4.7 HYDROLOGY, STORM DRAINAGE & WATER QUALITY

4.7.1 ENVIRONMENTAL SETTING

IN THIS SECTION:

- Regulatory Setting
- Hydrological Setting
- Stormwater Drainage
- Water Quality
- Flood & Coastal Hazards
- Regional & Local Plans

REGULATORY SETTING

Federal Regulations

The Clean Water Act (CWA), enacted in 1972, regulates the discharge of pollutants to waters of the United States from any point source. Section 401 of the CWA requires water quality certification for any activity, including the construction or operation of a facility, which may result in any discharge into navigable waters (Title 33 CFR §1341). Section 404 of the CWA requires a permit for the discharge of dredged fill material into navigable waters at specified disposal sites (Title 33 CFR §1344). In 1987, amendments to the CWA added Section 402(p), which establishes a framework for regulating non-point source stormwater discharges under the National Pollutant Discharge Elimination System (NPDES). The NPDES stormwater program is further described below under the "State Regulations" subsection.

The Federal Emergency Management Agency (FEMA) – a former independent agency that became part of the new Department of Homeland Security in March 2003 – is tasked with responding to, planning for, recovering from, and mitigating against disasters. Formed in 1979 under an executive order by President Jimmy Carter to merge many of the separate disaster-related responsibilities of the federal government into one agency, FEMA is responsible for determining flood elevations and floodplain boundaries based on U.S. Army Corps of Engineers studies and approved agencies studies and for coordinating the federal response to floods, earthquakes, hurricanes, and other natural or man-made disasters and providing disaster assistance to states, communities and individuals. FEMA distributes the Flood Insurance Rate Maps (FIRMS), which are used in the National Flood Insurance Program (NFIP). These maps identify the locations of special flood hazard areas (SFHAs), including the 100-year flood zone.

Executive Order 11988 (Flood Plain Management) links the need to protect lives and property with the need to restore and preserve natural and beneficial flood plain values. Specifically,

federal agencies are directed to avoid conducting, allowing, or supporting actions on the base floodplain unless the agency finds that the base floodplain is the only practicable alternative location. Similarly, Department of Transportation (DOT) Order 5650.2, which implements Executive Order 11988 and was issued pursuant to the National Environmental Policy Act of 1969, the National Flood Insurance Act of 1968, and the Flood Disaster Protection Act of 1973, prescribes policies and procedures for ensuring that proper consideration is given to avoidance and mitigation of adverse floodplain impacts in agency actions, planning programs, and budget requests.

State Regulations

The California State Water Resources Control Board (State Board) and the nine Regional Water Quality Control Boards (RWQCB) have the responsibility in California to protect and enhance water quality, both through their designation as the lead agencies in implementing the Section 319 non-point source program of the federal Clean Water Act, and through the state's primary water pollution control legislation, the Porter-Cologne Water Quality Control Act. The State Board establishes statewide policies and regulations for the implementation of water quality control programs mandated by federal and state water quality statutes and regulations. The RWQCBs develop and implement Water Quality Control Plans (Basin Plans) that consider regional beneficial uses, water quality characteristics, and water quality problems. All projects resulting in discharges, whether to land or water, are subject to Section 13263 of the California Water Code (CWC) and are required to obtain approval of Waste Discharge Requirements (WDRs) by the RWQCBs. Land and groundwater-related WDRs (i.e., non-NPDES WDRs) regulate discharges of privately or publicly treated domestic wastewater and process and wash-down wastewater. WDRs for discharges to surface waters also serve as NPDES permits, which are further described below.

The Central Coast (Region 3) office of the RWQCB guides and regulates water quality in streams and aquifers throughout the central coast of California and the Monterey Bay region through designation of beneficial uses, establishment of water quality objectives, and administration of the NPDES permit program for stormwater and construction site runoff. The RWQCB is also responsible for providing permits and water quality certifications pursuant to CWA.

All dischargers of waste to waters of the State are subject to regulation under the Porter-Cologne Act and the requirement for WDRs is incorporated into the California Water Code. This includes both point and non-point source (NPS) dischargers. All current and proposed NPS discharges to land must be regulated under WDRs, waivers of WDRs, a basin plan prohibition, or some combination of these administrative tools. Dischargers of waste directly to state waters would be subject to an individual or general NPDES permit, which also serves as WDRs. The RWCQBs may issue individual WDRs to cover individual discharges or general WDRs to cover a category of discharges. WDRs may include effluent limitations or other requirements that are designed to implement applicable water quality control plans, including designated beneficial uses and the water quality objectives established to protect those uses and prevent the creation of nuisance conditions. Violations of WDRs may be addressed by issuing Cleanup and Abatement Orders (CAOs) or Cease and Desist Orders (CDOs), assessing administrative civil liability, or seeking imposition of judicial civil liability or judicial injunctive relief.

The 1987 amendments to the Clean Water Act (Section 402[p]) provided for the U.S. EPA regulation of several new categories of non-point pollution sources within the existing NPDES. The EPA has delegated management of California's NPDES stormwater permit program to the State Board and the nine RWQCB offices. In Phase 1, NPDES permits were issued for urban runoff discharges from municipalities of over 100,000 people, from plants in industries recognized by the EPA as being likely sources of stormwater pollutants, and from construction activities that disturbed more than five acres. Phase 2 implementation, effective March 10, 2003, extended NPDES urban runoff discharge permitting to cities of 50,000 to 100,000, and to construction sites that disturb between 1 and 5 acres. The State Board has developed several general permits for coverage under the Phase 2 NPDES stormwater permit program.

Construction activity on projects that disturb one or more acres of soil, or less than 1 acre but are part of a larger common plan of development that in total disturbs one or more acres, must obtain coverage under the General Permit for Discharges of Storm Water Associated with Construction Activity (Construction General Permit, 99-08-DWQ). Construction activity subject to this permit includes clearing, grading, and disturbances to the ground such as stockpiling or excavation, but does not include regular maintenance activities performed to restore the original line, grade, or capacity of a facility. The Construction General Permit requires the development and implementation of a Storm Water Pollution Prevention Program (SWPPP). The SWPPP should identify stormwater collection and discharge points, drainage patterns across the project, and best management practices (BMPs[1]) that the discharger will use to protect stormwater runoff and the placement of those BMPs.

As mandated by Section 303(d) of the Federal Clean Water Act, the State Board maintains and updates a list of "impaired water bodies" (i.e., water bodies that do not meet State and Federal water quality standards). This list is known as the Section 303(d) list of impaired waters. The State is then required to prioritize waters/watersheds for development of Total Maximum Daily Load (TMDL) regulations. This information is compiled in a list and submitted to the EPA for review and approval. The State Board and Regional Boards monitor and assess water quality on an ongoing basis.

Local Regulations

STORMWATER MANAGEMENT PROGRAM

The City of Santa Cruz has developed a comprehensive Storm Water Management Program (SWMP) to fulfill the requirements for the Phase II NPDES General Permit for Discharges of Storm Water from Small Municipal Separate Storm Sewer Systems (MS4 General Permit) and to reduce the amount of pollutants discharged in urban runoff. The SWMP includes eight programs to achieve this goal, including runoff control policies, outreach and education efforts, site visits, and the implementation of BMPs.

[1] BMPs are either pollution prevention practices or structural controls designed to reduce or eliminate pollutant discharges. BMPs typically emphasize "good housekeeping methods," chemical handling procedures, spill prevention, and proper waste storage and disposal.

MUNICIPAL CODE REGULATIONS

Storm Water and Urban Runoff Pollution Control. In 1998, the City adopted an ordinance, entitled "Storm Water and Urban Runoff Pollution Control," which is Chapter 16.19 of the City's Municipal Code. The ordinance established the legal authority to prohibit illicit connections and pollutant discharges to the City storm drain system. The ordinance also provides the City with the legal authority to conduct inspections and sampling. In addition, the ordinance contains a provision requiring the implementation of BMPs, as published by the Public Works Department, by certain types of facilities. The City also has the authority to terminate illicit connections and discharges, and to initiate enforcement actions for violations of the code. Potential enforcement actions include written notices, citations, termination of discharge, and monetary penalties. The ordinance prohibits non-stormwater discharges to the storm drain system with a few exceptions (City of Santa Cruz, March 2010). The City revised the Storm Water Ordinance in July 2003 in order to update the ordinance and incorporate new Phase II stormwater regulations (Ibid.).

