium VI, copper, cyanide, lead, mercury, nickel, selenium, silver, tributyltin, and zinc are provided in the Basin Plan.
Diazinon	Diazinon concentrations in urban creeks shall not exceed 100 nanograms per liter as a 1-hour average (Basin Plan amendment awaiting US EPA approval).

Total Maximum Daily Load (Section 303(d) of the Clean Water Act)

The State of California is required by Section 303(d) of the CWA to provide the US EPA with a list of water bodies considered by the state to be impaired (i.e., not meeting water quality standards and not supporting their beneficial uses). The list also identifies the pollutant or stressor causing impairment, and establishes a schedule for developing a control plan to address the impairment, typically a TMDL. The TMDL specifies the amount of the target pollutant that the waterbody can sustain on a daily or annual basis and is established by amending the Water Quality Control Plan. TMDLs are prepared by the Regional Boards and result in amendments to Water Quality Control Plans that must be approved by the US EPA. The 303(d) list is used by the US EPA to prepare the biennial federal CWA Section 305(b) Report on Water Quality.

Although Ward Creek is not included in the 2006 303(d) list, Alameda Creek is on the list. Because Ward Creek is a tributary to Alameda Creek, TMDL guidelines may apply to Ward Creek. Additionally, the San Francisco Bay Regional Board has found that San Francisco Bay Area urban creeks do not consistently meet the Basin Plan's narrative water quality objectives pertaining to toxicity. In response, the Basin Plan was amended on November 16, 2005, by Board Resolution R2 2005 0063 to establish a TMDL to reduce diazinon and pesticide-related toxicity in Bay Area urban creeks (Johnson 2005). The TMDL will become effective upon US EPA approval. Diazinon is currently listed as a chemical from urban runoff and storm sewers sources in the proposed 2006 CWA Section 303(d) List of Water Quality Limited Segments, San Francisco Bay Regional Water Quality Control Board (SF Regional Board), October 25, 2006.

National Pollutant Discharge Elimination System

The US EPA has delegated management of California's National Pollution Discharge Elimination System (NPDES) program to the State Water Board and the nine Regional Board offices. The NPDES program was established in 1972 to regulate the quality of effluent discharged from easily detected point sources of pollution such as wastewater treatment plants and industrial discharges. The 1987 amendments to the CWA (Section 402[p]) recognized the need to address nonpoint source stormwater runoff pollution and expanded the NPDES program to operators of municipal separate storm sewer systems (MS4s), construction projects, and industrial facilities.

Construction

The State Water Board administers the NPDES General Permit for Discharges of Stormwater Runoff Associated with Construction Activity (General Construction Permit). If projects involving 1 acre or more of construction want to be covered under the General Construction Permit, the facility must submit a Notice of Intent (NOI) to the State Water Board prior to the beginning of construction. The General Construction Permit requires that projects develop and implement a SWPPP, identifying potential sources of pollution and specifying runoff controls during construction for the purpose of minimizing the discharge of pollutants in stormwater from the construction area. In addition, the SWPPP needs to identify post-construction control measures and a monitoring plan.

Dewatering

Small volumes of construction-related dewatering discharges are covered under the General Construction Permit. Flow diversions are not considered discharges; however, pumping of groundwater seepage from an excavation and subsequent discharge would be considered a dewatering discharge. For dewatering discharges that do not meet the criteria in the General Construction Permit, the SF Regional Board would need to be consulted and may require that an individual NPDES Permit and Waste Discharge Requirement be obtained for dewatering activities (Order NO. R2-2006-0075, NPDES NO. CAG912002, adopted by the SF Regional Board on November 13, 2006, effective January 12, 2007).

Municipal

The City of Hayward is a participating agency and signatory to the Alameda Countywide Clean Water Program (ACCWP) NPDES Municipal Stormwater Permit, which regulates urban runoff discharges from municipalities based on the 1987 amendments to the CWA. The ACCWP is an association of agencies in Alameda County that manage separate storm drain systems and creek channels that discharge urban runoff to San Francisco Bay. ACCWP has 17 member agencies that represent 14 cities in the county, as well as unincorporated Alameda County, Zone 7 Water Agency, and the Alameda County Water Conservation and Flood Control District. Members of the ACCWP are joint permit holders of the Alameda Countywide NPDES Municipal Stormwater Permit.