City Municipal Ordinance section 16.19.140 requires that any construction project, including those undertaken under any permit or approval granted pursuant to Titles 15 (Streets and Sidewalks), 18 (Buildings and Construction), and 24 (Zoning) of the City Code, shall implement best management practices including the City's mandatory BMPs as detailed in the latest BMP manual published by the City's Public Works Department. BMPs are required to be maintained in full force and effect throughout the life of a project.

In addition, the City's Ordinance 16.19.150 requires that all industrial/commercial facilities file a Notice of Intent (NOI) with the State Board and abide by the state regulations outlined in the general permit and implement best management practices to the maximum extent practicable listed in the guidelines published in the *California Storm Water Best Management Practices Handbook, Industrial/Commercial*, by the Storm Water Quality Task Force. The City's mandatory BMPs, as detailed in the latest BMP manual published by the City's Public Works Department, must also be implemented.

Zoning Ordinance Requirements for New Development. The Zoning Ordinance, Title 24 of the Municipal Code, currently contains provisions to ensure that new developments or remodeled sites are designed and constructed in a manner that limits alteration of drainage patterns, prevents erosion, and minimizes long-term impacts on water quality. Chapter 24.14 – Environmental Resource Management – contains a section on Conservation Regulations that includes general provisions for drainage and erosion controls. These provisions include requirements that a drainage plan be submitted for projects, both large and small, when existing drainage patterns would be altered by new construction. A drainage plan must be submitted and reviewed as part of the project approval. In addition, the ordinance requires that stormwater runoff resulting from project development be minimized, and if a proposed project includes the discharge of runoff into a natural watercourse, the drainage plan shall include methods to safeguard or enhance the existing water quality. Devices such as detention basins, percolation ponds, or sediment traps may be required by the City, where appropriate or as specified in an adopted plan or wetlands management plan. Provisions pertaining to erosion control include requirements that a site development be fitted to the topography and soil so as to create the least potential for erosion. Vegetation removal is limited to the amount necessary and according to the project's approved erosion control plans.

Flood Management. Section 24.14.400 ("Floodplain Management") sets forth requirements and procedures to protect properties against flood hazards and comply with National Flood Insurance Program requirements. The regulations set forth programs for floodplain management and specify circumstances in which floodproofing of structures may be required.

Grading Regulations. The Grading Ordinance is a subset of Title 18, Buildings and Construction, of the City's Municipal Code and is included in Chapter 18.45 – Excavation and Grading Regulations." It provides technical regulations of grading and excavation, in conjunction with the Environmental Resource Management provisions (Municipal Code, Title 24, Chapter 24.14), in order to safeguard life, health, safety and the public welfare; protect fish and wildlife, riparian corridors and habitats, water supplies, and private and public property, and to protect the environment from the effects of flooding, accelerated erosion and/or deposition of silt. The ordinance accomplishes this by providing guidelines, regulations, and minimum standards for clearing, excavation, cuts, fills, earth moving, grading operations (including cumulative grading), water runoff and sediment control. In addition, the ordinance includes provisions regarding administrative procedures for issuance of permits and approval of plans and inspections during construction and subsequent maintenance. The City revised the Grading Ordinance in April 2004 in order to strengthen the ordinance regarding implementation of BMPs, including those for erosion and sediment control (City of Santa Cruz, March 2010)

CITY-WIDE CREEKS AND WETLANDS MANAGEMENT PLAN

The City of Santa Cruz *City-wide Creeks and Wetlands Management Plan* (2006) (Management Plan) was adopted by the City Council to provide a comprehensive approach to managing all creeks and wetlands within the City. The Management Plan was certified as a LCP amendment by the California Coastal Commission in October 2007. The long-term goals of the *Management Plan* include protection and improvement of water quality.

HYDROLOGIC SETTING

The City of Santa Cruz encompasses approximately 12 square miles between the Monterey Bay and the Santa Cruz Mountains. A total of 39 miles of watercourses occur within the City, supporting riparian and wetland habitat and/or influencing stormwater conveyance and water quality (City of Santa Cruz Planning and Community Development Department, March 2008). Figure 4.8-2 illustrates major water courses in the City.

The San Lorenzo River, the major watercourse through the City, originates in the Santa Cruz Mountains, traverses through the center of the City and forms a major physical feature of the region. The City also supports four other major watersheds and several miscellaneous watercourses, ranging from numerous perennial, spring-fed streams on the west side of the City to intermittent streams located on the east side of the City. Table 4.8-1 in the BIOLOGICAL RESOURCES (Chapter 4.8) section of this EIR identifies the watersheds and watercourses within the City, which are summarized below. Watercourses and watersheds outside of the City from which the City obtains some of its municipal water supplies are discussed in the WATER SUPPLY (Chapter 4.5) section of this EIR.

San Lorenzo River Watershed

The San Lorenzo River Watershed is the largest watershed in the City, with the San Lorenzo River flowing adjacent to the center of the City's downtown area. The San Lorenzo River drains a 138-square mile watershed, featuring forested and urbanized areas within the City and Santa Cruz County. Within the City limits, the lower San Lorenzo River flows southward from the Sycamore Grove area of Pogonip, through the center of Santa Cruz, to Monterey Bay. This lower reach of the San Lorenzo River encompasses much of the river's historic floodplain. Branciforte Creek and Jessie Street Marsh are tributaries to the San Lorenzo River.

The watershed is comprised predominantly of open space lands (41%) in the northern portion, and residential neighborhoods (26%) and paved roads (13%) as the river flows south through the City. Other land uses include commercial businesses and a portion of the UCSC campus. The primary tributary streams within City limits include: Carbonera Creek, Branciforte Creek, Glen Canyon Creek, and Pogonip Creek (City of Santa Cruz, March 2010).

Over the last 50 years the San Lorenzo River has been impacted by increasing development within the watershed and the channelization of the lower 2.5 miles into a levee flood control structure following a damaging flood in Santa Cruz in 1955. This flood control project, developed in cooperation with the U.S. Army Corps of Engineers (ACOE), included rip-rap levee banks, removal of all vegetation from the banks, and dredging of the river channel bottom. During construction of the levee project, Jessie Street Marsh was filled and the lower Branciforte Creek was channelized in a cement culvert. The ACOE completed another levee improvement project in 2000 that improved and raised the levees. The design incorporated native vegetation concepts and a continuous bicycle and pedestrian path along the length of the levees.

Moore Creek Watershed

The Moore Creek watershed is located on the western side of Santa Cruz and drains directly into the Pacific Ocean at Natural Bridges State Park. The watershed is comprised primarily of open space (50%) and the UCSC campus (23%). Also within the watershed are residential areas, general industrial businesses, and parks. The primary resources located within this watershed are as follows: Younger Lagoon, Moore Creek, Antonelli Pond, Natural Bridges State Park, and Monterey Bay (City of Santa Cruz, March 2010).

Westside Watershed

The Westside Watershed is also located on the western side of the City, between the Moore Creek Watershed and the Neary Lagoon Watershed. The southern boundary of the Westside Watershed is the Pacific Ocean. A significant portion of the watershed is comprised of residential areas (53%) and paved roads (21%). Other land uses include open space, churches and schools, and industrial facilities. The primary resources are: Bethany Creek, Arroyo Seco Corridor, Lighthouse Field State Park, and Monterey Bay (City of Santa Cruz, March 2010).

Neary Lagoon Watershed

The Neary Lagoon Watershed is located in between the Moore Creek, Westside, and San Lorenzo River Watersheds. The watershed drains into Monterey Bay and the Pacific Ocean at Cowell Beach. The watershed drains the majority of the UCSC campus (44%) and residential neighborhoods (33%). Other land uses include roads, open spaces, churches and schools, and commercial businesses. Neary Lagoon is centrally located in the City's urban core and is comprised of approximately 44 acres of wetland, riparian and woodland habitats. The lagoon collects runoff and groundwater from approximately one half of the west side of the City, most of which is residential. A weir controls the lagoon water level. The lagoon outlets to Monterey Bay at Cowell Beach during the wet weather season via a gravity storm drain and one forced main storm drain. During the dry weather season, the lagoon's discharge is diverted to the Wastewater Treatment Facility. The primary resources are as follows: Donero Creek, Westlake Pond, Laurel Creek, Bay Creek, Neary Lagoon, Cowell Beach, and Monterey Bay (City of Santa Cruz, March 2010).

Arana Gulch Watershed

The Arana Gulch Watershed is located on the City's eastern border and is partially within the unincorporated residential areas of the County. The watershed drains into Monterey Bay at the Santa Cruz Yacht Harbor. The watershed, within City limits, is comprised predominantly of residential neighborhoods (34%) and open space (34%). Other land uses include paved roads, churches and schools, and the Santa Cruz Port District (Yacht Harbor). The primary resources include the following: Arana Creek, West Branch Creek, Hagemann Gulch, Woods Lagoon, the Santa Cruz Yacht Harbor, and Monterey Bay (City of Santa Cruz, March 2010).

STORMWATER DRAINAGE

The City's storm drain system is comprised of a wide variety of conveyance systems such as underground pipes, small open drainage channels, creeks, and the San Lorenzo River. The system includes numerous storm drain inlets and catch basins (approximately 1,450) throughout the City, and five pump stations that discharge stormwater directly into the San Lorenzo River. In addition, along both the east and west sides of the City, there are stormwater outfalls that discharge onto the beaches or cliffs, and into Monterey Bay (City of Santa Cruz, March 2010).

There is approximately 50 miles of underground storm drain system pipeline in the City. The majority of pipes are comprised of concrete. Old pipelines still remain that are comprised of clay, while new pipelines installed by the City are either made of PVC or high-density polyethylene (HDPE). The typical pipeline diameter is 12-15 inches although both smaller and larger pipelines, up to 72 inches, exist. Maintenance and repair of the City's storm drain system is conducted by the Public Works Department (City of Santa Cruz, March 2010).

In general, the City's downtown area drains to the San Lorenzo River. Although some stormwater reaches the river by absorption and gravity, the five pump stations along the river were installed in order to transfer the majority of the stormwater over (actually through) the river levees. There are three pump stations located on the west side of the river and two on the east side. The west side pump stations are located at Broadway and in Beach Flats area. The

east side locations pump stations are located at lower Ocean Street and at Water Street (City of Santa Cruz, March 2010).

In addition to the San Lorenzo River, there are numerous creeks traversing the City as indicated above, and summarized in Table 4.8-1 in the BIOLOGICAL RESOURCES (Chapter 4.8) section of this EIR. In certain areas of the City, natural spring water and stormwater flows through a network of conveyance systems, such as small creeks and underground piping. This is especially the case in the west side of Santa Cruz, particularly the upper west side. The upper west side is dotted by natural springs, which feed the small creeks that run through residential yards and cross streets via underground piping. These creeks drain either into Neary Lagoon or run through the storm drains system discharge from West Cliff Drive into Monterey Bay. As expected, the flow from some of these smaller creeks is seasonal or intermittent with the greatest flows occurring during the rainy season (City of Santa Cruz, March 2010).

WATER QUALITY

Urban development often results in the degradation of water quality due to the introduction of pollutants and erosion due to construction and development. Development and pervious pavement can result in increased runoff and higher velocities in creeks and streams. These changes can, in turn, cause erosion. Urban pollutants may include toxic metals, hydrocarbons, nutrients, suspended solids, and many other chemicals (City of Santa Cruz, March 2010).

The significant sources and examples of activities that may generate pollutants are listed below as summarized in the City's "Storm Water Management Plan" (March 2010):

- *Industrial facilities*: industrial chemical processes; chemical and waste storage; fleet maintenance and vehicle washing; and landscaping.
- C*ommercial businesses* including food and vehicle service facilities: vehicle and equipment maintenance; food processing; vehicle washing; landscaping; and chemical and waste storage.
- *Residential dwellings*: vehicle washing; home vehicle repair; home painting and construction projects; chemical and waste storage; pet waste; and landscaping.
- C*onstruction and remodeling projects*: grading; vegetation removal; concrete washout; vehicle and equipment fluids; landscaping; and material and waste storage.
- *Municipal sewer system and private sewer laterals*: exfiltration from leaking, cracked, and debilitated pipelines; and overflows from blocked pipelines.

The City's "Storm Water Management Plan" (SWMP) is a comprehensive program to reduce the amount of pollutants discharged in urban runoff and to improve and protect water quality. The SWMP includes six required control programs and two recommended control programs for industrial and commercial facilities, and Best Management Practices (BMPs). The City's SWMP was approved by the Central Coast RWQCB on April 14, 2009, and thus, the City is granted coverage under the statewide NPDES Small Municipal Separate Storm Sewer Systems General Permit. The SWMP is described further in this chapter.

Pollutants of Concern

Stormwater pollutants generated by the sources described above are numerous and quite varied. These pollutants include: metals, solvents, paint, concrete, masonry products, detergents, vehicle fuels and fluids, oil and grease, pesticides and fertilizers (organic compounds and nutrients), debris and litter, bacteria, pathogens and oxygen demanding compounds, and sediment and silt. In general, all five of the City's watersheds contain most or all of these pollutants due to the various types of land uses that are distributed throughout the City rather than certain types being concentrated in specific watersheds. However, the San Lorenzo River watershed does have a higher level of commercial and tourist activity, and the Moore Creek watershed has very little commercial land use and the Neary Lagoon watershed has practically no industrial land use (City of Santa Cruz, March 2010).

The primary pollutants of concern in the City watersheds are sediment and silt and fecal indicator bacteria. The City has targeted these primary pollutants of concern in the SWMP because certain water bodies within the City are listed on the Clean Water Act Section 303(3) list as impaired for these specific pollutants as further discussed below (City of Santa Cruz, March 2010). The other pollutants of concern will also be addressed in the City's Storm Water Management Plan, as further described below, through the measures and BMPs detailed plan. Other identified water quality issues include:

- *Central Coast Ambient Monitoring Program* Toxicity:
  - sublethal effects observed in San Lorenzo River
  - one lethal effect observed in Arana Gulch
- *Monterey Bay Sanctuary Citizen Watershed Monitoring Network*
  - Copper and Zinc: observed at elevated levels in stormwater discharges during First Flush events
- *Fecal Indicator Bacteria from transients and homeless people* (City of Santa Cruz, March 2010).

On February 15, 2008, the Central Coast RWQCB notified the City that BMPs must be adopted for the development of hydromodification criteria to protect beneficial uses and promote the desired conditions of healthy watersheds including:

I. Maximize infiltration of clean stormwater, and minimize runoff volume and rate;
II. Protect riparian areas, wetlands, and their buffer zones;
III. Minimize pollutant loading; and
IV. Provide long-term watershed protection.

The City has joined with other surrounding jurisdiction and the RWQCB in a Joint Effort to cooperatively develop hydromodification control criteria. The City will derive municipality-specific criteria for controlling hydromodification in new and redevelopment projects using approved methodology developed through the Joint Effort. In addition, the City will develop and enact a strategy for implementing LID and hydromodification control for new and redevelopment projects. Water quality and runoff flow and volume can be addressed by individual development projects through incorporation "low impact development" (LID) concepts into the project design. There is a general understanding that LID is a type of site design that strives to protect the natural hydrology once the site is developed. However, there is a common misconception that LID is only about the use of structural practices such as rain gardens, pervious

pavements, and bioswales. In fact, a good LID design incorporates both site planning principles and structural practices to achieve site performance objectives. Neglecting to incorporate LID design principles throughout the site planning and design process often results in the designer attempting to fit LID structural practices to the site after all other site design has been defined. This can result in higher costs as well as a reduced ability to meet stormwater management objectives. LID design is often an iterative process that includes evaluating the stormwater benefits (e.g., reduced surface runoff, improved water quality) during the design and going back to the design to revise and then recalculate benefits.