The permittees are currently subject to NPDES Permit No. CAS0029831 (General Permit) issued by the SF Regional Board (Order No. R2-2003-0021 on February 19, 2003, amended by Order No. R2-2007-0025 on March 14, 2007). This permit was issued to the Alameda County permittees to discharge stormwater runoff from storm drains and watercourses within their jurisdiction. Each member agency is responsible for implementing the requirements of the General Permit.

Since the first five-year permit was issued by the SF Regional Board in 1991, the ACCWP has successively implemented a series of comprehensive stormwater management plans for urban runoff management meeting Regional Board standards.

When the permit was renewed in 2003, the Regional Board included new design standards for runoff treatment control measures (Provision C.3) from new development and significant redevelopment. The reissued permit also required development of a Hydrograph Modification Management Plan (HMP) to manage increased peak runoff flows and volumes (hydromodification) and avoid erosion of stream channels and degradation of water quality caused by new and redevelopment projects (Provision C.3.f). The State Water Board is reissuing the region's Phase 1 permit as a single region-wide permit for the four major urban counties of Alameda, Contra Costa, Santa Clara, and San Mateo, and including the cities of Fairfield, Suisun City, and Vallejo (Municipal Regional Permit [NPDES Permit No. CA612008]). In the draft Municipal Regional Permit, hydromodification requirement is in Provision C.3.g.

C.3 Stormwater Requirements (ACCWP NPDES General Permit)

The ACCWP NPDES Stormwater Permit Section C.3 notes that starting June 12, 2007, hydromodification management (HM) is required for all projects that create and or replace 1 acre or more of imperviousness area and are located in a susceptible area. HM requires a maintenance agreement to maintain the post construction water treatment system. Projects creating or replacing more than 10,000 square feet of impervious surface must comply with the hydraulic sizing design criteria of stormwater quality treatment.

The SF Regional Board required ACCWP to prepare a HMP to reduce erosive flows that result from increasing impervious surfaces in watersheds and creeks. The HMP was due to the SF Regional Board on May 15, 2005, and is currently under review based on the latest ACCWP C.3 Technical Guidance Handbook dated August 2006. The details of the HMP are subject to change in the process of gaining approval by the SF Regional Board. The HMP includes a simple map-based approach for determining which parts of the drainage network are susceptible to hydromodification impacts. Projects that meet certain criteria, from which runoff passes through the susceptible areas, will be required to incorporate one or more HM measures in the design in order to reduce erosive flows from a wide range of runoff conditions. Flow duration control for frequent, small runoff events (with average occurrence ranging from less than two years to approximately 10 years) is especially critical (ACCWP 2006). The HMP also describes procedures for assessing the potential impacts of development-related hydrograph changes in a specific section of a watercourse. Projects that meet the definitions above and are located in susceptible areas must comply with the terms of the HMP.

Although the Hayward campus as a state property is not subject to ACCWP HMP, according to the HMP susceptibility map, the Hayward campus is located in a susceptible area (hill or high slope). Projects requiring HM controls typically also require water quality treatment and therefore require maintenance agreements for operations and maintenance of the treatment unit(s). The HM standard does not apply if the project proponent demonstrates that all the project runoff will flow through enclosed storm drains, existing concrete culverts, or fully hardened (with bed and banks continuously concrete-lined) channels to the tidal areas. In some instances, projects that replace impervious surfaces and are susceptible to hydromodifications may be exempt from HM requirements if a comparison of a project design to the pre-project conditions shows that the project will not increase impervious area and will not increase the efficiency of the drainage collection and conveyance system. The comparison must assess opportunities and constraints to reduce imperviousness and retain or detain site drainage, propose design features that minimize imperviousness, inventory existing and proposed impervious areas, and demonstrate that hydrologic source controls are used to the maximum extent practicable.

4.7.4 IMPACTS AND MITIGATION MEASURES

4.7.4.1 Standards of Significance

In accordance with Appendix G of the *2008 California Environmental Quality Act (CEQA) Statutes and Guidelines* and the CSU CEQA Handbook, the impact of the proposed project on hydrology and water quality would be considered significant if it would:

- Violate any water quality standards or waste discharge requirements by one of the following:
  - Result in an increase in any pollutant for which an impaired waterbody, as listed on the CWA Section 303(d) list, is already impaired.
  - Cause or contribute to an exceedance of applicable surface or groundwater receiving water quality objectives or degradation of beneficial uses.
- 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.
- 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 that would result in substantial erosion or siltation on site 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 site 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.
- 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.
- Place within a 100-year flood hazard area structures that would impede or redirect flood flows.
- 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

4.7.4.2 Methodology

The potential impacts from the development of the Hayward campus under the proposed Master Plan on hydrology and water quality were assessed qualitatively and quantitatively. The assessment evaluates whether the proposed project could result in possible violations of water quality standards, impairment of beneficial uses, or hydrologic or water quality conditions that could be harmful to aquatic life and human health.