Impaired Water Bodies

As indicated in the "Regulatory Setting", subsection, the Clean Water Act requires states to identify and prepare a list of water bodies that do not meet water quality objectives, and to establish Total Maximum Daily Loads (TMDL) for each water body to ensure attainment of water quality objectives. The City of Santa Cruz storm drain system (MS4) discharges into four water bodies that are currently on the 303(d) list of impaired water bodies. These water bodies and associated impairments are identified below.

- San Lorenzo River. The San Lorenzo River is listed for:
  - *Sedimentation/siltation* – potential sources are construction/land development, urban runoff, and non-point sources. There is an adopted TMDL for this impairment as discussed below.
  - *Pathogens* – the relative order of controllable sources, in descending order, is: 1) City of Santa Cruz sanitary sewer collection system spills and leaks (including private laterals connected to municipal sanitary sewer collection systems), 2) storm drain discharges to municipally-owned and operated separate storm sewer systems (MS4s), 3) pet waste in areas that do not drain to MS4s, 4) homeless person/encampment discharges in areas that do not drain to MS4s, 5) onsite wastewater disposal system discharges, and 6) farm animal and livestock discharges.
  - *Nutrients* – the potential sources being nonpoint sources and septage disposal, and pathogens. The potential sources of these are septage disposal and urban runoff/storm sewers.

- San Lorenzo River Lagoon. The San Lorenzo River Lagoon is listed for *pathogens*. The relative order of controllable sources, in descending order, is: 1) City of Santa Cruz sanitary sewer collection system spills and leaks (including private laterals connected to municipal sanitary sewer collection systems), 2) storm drain discharges to municipally-owned and operated separate storm sewer systems (MS4s), 3) pet waste in areas that do not drain to MS4s, 4) homeless person/encampment discharges in areas that do not drain to MS4s, 5) onsite wastewater disposal system discharges, and 6) farm animal and livestock discharges.

- Carbonera Creek.
  - *Sedimentation/siltation* – potential sources are construction/land development, and non-point sources. There is an adopted TMDL for this impairment as discussed below.

- *Pathogens* – the relative order of controllable sources, in descending order, is: 1) City of Santa Cruz sanitary sewer collection system spills and leaks (including private laterals connected to municipal sanitary sewer collection systems), 2) storm drain discharges to municipally-owned and operated separate storm sewer systems (MS4s), 3) pet waste in areas that do not drain to MS4s, 4) homeless person/encampment discharges in areas that do not drain to MS4s, 5) onsite wastewater disposal system discharges, and 6) farm animal and livestock discharges.
- *Nutrients* – the potential sources being nonpoint sources (septage disposal and urban runoff/storm sewers).

- Branciforte Creek.
  - *Sedimentation/siltation* – the potential sources are nonpoint source, road construction, and silviculture (not applicable in the City). The City is currently addressing these issues under the Implementation Plan for the San Lorenzo River Sediment TMDL.
  - *Pathogens* - the relative order of controllable sources, in descending order, is: 1) City of Santa Cruz sanitary sewer collection system spills and leaks (including private laterals connected to municipal sanitary sewer collection systems), 2) storm drain discharges to municipally-owned and operated separate storm sewer systems (MS4s), 3) pet waste in areas that do not drain to MS4s, 4) homeless person/encampment discharges in areas that do not drain to MS4s, 5) onsite wastewater disposal system discharges, and 6) farm animal and livestock discharges.

For these water bodies and impairments, the City's SWMP addresses the primary pollutants of concern through City measures and BMPs to the Maximum Extent Practicable. In addition, where there is an adopted TMDL, the SWMP targets these primary pollutants of concern due to their high priority. In some cases a TMDL has been adopted for these primary pollutants of concern by the RWQCB. To date, a "Total Maximum Daily Load" (TMDL) has not been established for all of the 303(d) listed water bodies/impairments identified above, although they are under development. A discussion of the adopted TMDLs for water bodies within the City of Santa Cruz is provided below.

TMDLs for Sediment. The San Lorenzo River and Carbonera Creek (along with Lompico Creek and Shingle Mill Creek, which are outside of the City's jurisdiction) were identified as impaired by sediment on the 1998 Clean Water Act Section 303 (d) list of impaired water bodies. On May 16, 2003, the RWQCB adopted a sediment TMDL (Resolution No. R3-2002-0063) for these water bodies and thereby incorporated the TMDL and associated Implementation Plan into the Basin Plan. Again, the sources of impairment are attributed to the following: land development, urban runoff, roads, non-point sources, and silviculture. In 2006, the State Board added additional water bodies that were on the 303(d) as impaired by sediment. Of these additions, Branciforte Creek is located within the City. Thus, the water bodies within the City included in the Implementation Plan are the San Lorenzo River, Carbonera Creek, and Branciforte Creek.

The *Implementation Plan for the San Lorenzo River Sediment TMDL* identifies the Cities of Santa Cruz and Scotts Valley, the County of Santa Cruz, and the owners and operators of construction sites of one acre and greater as Responsible Dischargers. Therefore, the City has and will take the following implementation actions within its jurisdiction:

a) Develop and implement the SWMP and Storm Water Pollution Prevention Plans (SWPPPs) consistent with NPDES Phase II Storm Water regulations.

b) Identify the San Lorenzo River Watershed as a priority for site inspection and enforcement of control measures in the SWMP and SWPPPs.

c) Incorporate sediment control programs/projects into the SWMP.

TMDLs for Fecal Indicator Bacteria. A TMDL for Fecal Indicator Bacteria has also been adopted for the San Lorenzo River, San Lorenzo River Lagoon, Branciforte Creek, and Carbonera Creek. Although the TMDL has been adopted by the RWQCB and the SWRCB it has not been adopted by the Office of Administrative Law and therefore an implementation schedule is not yet set. The implementation plan tasks to be performed by the City include:

1. Improved maintenance of the sanitary sewer system adjacent to the impaired bodies
2. Implementing BMPs as required by the City's SWMP.

The implementation plan also requires that the City address impacts from homeless persons and encampments.

FLOOD & COASTAL HAZARDS

Flood Hazards

OVERVIEW

Flooding and coastal storms present essentially the same risks and are frequently related types of hazards in the City of Santa Cruz. A flood is a natural event for rivers and streams. Coastal storms can cause increases in tidal elevations (called storm surge) wind speed and erosion as well as flooding Floodplains are lowlands adjacent to rivers, lakes and oceans that are subject to recurring floods (City of Santa Cruz, September 2007).

A flood occurs when a waterway receives a discharge greater than its capacity. Several factors determine the severity of floods, including rainfall intensity (or other water source) and duration. Floods may result from intense rainfall, localized drainage problems, tsunamis or failure of flood control or water supply structures such as levees, dams or reservoirs. Floodwaters can carry large objects downstream with a force strong enough to destroy stationary structures such as bridges and break utility lines. Flood waters also saturate materials and earth resulting in the instability, collapse and destruction of structures as well as the loss of human life. The City of Santa Cruz has lost bridges and other infrastructure during previous storms (City of Santa Cruz, September 2007).

Floods occur in relation to precipitation. Flood severity is determined by the quantity and rate at which water enters the waterway, increasing volume and velocity of water flow. The rate of

surface runoff, the major component to flood severity, is influenced by the topography of the region as well as the extent to which ground soil allows for infiltration in addition to the percent of impervious surfaces (City of Santa Cruz, September 2007).

Most of the known floodplains in the United States have been mapped by FEMA, which administers the National Flood Insurance Program (NFIP.) Information on Santa Cruz can be found in FEMA's most recent flood Insurance Study (FIS).

FLOOD HAZARDS IN CITY OF SANTA CRUZ

Within the City of Santa Cruz there are several areas subject to flooding. The San Lorenzo River runs through the downtown corridor and the majority of the downtown area is in the San Lorenzo floodplain. Flooding along the coast of Santa Cruz may occur with the simultaneous occurrence of large waves and storm swells during the winter. When storms occur simultaneously with high tides, flood conditions including flooding at the mouth of the San Lorenzo River are exacerbated.

There are several smaller creeks in the City that are subject to periodic flooding. Figure 4.7-1 shows FEMA-identified floodplains in the City. Flooding is a hazard on the lower reaches of Moore Creek where only shallow stream channels are present, the lower portion of Arana Gulch, north of Santa Cruz Yacht Harbor, and along portions of Branciforte and Carbonera creeks. In these areas there is minimal impact on public structures and facilities and only a few residential structures are within these flood zones (City of Santa Cruz, September 2007).

The City of Santa Cruz has been subject to floods along the San Lorenzo River throughout recorded history from the time the Mission was first built in 1793 to the "Christmas Flood" on December 22, 1955. Eighteen floods, eight of which have been considered severe, have occurred over the last hundred years in Santa Cruz (City of Santa Cruz, September 2007).

The City of Santa Cruz has worked to improve the flood capacity of the San Lorenzo River levees over the past twenty years. Significant flood improvements along the river were completed in 2000 as part of the U.S. Army Corps of Engineers' San Lorenzo River Flood Control and Environmental Restoration Project. This project raised the river levees and rehabilitated the three downtown bridges (over the San Lorenzo River) to increase flood flow capacity. Despite recent flood control projects and improved flood rating in much of the down-town and beach area, the risk of flooding is still a concern to the City. While the levee project has resulted in a more flood-resistant downtown, floods may still occur. The levee project did not impact areas along the San Lorenzo River above the Highway One bridge (City of Santa Cruz, September 2007).

The City of Santa Cruz Storm Water Management Utility is primarily a financing mechanism for flood control and stormwater programs. The City established a stormwater utility fee in May 1994 to fund the local share of the San Lorenzo River Flood Control and Environmental Restoration Project. The funds are used to maintain and retrofit surface water, stormwater, and flood control facilities and are generated as a property tax assessment.

FEMA RATINGS AND FLOOD INSURANCE

The Flood Insurance Rate Map (FIRM) is an official map of a community for which the Federal Insurance and Mitigation Administration has delineated the Special Flood Hazard Area (SFHA) and the risk premium zones applicable to the community. All known areas of the City subject to natural flooding hazards have been designated and mapped by the Federal Emergency Management Agency (FEMA), such as the 100-year floodplain boundaries which appear on FEMA's Flood Insurance Rate Maps, and are a source for the floodplain map included in this chapter (City of Santa Cruz, September 2007).

FEMA re-designated much of the downtown and beach area from A-11 to the A-99 Flood Zone designation in recognition of the significant flood improvements resulting from completion of the San Lorenzo River Flood Control and Environmental Restoration Project. Under the A-99 designation, new buildings and improvements are no longer mandated to meet FEMA flood construction requirements and flood insurance premiums are significantly reduced. The FEMA Community Rating System (CRS) class seven rating for the City of Santa Cruz further reduces the National Flood Insurance Program (NFIP) A-99 flood insurance rates by five percent. At present the combination of the CRS class seven rating and the A-99 designation reduces flood insurance by 45% (City of Santa Cruz, September 2007).

Dam Failure

Dam failure can occur as a result of earthquakes, seiches, structural instability, or intense rain in excess of design capacity. Timber, rock, concrete, earth, steel or a combination of these materials may be used to build the dam. Dams must have spillway systems to safely convey normal stream and flood flows over, around, or through the dam. Spillways are commonly constructed of non-erosive materials such as concrete. Dams also have a drain or other water-withdrawal facility to control the reservoir level and to lower or drain the reservoir for normal maintenance and emergency purposes (City of Santa Cruz, September 2007).

The City of Santa Cruz owns and operates Newell Creek Dam (NCD) and Bay Street Reservoir (BSR). NCD is located near the town of Ben Lomond in the Santa Cruz Mountains and impounds Newell Creek to form Loch Lomond Reservoir. The reservoir was constructed in the early 1960s and has a maximum capacity of 2.9 billion gallons (BG). The Loch Lomond Reservoir is the City's primary raw water storage facility (City of Santa Cruz, September 2007). The Bay Street Reservoir, a former impoundment to store treated water, has been removed, and is being replaced with permanent water storage tanks.

The primary mitigation strategy is the continuation of monitoring protocols for structural integrity. These include the monitoring of the Newell Creek Dam as follows:

- Water pressures within the dam and seepage are monitored monthly and after established rainfall and earthquake triggers.
- Horizontal and vertical movement is monitored annually at Newell Creek Dam. California Department of Water Resources, Division of Safety of Dams, has just recently requested a similar monitoring protocol at BSR which will begin in the spring of 2007.

- Periodic seismic reviews are conducted at both dams to ensure stability with respect to current seismic standards.

Coastal Issues and Hazards

TSUNAMI HAZARD

A tsunami is a series of waves generated by an impulsive disturbance in the ocean or in a small, connected body of water. Tsunamis are produced when movement occurs on faults in the ocean floor, usually during very large earthquakes. Sudden vertical movement of the ocean floor by fault movement displaces the overlying water column, creating a wave that travels outward from the earthquake source. An earthquake anywhere in the Pacific can cause tsunamis around the entire Pacific basin. Since the Pacific Rim is highly seismically active, tsunamis are not uncommon (City of Santa Cruz, September 2007).

California is at risk from both local and distant source tsunamis. Eighty-two possible or confirmed tsunamis have been observed or recorded in California during historic times. Most of these events were small and only detected by tide gages. Eleven were large enough to cause damage and four events resulted in deaths. Two tsunami events caused major damage (City of Santa Cruz, September 2007).

There has been minimal damage and loss of life in Santa Cruz during recorded history of tsunamis (City of Santa Cruz, September 2007). However, a tsunami generated by a 9.0 magnitude earthquake in Japan in March 2011 reached Santa Cruz and caused substantial damage to the Santa Cruz Small Craft Harbor.

Even though the potential for a significant tsunami may be low or possibly uncertain, the potential outcome of such a tsunami could be significant damage and loss of life. Figure 4.7-2 illustrates tsunami inundation zones in Santa Cruz. Several active and potentially active earthquake faults are located within or near Santa Cruz. Even a moderate earthquake occurring in or near any of the nearby faults could result in local source tsunamis from submarine landsliding in Monterey Bay (City of Santa Cruz, September 2007). In the aftermath of the 1989 Loma Prieta Earthquake, several docks in the Harbor became stuck to the piers and had to be lifted manually, or were broken implying that the water level fell below the usual low tide level. A small tidal wave was observed rushing out of the harbor following the earthquake that continued for 15-20 minutes (Ibid.). Additionally, distant source tsunamis from the Cascadia Subduction Zone to the north, or Teletsunamis from elsewhere in the Pacific Ocean are also capable of causing significant destruction in Santa Cruz (Ibid.).

The US Army Corps of Engineers has looked at potential earthquake sources around the Pacific and modeled expected tsunami impacts on the coast of the Monterey Bay (US Army Corps of Engineers, 1975). The study estimated that a tsunami wave with a probability of occurrence of one every 100 years would be about 5.9 feet high. A tsunami with a probability of occurrence of one every 500 years is expected to be 11.5 feet high (City of Santa Cruz, September 2007).