4.7.4.3 Project Impacts and Mitigation Measures

MP Impact HYDRO-1: Compliance with NPDES requirements and campus stormwater management policies would result in a less than significant impact on water quality, including erosion and sedimentation, during construction.

Level of Significance: Less than significant

Construction and grading activities associated with development projects under the proposed Master Plan would involve demolition of existing structures, removal of asphalt, site grading, and the operation of heavy equipment. Stormwater runoff could result in short-term sheet erosion within areas of exposed or stockpiled soils. Furthermore, the compaction of soils by heavy equipment may reduce the infiltration capacity of soils and increase runoff and erosion potential. Given the above, pollutants such as soil, sediments, and other substances associated with construction activities (e.g., oil, gasoline, grease, and surface litter) could enter the campus storm drain system.

Individual construction projects associated with implementation of the proposed Master Plan that involve 1 acre or more of land disturbance would be required to comply with the NPDES General Construction Permit, which includes the preparation of a SWPPP. The SWPPP for each construction project would identify best management practices (BMPs) to maintain water quality. BMPs may consist of a wide variety of measures taken to reduce pollutants in stormwater and other nonpoint source runoff. Measures range from source control, such as reduced surface disturbance, to treatment of polluted runoff, such as detention or retention basins. BMPs to be implemented as part of the General Construction Permit may include, but are not limited to, the following measures:

- Temporary erosion control measures (such as silt fences, staked straw bales/wattles, silt/sediment basins and traps, check dams, geofabric, sandbag dikes, and temporary revegetation or other ground cover) will be employed to control erosion from disturbed areas.

- Drainage facilities in downstream off-site areas will be protected from sediment using BMPs acceptable to the Regional Board.

- Grass or other vegetative cover will be established on the construction site as soon as possible after disturbance.

Final selection of BMPs may be subject to approval by the San Francisco Bay Regional Board. CSUEB would verify that an NOI has been filed by the construction contractor with the State Water Board and a

SWPPP has been developed and initiated before allowing construction to begin. CSUEB or its contractor would perform inspections of the construction area to verify that the BMPs specified in the SWPPP are properly implemented and maintained. Additionally, CSUEB or its contractor would implement a monitoring program to verify BMP effectiveness. The monitoring program would begin at the outset of construction and terminate upon completion of the project.

As part of compliance with the NPDES General Construction Permit, CSUEB or its contractor would develop and implement a spill prevention and control program to minimize the potential for, and effects from, spills of hazardous, toxic, or petroleum substances during construction activities. The plan would be completed before any construction activities begin, and would include provisions for preventing, containing, and reporting spills of hazardous materials.

In addition to NPDES requirements, construction would comply with CSUEB standard stormwater management practices and engineering controls, which require the control and minimization of stormwater pollutants originating from construction sites as a standard part of contract specifications. Compliance with NPDES and campus requirements would result in a less than significant impact to water quality during construction.

Mitigation Measure: No mitigation is required.

MP Impact HYDRO-2: Compliance with NPDES requirements and campus stormwater management policies would result in a less than significant impact to water quality, including erosion and sedimentation, during campus operation.

Level of Significance: Less than significant

Impervious surfaces prevent natural absorption and pollutant filtration of stormwater compared to natural pervious (permeable) ground cover. Construction of impervious surfaces on areas currently occupied primarily by vegetated open space would, without appropriate controls, serve to decrease storm water infiltration at the site and result in increased peak flow, volume of flow, and velocity intensity of storm runoff flows, which would increase the potential for erosion and flooding in downstream reaches. These increases, or hydromodification, can in turn increase the frequency of erosive events in downstream channels. Furthermore, pollutants accumulate on impervious areas such as roads and are mobilized during precipitation events. Storm runoff carries these pollutants into the storm drainage system, from where they are discharged to surface waters. Increasing the area of impervious surfaces can thus result in increased pollutant loading to surface waters. In addition to erosion and siltation, diazinon and pesticide-related toxicity are a concern for Bay Area urban creeks.

As noted earlier, runoff from the campus is collected by the campus storm drain system and is discharged into creeks on the west side of the campus. These creeks eventually enter the City's storm drain system, which in turn discharges urban runoff into the bay. The implementation of the proposed Master Plan would involve some modifications to and an extension of the on-site storm drain system but no changes to the storm drain outfalls on the receiving creeks would be necessary.

With the exception of the areas where new housing is proposed and the sites of some parking facilities, most of the campus areas that would be developed under the proposed Master Plan are under existing impervious surfaces. As a result, the redevelopment of most of the campus with new buildings and other project components under the proposed Master Plan would not result in a substantial increase in the amount of impervious surfaces on the Hayward campus and a resultant increase in stormwater runoff. The increase in impervious surface can be estimated by comparing the current campus map to the campus at full buildout. Approximately 9 acres of currently permeable land within the currently developed campus would be converted to impervious surfaces as estimated by the rooftop area of proposed buildings. This change will result in the campus becoming 51 percent permeable and 49 percent impermeable, compared with the current 55 percent permeable and 45 percent impermeable (BMS Design Group 2008). This is a 7.3 percent decrease in permeability and an 8.9 percent increase in impermeability.

An increase in impervious surfaces (albeit small) on the campus could potentially increase both the peak flows and the volume of site runoff which in turn could result in erosion and sedimentation in creeks that receive campus runoff (hydromodification impacts). An increase in impervious surfaces and increased human activity could also result in degradation of the quality of site runoff. The proposed Master Plan includes a storm drain plan and strategy to reduce the amount of stormwater entering the existing storm sewer network by mimicking the surrounding vegetation and landforms as well as addressing the effect of increased human activity on stormwater quality. According to the proposed Master Plan, in order to encourage sustainable development on the campus, each new building project will be required to develop a stormwater management plan that addresses both the quantity and quality of runoff by reducing impervious cover, promoting infiltration, and capturing and treating stormwater runoff. Future development on the campus will incorporate low impact development (LID) features appropriate for the campus site. The proposed Master Plan includes the following BMPs that are derived from California Stormwater Quality Association Stormwater Best Management Practice Handbook (BMP Handbook) (January 2003) as the types of stormwater controls that would be implemented by the Campus in conjunction with new development and redevelopment. BMPs, as described in the BMP Handbook, are defined as "any program, technology, process, siting criteria, operating method, measure, or device which controls, prevents, removes, or reduces pollution." The numbers listed in the parentheses are the BMP labels from the BMP Handbook.

- Infiltration Trench (TC-10): An infiltration trench is a long, narrow rock-filled trench with no outlet that receives stormwater runoff. The runoff infiltrates through the rock into the soil. Infiltration trenches are often paired with vegetated swales so that sediments are removed upstream of the infiltration trench, which helps to reduce clogging. Infiltration trenches could be installed along walkways within the campus as new walkways are installed or existing walkways are renovated.

- Infiltration Basin (TC-11): An infiltration basin is a shallow impoundment designed to allow stormwater to infiltrate into the groundwater. Because these basins can be relatively large and are very dependent upon the permeability of the underlying soils, these may have limited applicability to CSUEB.

- Detention Pond (TC-22): A detention pond is a depressed area where runoff would be detained. The main difference between a detention pond and an infiltration basin is that detention ponds are designed to hold the stormwater for a period of time prior to releasing the stormwater to the storm drainage system, while infiltration basins are designed to hold all of the stormwater until it infiltrates into the groundwater. As such, detention ponds can be smaller and so may be easier to incorporate into new building areas. Detention ponds would be easiest to incorporate into larger project areas such as future faculty housing.

- Vegetated Swale (TC-30): A vegetated swale is an open shallow channel with vegetation. Stormwater runoff flows into the swale, where it is filtered by the vegetation. Some of the runoff then infiltrates into the groundwater, while the remainder flows into catch basins and into the stormwater drainage system or into infiltration trenches. Vegetated swales require relatively long lengths of landscaped area and nearby stormwater drainage facilities, and as such would work best along the parking areas and adjacent to the walkway areas at CSUEB.

- Bioretention (TC-32): Bioretention consists of a landscaped area into which stormwater is directed and allowed to infiltrate or flow into catch basins. At CSUEB, bioretention could be incorporated into new building projects by directing roof drains into landscaped areas away from buildings and then locating adjacent catch basins on the opposite side, so that the runoff flows through the landscaped area prior to flowing into the catch basins. These landscaped areas could be above ground planters with underdrains to allow rainwater from the roof drains to flow through the planter into the groundwater below or into perforated pipes located at the bottom of the planter.