CLIMATE CHANGE – POTENTIAL SEA LEVEL RISE

There has been increasing attention paid in recent years to the issue of global climate change and its potential effects on coastal resources. Over the past century, sea level has risen nearly eight inches along the California coast, and general model scenarios suggest very substantial increase in sea level due to climate change over the coming century (California Climate Change Center, March 2009). Specifically, a 1.4 meter sea-level rise has been estimated, which would place nearly 500,000 people in California at risk of a 100-year flood event (Ibid.). The City of Santa Cruz, built on the 100-year floodplain, and only 20 feet above sea level is at risk (California Climate Action Center, July 2006). Large sections of the Pacific Coast not vulnerable to flooding are highly susceptible to coastal erosion that could be accelerated by a rising sea level (Ibid.). Additionally, changes in precipitation patterns could lead to increased flooding. According to the California Climate Change Center:

- Sea level in California could rise between approximately10 centimeters to 90 centimeters (4 to 25 inches) above existing mean sea level by 2099 as a result of climate change, also increasing the frequency of 100-year event high tide peaks (California Climate Change Center, March 2006).

- Under medium to medium-high greenhouse-gas emissions scenarios, mean sea level along the California coast is projected to rise from 1.0 to 1.4 meters (about 3 to 4.5 feet) by the year 2100 (California Climate Change Center, March 2009).

Rising sea levels, storms of increasing intensity and an alternating series of floods and drought threaten the City of Santa Cruz in the coming decades. With funding from FEMA, the City is now in the process of drafting a "Climate Change Adaptation Plan". The objectives of this Plan are to identify and evaluate the potential impacts of climate change on the City of Santa Cruz, analyze the severity of the hazards that the City faces, and develop potential adaptation responses to reduce the risk and exposure of the City to these hazards. The first step identified potential risks in a "Vulnerability Study", prepared as a collaborative effort between the City's Climate Adaptation Team and UCSC scientists. The study identified potential facilities vulnerable to risks of sea level rise, including beaches, West Cliff Drive, the City's wastewater treatment facility and the Santa Cruz Harbor (Griggs and Haddad, January 2011). The study also addressed coastal storm and cliff erosions hazards, as well as the potential for increased precipitation and flooding. Based on this study, the City has developed action items with priorities to respond to specific risks and hazards related to climate change. that will build adaptive capacity into policies, programs and infrastructure. The Plan will include provide a range of goals, objectives and actions that will build adaptive capacity into policies, programs and infrastructure and will provide a framework to continually expand understanding of climate science, community vulnerabilities and new adaptation technologies to inform current and future decisions.

REGIONAL AND LOCAL PLANS

Basin Plan

The Central Coast RWQCB regulates water quality in the Monterey Bay area in accordance with the Water Quality Control Plan or "Basin Plan" (Central Coast RWQCB, 2009). The Basin Plan designates beneficial uses that the RWQCB has identified for local water bodies. The Plan also provides water quality objectives for waters of the state, including surface waters and groundwater. It also includes implementation programs to achieve water quality objectives. Table 4.7-1 identifies beneficial uses designated for selected water bodies in the City of Santa Cruz.

Table 4.7-1
Beneficial Uses of Surface Water Bodies within City of Santa Cruz

Water Body	Beneficial Uses in the Basin Plan
Younger Lagoon	GWR, REC1, REC2, WILD, COLD, WARM, SPWN, BIOL, COMM
Antonelli Pond	GWR, REC1, REC2, WILD, WARM, MIGR, SPWN, RARE, COMM
Moore Creek	MUN, AGR, GWR, REC1, REC2, WILD, COLD, WARM, SPWN, BIOL, FRESH, COMM
Neary's Lagoon	GWR, REC1, REC2, WILD, WARM, SPWN, RARE, COMM
San Lorenzo River Estuary	REC1, REC2, WILD, COLD, MIGR, SPWN, BIOL, RARE, EST, COMM
San Lorenzo River	MUN, AGR, IND, GWR, REC1, REC2, WILD, COLD, MIGR, SPWN, BIOL, RARE, FRESH, COMM
Branciforte Cree,	MUN, AGR, GWR, REC1, REC2, WILD, COLD, MIGR, SPWN, COMM
Carbonera Creek	MUN, AGR, IND, GWR, REC1, REC2, WILD, COLD, MIGR, SPWN, COMM

Source: Central Coast Regional Water Quality Control Board, July 2009

Beneficial Use Definitions: Municipal and Domestic Supply (MUN); Agricultural Supply (AGR); Industrial Service Supply (IND); Ground Water Recharge (GWR); Freshwater Replenishment (FRSH); Water Contact Recreation (REC-1); Non-Contact Water Recreation (REC-2); Commercial and Sport Fishing (COMM); Warm Fresh Water Habitat (WARM); Cold Fresh Water Habitat (COLD); Wildlife Habitat (WILD), Preservation of Biological Habitats of Special Significance (BIOL); Rare, Threatened, or Endangered Species (RARE); Migration of Aquatic Organisms (MIGR); Spawning, Reproduction, and/or Early Development (SPWN).

The proposed *General Plan 2030* is consistent with provisions of the Basin Plan. The proposed general plan supports water quality protection through implementation of the City's Storm Water Management Plan and water quality prevention programs. Table 4.7-2 in subsection 4.7-3 below summarizes proposed policies and actions to support water quality programs and protection.

City Plans

STORMWATER MANAGEMENT PROGRAM

The City of Santa Cruz has developed a comprehensive Storm Water Management Program (SWMP) to fulfill the requirements for the Phase II NPDES General Permit for Discharges of Storm Water from Small Municipal Separate Storm Sewer Systems (MS4 General Permit) and

to reduce the amount of pollutants discharged in urban runoff. In compliance with the Phase II regulations, the City has developed a comprehensive SWMP that is designed to reduce the discharge of pollutants to the Maximum Extent Practicable (MEP) and to protect water quality. The SWMP includes eight programs to achieve this goal, including runoff control policies, outreach and education efforts, site visits, and the implementation of BMPs. The eight programs include:

- Municipal Operations/Pollution Prevention and Good Housekeeping
- Illicit Discharge Detection and Elimination
- Public Participation
- Public Education
- Construction Site Storm Water Runoff Control
- Post Construction Storm Water Management
- Industrial Facilities
- Commercial Facilities

BMPs will include both preventative measures, such as good housekeeping practices, and structural controls. BMPs that reduce pollutants in stormwater runoff will be implemented to the technology-based standard of Maximum Extent Practicable (MEP). Project development plans are required to include the details of any and all BMPs such as the location, size, and hydraulic calculations that show how the BMP meets City requirements. Project plans are also required to include a signed certification from a licensed civil engineer or architect registered in the State of California that the proposed structural or treatment control BMP(s) meet the design standards criteria established within the City's latest BMP manual.

In addition, since improper maintenance is one of the primary reasons a structural or treatment control BMP may cease to function properly, the City will take measures to ensure that any BMP devices or systems used or installed at a site will be adequately maintained in the long-term (regardless of property owner). To this end, a property owner would be made responsible for inspection and maintenance of the BMP by agreeing in a signed statement, entitled "Maintenance Agreement", to several conditions that define the schedule, responsibility, and proof of inspections and maintenance.

As indicated above, the City of Santa Cruz Storm Water Management Utility is primarily a financing mechanism for flood control and stormwater programs. The City established a stormwater utility fee in May 1994 to fund the local share of the Army Corps of Engineers San Lorenzo River Flood Control and Environmental Restoration Project (as described above). The stormwater utility also provides funds towards development and implementation of the SWMP including staffing to promote departmental and interagency coordination, Best Management Practice compliance, permitting and enforcement, and educational efforts. Lastly, funds are used to maintain and retrofit surface water, stormwater, and flood control facilities. The fee is included on the County Property Tax statements and is payable on a biannual basis. The City bills owners of parcels who do not pay property taxes (City of Santa Cruz, March 2010).

NEARY LAGOON MANAGEMENT PLAN

The Neary Lagoon Management Plan was developed as a comprehensive guide and directive for managing the lagoon area to ensure its viability as an ecosystem and its value as a unique resource for the community. Goals, objectives, and actions are designed with the purpose of preserving and enhancing the lagoon's environmental integrity and quality while satisfying other purposes for public use, flood protection, water quality, mosquito control and aesthetics. Many aspects of the management plan have been implemented. The Parks and Recreation Department is primarily responsible for the implementation of the management plan (City of Santa Cruz, March 2010).