- Water Quality Inlet (ITC-50): A water quality inlet is typically a catch basin, which contains one or more chambers that promote sedimentation of coarse materials and separation of free oil from stormwater. It is easier to install these with new developments rather than to retrofit existing catch basins.

- Wet Vault (MP-50): A wet vault is a permanent water pool or buried tank, which stores rainwater for future use. Due to pest control concerns, it may not be feasible to use permanent surface water pools, but it could be possible to install buried tanks to collect stormwater from new projects.

- Use of pervious/porous pavement will be considered in low-traffic areas to reduce runoff when economically feasible. The pavement is a unique cement-based concrete product that has a porous structure that allows rainwater to pass directly through the pavement and into the soil.

- On-site drain inlets that could be accessed from sidewalks and driveways will be marked with "No Dumping! Flows to Bay" or equivalent signage.
- Minimize use of pesticides and herbicides on the campus.

For all new development projects at the Hayward campus, these BMPs would be evaluated and, as appropriate, incorporated into the projects. The Hayward campus or its contractor would select a combination of BMPs that are expected to minimize runoff flows and remove contaminants from storm water discharges. As required, the final selection and design of BMPs would provide maximum contaminant removal, represent the best available technology that is economically achievable, and explicitly identify the expected level of effectiveness at contaminant removal.

The Hayward campus and/or its contractor would conduct inspections following construction to ensure that all identified BMPs have been properly installed. The Campus would adopt a regular maintenance and monitoring schedule to ensure that these BMPs function properly during project operations. If necessary, the Hayward campus would require that additional BMPs be designed and implemented if those originally constructed do not achieve the identified performance standard.

Based on the above, it is expected that both the peak flows as well as the total volume of stormwater runoff at buildout of the proposed Master Plan would be significantly less than the existing condition. Because campus runoff would actually decrease compared to current conditions, hydromodification and erosion of a creek would not a concern for the future development of the campus as a whole. Implementation of the BMPs listed above in conjunction with new projects on the campus would minimize the potential for impacts on surface water quality. The impact to surface water quality would therefore be less than significant. To ensure that stormwater controls are carefully evaluated and incorporated into future development projects on the campus, and that campus development does not result in any downstream impacts, the following mitigation measure is proposed.

MP MM HYDRO-2: During the design review phase of each future development project on the campus, the Campus will verify that the stormwater BMPs were evaluated for the proposed project and those determined to be appropriate were incorporated into the proposed project. The Campus will also verify that post-development runoff from the project site will approximate pre-development runoff volumes.

MP Impact HYDRO-3: Development of the campus under the proposed Master Plan would not substantially alter the existing drainage patterns in a way that would result in on- or off-site flooding.

Level of Significance: Less than significant

Although the proposed project would generate an increase in stormwater runoff at certain locations due to the construction of impervious surfaces within the watershed, the proposed drainage enhancements, plus the creation of vegetated areas, stormwater retention areas, and incorporated LID practices, would minimize the increase in runoff from the campus that drains into the off-site stormdrain system. In the long run, as described above under **MP Impact HYDRO-2**, the volume of stormwater runoff would decrease under the proposed Master Plan. Given that the stormdrain system is designed to convey on-site stormwater flows and prevent on-site or off-site flooding and the fact that the volume of stormwater would decrease under the proposed Master Plan, impacts related to on-site or off-site flooding would be less than significant.

Mitigation Measure: No mitigation is required.

MP Impact HYDRO-4: Implementation of the proposed Master Plan would not substantially deplete groundwater 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 of Significance: Less than significant

The Hayward campus and the surrounding area do not have any significant groundwater resources, although localized shallow springs exist in the upper Harder Road area. Field research indicates the groundwater supply is marginal to barely adequate to support scattered livestock and single-family domestic use (Earth Metrics 1987). The City of Hayward does not depend on local groundwater supplies to meet domestic and industrial needs. This demand is met by the Hetch Hetchy water system. As the project would not generate a demand for groundwater for potable water supply, impacts on groundwater resources in the Hayward area would not occur.

Although there would be an increase in impervious surfaces on the campus of about 9 percent, the decrease in groundwater recharge would not be proportional because the Hayward campus plans to infiltrate to the maximum extent possible existing and new runoff using LID features, bioswales and other BMPs described under **MP Impact HYDRO-2** above. The decrease in groundwater recharge would therefore be negligible. The impact of campus development under the proposed Master Plan on groundwater resources would be less than significant.