SAN LORENZO URBAN RIVER PLAN

The *San Lorenzo Urban River Plan* is the outcome of a planning process initiated by City Council in 1999 to update previous plans for the San Lorenzo River, Jessie Street Marsh, and Branciforte Creek that guided flood control, vegetation restoration and public access improvements along the San Lorenzo River. (See also discussion in the BIOLOGICAL RESOURCES (Chapter 4.8) section of this EIR.)

The "Lower San Lorenzo River and Lagoon Management Plan" is included as an appendix in the San Lorenzo Urban River Plan and provides resource management and restoration recommendations within the constraints of providing flood protection. Management and restoration recommendations address:

- Annual vegetation and sediment management,
- Summer lagoon water level management,
- Streamflow standard for inflow into lagoon and maintenance of a low flow channel,
- Enhancement of streambed aquatic cover and substrate,
- Enhancement of riverbank shoreline habitat and riparian corridor vegetation, and
- Floodplain and marsh restoration.

CITY-WIDE CREEKS AND WETLANDS MANAGEMENT PLAN

The City-Wide Creeks and Wetlands Management Plan identifies and categorizes all watercourses in the city and establishes a riparian corridor, development setback area, and management area for each watercourse. Specific setback requirements were determined based on an evaluation of biological, hydrological, and land use characteristics, and are applied to all watercourse segments. However, setbacks for wetland areas would be subject to site-specific review. All projects must comply with the watercourse development standards, and a watercourse development permit is required unless specifically exempted or approval of a watercourse variance is obtained. The primary long-term goals of this Management Plan are to:

- Reduce and/or eliminate pollutants discharged to aquatic bodies;
- Improve water quality;
- Improve and restore natural habitat;
- Increase biodiversity;
- Lower water temperatures; and

- Increase public awareness of the value of watershed quality. (City of Santa Cruz, March 2010).

(See the BIOLOGICAL RESOURCES (Chapter 4.8) section of this EIR for further discussion of this plan.)

4.7.2 RELEVANT PROJECT ELEMENTS

PROPOSED GOALS, POLICIES & ACTIONS

The CIVIC AND COMMUNITY FACILITIES chapter of the draft *General Plan 2030* includes one goal related to management of the stormwater system that is identified below, one policy (CC5.1) and 12 accompanying actions that set forth measures to manage stormwater drainage and water quality.

GOAL CC5 *A sustainable and efficient stormwater system.*

Several policies and actions in other chapters of the proposed General Plan also seek to protect critical facilities and new development from flood hazards (HZ1 and HZ6 and actions) and hazards from tsunamis or dam failure (HZ6.6).

FUTURE DEVELOPMENT POTENTIAL

The *General Plan 2030* Land Use Map and land use designations are largely unchanged from the 1990-2005 General Plan / Local Coastal Program, except for three new mixed use land designations have been developed and applied to the following major transportation corridors: Mission Street, Ocean Street, Soquel, Avenue, and Water Street. Additionally, some of the *General Plan 2030* policies and actions also support mixed use districts and/or intensified redevelopment, such as a Mixed Use River District and expansion of the High Density Overlay on Front and lower Pacific.

Land Use actions LU1.1.4 and LU1.1.5 address development and land use for specific sites: the Swenson property and the Golf Club Drive property, respectively. LU2.2.3 also includes addition of 5.5-acre parcel adjacent to the Dimeo Lane landfill and Resource Recovery Center, but specific uses haven't been identified, although the site will not be used as part of expansion of the landfill disposal area. In addition, the proposed *General Plan 2030* supports development of a desalination plant as part of the actions outlined to implement the City's adopted *Integrated Water Plan* (Policy CC3.1.3), but a specific site is not identified.

4.7.3 IMPACTS AND MITIGATION MEASURES

CRITERIA FOR DETERMINING SIGNIFICANCE

In accordance with the California Environmental Quality Act (CEQA), State CEQA Guidelines (including Appendix G), City of Santa Cruz plans, policies and/or guidelines, and agency and professional standards, a project impact would be considered significant if the project would:

- 7a Substantially deplete groundwater supplies or interfere substantially with groundwater recharge;
- 7b Substantially alter the existing drainage pattern of the site or area or result in offsite drainage or flood problems;
- 7c Substantially increase the rate or amount of surface runoff, which would exceed capacity of existing or planned storm drain facilities, cause downstream or offsite drainage problems, or increase the risk or severity of flooding in downstream areas;
- 7d Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface water quality;
- 7e Result in construction of habitable structures within a 100-year floodplain as mapped on a Federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map, which would expose people or structures to a significant risk of loss, injury or death due to flooding;
- 7f Locate structures within a 100-year flood hazard area that would impede or redirect flood flows;
- 7g Expose people or structures to a significant risk of loss, injury, or death involving flooding as a result of the failure of a levee or dam or coastal flooding due to sea level rise and/or
- 7h Expose people or structures to a significant risk of loss, injury or death as a result in inundation by seiche, tsunami, or mudflow.

IMPACT ANALYSIS

Potential impacts related to groundwater (7a) are addressed in the WATER SUPPLY (Chapter 4.4) section of this EIR. The following impact analyses address alteration of drainage patterns and stormwater runoff (7b-c); water quality (7d); and exposure to flood and other hazards (7e-h).

Potential Future Development & Buildout

Adoption and implementation of the proposed *General Plan 2030* would not directly result in increased new development. However, the draft General Plan includes policies and a land use map that support additional development as summarized in subsection 4.7-2 above. Buildout projections indicate that potential new development accommodated by the draft General Plan to the year 2030 could total 3,350 residential units, 3,140,000 square feet of commercial, office and industrial development and new hotel rooms, primarily on infill and underutilized lots,

as described in the PROJECT DESCRIPTION (Chapter 3.0) and LAND USE (Chapter 4.1) sections of this EIR.

Development under the proposed General Plan would primarily occur on vacant infill sites, on underutilized properties that could be redeveloped at higher densities and/or land use intensities, and in the new mixed-use districts along the City's four major street corridors: Mission Street, Ocean Street, Soquel Avenue, and Water Street. Based on the estimated development occurring under the proposed plan,[2] approximately 55% of all new housing, 45% of new commercial development and 52% of new office development would be located along these corridors. The draft plan also supports a mixed use district and high density in the lower Front Street and Pacific Avenue areas east of the San Lorenzo River (LU3.6, LU3.6.1).

Impact 4.7-1: Alteration of Drainage Patterns and Stormwater Runoff
Adoption and Implementation of the proposed *General Plan 2030* would accommodate future development that could result in increased stormwater runoff. With implementation of the proposed policies and actions for stormwater management and adherence to other City's plans and regulations, there would be no alteration of drainage patterns and increases in runoff would be considered a *less-than-significant impact*.

The City is primarily developed, and future development accommodated by the proposed *General Plan 2030* would be considered predominantly infill development within developed areas on vacant infill sites, on underutilized properties, and in the new mixed-use districts along the City's four major street corridors. Based on the estimated development occurring under the proposed plan, approximately one-half of new development would be located along these transportation corridors. There are a few remaining vacant lots and underdeveloped properties located within developed areas (i.e., Swenson site and Golf Club Drive area). Future development could result in an increase in impervious surfaces and runoff, although in the mixed use corridors, most areas already are covered with impervious surfaces, so there would be no net increase in runoff from those sites.

The General Plan policies and actions outlined in Table 4.7-2 and existing City regulations will serve to manage stormwater runoff from future development accommodated by the proposed General Plan. New development would result in stormwater runoff, but proposed policies and actions require that new development maintain pre-development runoff levels (CC5.1.8). Furthermore, the proposed General Plan policies specifically seek to minimize alteration of streams (HZ6.48) and maintain drainage within each drainage basin (CC5.1.5).