Mitigation Measure: No mitigation is required.

MP Impact HYDRO-5: Implementation of the proposed Master Plan would not place housing or structures that would impede or redirect flood flows within a 100-year flood hazard area or levee or dam inundation zone.

Level of Significance: No impact

The Hayward campus is not within a FEMA-designated 100-year flood zone. Therefore, the housing included in the proposed Master Plan would not be located within a flood zone. According to the City of Hayward Tsunami and Dam Failure Inundation Hazard Map (City of Hayward 2002), dam failure at the Don Castro Reservoir would flood areas near San Lorenzo Creek. That dam failure, should it occur, would not affect the Hayward campus. Therefore, no impact would occur.

Mitigation Measure: No mitigation is required.

MP Impact HYDRO-6: Development on the Hayward campus under the proposed Master Plan would not be affected by inundation associated with a tsunami or seiche event due to elevation and location relative to the Pacific Ocean and enclosed water bodies.

Level of Significance: No impact

Due to the relatively hilly topography and its distant location from the ocean and San Francisco Bay, the Hayward campus would not be affected by inundation by a tsunami or seiche event. Therefore, no impact would occur.

Mitigation Measure: No mitigation is required.

4.7.4.4 Cumulative Impacts and Mitigation Measures

Implementation of the proposed Campus Master Plan, in conjunction with other reasonably foreseeable development, would increase the quantity of impervious surfaces in the campus vicinity. As described under **MP Impacts HYDRO-1** and **HYDRO-2,** compliance with NPDES requirements and campus stormwater management policies would result in a less than significant impact to water quality, including erosion and sedimentation, during construction and operation. Similarly, all new development or redevelopment in the City of Hayward would be required to comply with existing stormwater regulations, which control site runoff during construction and operation. Development projects in the City would be required to design on-site drainage facilities to convey runoff from a 10-year frequency storm. BMPs would be identified appropriate to the uses conducted on site to effectively prohibit the discharge of pollutants with stormwater runoff for projects in the City (City of Hayward 2002). The cumulative impact on surface water quality would therefore be less than significant.

Campus development under the proposed Master Plan would in the long run decrease stormwater flows from the campus. Furthermore, in the short term each campus project would include controls that would avoid any increases in peak flows. As a result, campus development would not contribute to downstream flooding (**MP Impact HYDRO-3**). Development within the City of Hayward would also similarly be required to control peak flows and avoid flooding. The cumulative impact would therefore be less than significant.

Campus development under the proposed Master Plan would not require the use of groundwater (**MP Impact HYDRO-4**). Similarly, development in Hayward is not expected to substantially deplete groundwater because there is no potable use of the local groundwater except for emergency backup. Implementation of projects in the City of Hayward, in addition to the Campus Master Plan, could increase the total area of impervious surfaces within the City, which could interfere with groundwater recharge to some extent. However, this would not be expected to result in substantial interference with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table, and would be regarded as a less than significant environmental impact (City of Hayward 2002). The cumulative impact would be less than significant.

The proposed project would result in no impacts related to building facilities within a 100-year flood plain or exposure to tsunamis and seiches (**MP Impacts HYDRO-5** and **HYDRO-6**). There would be no cumulative impacts.

4.7.5 REFERENCES

Alameda Countywide Clean Water Program (ACCWP). 2006. C.3 Stormwater Technical Guidance, National Pollutant Discharge Elimination System, Municipal. August 31. Version 1.0.

BMS Design Group. 2007. CSUEB Hayward Campus Master Plan Study. July 16.

BMS Design Group. 2008. CSUEB Hayward Campus Master Plan.

City of Hayward. 2002. Tsunami and Dam Failure Inundation Hazard Map.

Earth Metrics, Inc. 1987. Final Environmental Impact Report for the Carlos Bee Boulevard and Harder Road Extensions. Prepared for the City of Hayward. March.

Johnson, B. 2005. Diazinon and pesticide-related toxicity in Bay Area creeks—Water quality attainment strategy and TMDL: Proposed basin plan amendment and staff report: California Regional Water Quality Control Board San Francisco Bay Region, 132 pp. and appendices.

Jones and Stokes. 2007. Route 238 Corridor Improvement Project, Draft Environmental Impact Report. March.

SWA Group. 2008. CSUEB Hayward Landscape Master Plan—Discussion Draft for March 10 Team Meeting. March 7.