Furthermore, Title 24 of the Municipal Code (Zoning Ordinance) currently contains provisions to ensure that new developments or remodeled sites are designed and constructed in a manner that limits alteration of drainage patterns, prevents erosion, and minimizes long-term impacts on water quality. Chapter 24.14 – Environmental Resource Management – contains a section on Conservation Regulations that includes general provisions for drainage and erosion controls.

[2] See Table 3-3 in the PROJECT DESCRIPTION (Chapter 3.0) section of this EIR and Figure 2-3 for estimated distribution of new development per specific areas in the City.

These provisions include requirements that a drainage plan be submitted for projects, both large and small, when existing drainage patterns would be altered by new construction. A drainage plan must be submitted and reviewed as part of the project approval. In addition, the ordinance requires that stormwater runoff resulting from project development be minimized, and if a proposed project includes the discharge of runoff into a natural watercourse, the drainage plan shall include methods to safeguard or enhance the existing water quality. Devices such as detention basins, percolation ponds, or sediment traps may be required by the City, where appropriate or as specified in an adopted plan or wetlands management plan.

TABLE 4.7-2
Proposed General Plan Policies & Actions that Avoid or Reduce Drainage, Water Quality and Other Hydrological Impacts

Type of Measure / Action	Policies / Actions
PREVENT ALTERATION OF DRAINAGES – DRAINAGE PATTERNS	• Minimize alteration of streams & floodplains: HZ6.4.8 • Strive to maintain drainage within each drainage basin: CC5.1.5, CC5.1.6
MANAGE STORMWATER & DRAINAGE SYSTEM	• Develop Stormwater Master Plan & Storm Drain Master Plan: CC5.1, CC5.13 • Conduct annual maintenance: CC5.1.4 • Require new development to maintain pre-development runoff: CC5.1.8
PROTECT WATER QULAITY	• Implement stormwater quality & water pollution prevention programs: CC5.1.1, CC5.1.9, CC5.1.10 • Discourage use of pesticides, herbicides, chemical fertilizers: NRC3.2 • Education efforts: CC5.1.12
PROTECT AGAINST FLOOD HAZARDS	• Manage/maintain San Lorenzo River floodway: CC5.1.7 • Evaluate critical facilities for ability to survive flood hazards: HZ1.1.8 • Strengthen bridges: HZ1.1.11 • Address effects of global warming in areas that may have increased sea level or flooding: HZ6.4.1, NRC4.5 & 4.5.1 • Prepare guidelines for construction in floodplains: HZ6.4.6 • Use restrictions in undeveloped flood areas: HZ6.4.7 • Control activities that may increase flood potential: HZ6.4.9 • Limit impervious surfaces in flood-prone areas: HZ6.4.10
PROTECT AGAINST DAM FAILURE & TSUNAMI	• Avoid or reduce risks from tsunami & dam failure: HZ6.6 & actions

Conclusion. Adoption and implementation of the proposed *General Plan 2030* would not directly result in new development, but new development accommodated by the plan would result in increased runoff. However, with implementation of the proposed *General Plan 2030* goals, policies and actions that set forth measures to avoid and minimize adverse impacts to drainage patterns and stormwater systems (as summarized on Table 4.7-2) and adherence to City regulations regarding project-level drainage control and design, the proposed *General Plan 2030* would not result in substantial

alteration of existing drainage patterns and its indirect impact related to increased stormwater runoff would be less than significant.

Mitigation Measures

No mitigation measures are required as a significant impact has not been identified.

Impact 4.7-2: Water Quality
Adoption and Implementation of the proposed *General Plan 2030* would accommodate future development that could result in increased stormwater runoff and potential urban pollutants that contribute to water quality degradation. With implementation of the proposed policies and actions for water quality protection and adherence to other City's plans and regulations related to drainage and water quality controls, this would be considered a *less-than-significant impact*.

As indicated above, the City is primarily developed, and future development accommodated by the proposed *General Plan 2030* would be considered predominantly infill development within developed areas on vacant infill sites, on underutilized properties, and in the new mixed-use districts along the City's four major street corridors. Based on the estimated development occurring under the proposed plan, approximately one-half of new development would be located along these transportation corridors. There are a few remaining vacant lots and underdeveloped properties located within developed areas that are also located adjacent to water bodies to include:

- The Swenson Site adjacent to Antonelli Pond;
- The Golf Club Drive area adjacent to Pogonip Creek; and
- Portions of the area along Seventh Avenue that is within the City's Sphere of Influence, but outside city limits; portions of which border Arana Gulch and the Small Craft Harbor area.

Runoff from future development could carry urban pollutants into city watercourses if not properly managed. None of the larger vacant or underdeveloped areas identified below are adjacent to existing impaired water bodies. However, land use intensification is supported in areas along San Lorenzo River. The proposed General Plan does not propose any new uses that would result in a potential violation of water quality standards or waste discharge requirements. The plan does support development of a desalination facility that could result in marine discharges. However, this facility is currently subject of a site-specific environmental review process; previous program-level impacts are summarized in the WATER QUALITY (Chapter 4.4) section of this EIR.

The General Plan policies and actions outlined in Table 4.7-2 and existing City regulations will serve to manage stormwater runoff from future development accommodated by the proposed General Plan and protect water quality. The plan supports development and maintenance of a Stormwater Master Plan (CC5.1) with implementation of the City's stormwater quality program

(CC5.1.1) and stormwater pollution prevention program (CC5.1.10). The plan also seeks to reduce stormwater pollution (CC5.1.9).

Furthermore, Chapter 16.19 of the Municipal Code (Stormwater and Urban Runoff Pollution Control) and the City's recently adopted "Storm Water Management Plan" include provisions and requirements for drainage controls and implementation of BMPs to protect the water quality, beneficial uses, marine habitats, and ecosystems of the receiving waters of the City, including the San Lorenzo River and Monterey Bay, from pollutants carried by urban runoff. As indicated above under the Impact 4.7-1 discussion, Chapter 24.14 includes general provisions for drainage and erosion controls, and if a proposed project includes the discharge of runoff into a natural watercourse, the drainage plan shall include methods to safeguard or enhance the existing water quality. Devices such as detention basins, percolation ponds, or sediment traps may be required by the City, where appropriate or as specified in an adopted plan or wetlands management plan. Provisions pertaining to erosion control include requirements that a site development be fitted to the topography and soil so as to create the least potential for erosion.

Conclusion. Adoption and implementation of the proposed *General Plan 2030* would not directly result in new development, but new development accommodated by the plan would result in increased runoff and potential water quality degradation. With implementation of the proposed *General Plan 2030* goals, policies and actions to protect water quality as summarized on Table 4.7.2, and adherence to City regulations regarding project-level drainage designs to protect water quality, the proposed *General Plan 2030* would not result in a substantial degradation of surface water quality.

Mitigation Measures

No mitigation measures are required as a significant impact has not been identified.

Impact 4.7-3: Flood Hazards
Adoption and Implementation of the proposed *General Plan 2030* would accommodate future development that could result in exposure to flood hazards, including watercourse flooding, dam failure and/or tsunami. With implementation of the proposed policies and actions related to flood control and adherence to other City's plans and regulations, the project would not result in location of habitable structures within a floodplain or substantial risk of exposure of structures or people to flood hazards. This is considered a *less-than-significant impact*.

As indicated above, the City is primarily developed, and future development accommodated by the proposed *General Plan 2030* would be considered predominantly infill development within developed areas on vacant infill sites, on underutilized properties, and in the new mixed-use districts along the City's four major street corridors. Based on the estimated development occurring under the proposed plan, approximately one-half of new development would be located along these transportation corridors. The draft plan also supports a mixed use district

and high density in the lower Front Street and Pacific Avenue areas east of the San Lorenzo River (LU3.6, LU3.6.1).

Future development accommodated by the proposed general plan could be subject to flood hazards in limited areas. These include areas of the downtown that are located in the San Lorenzo River floodplain, although recent levee improvements have increased flood protection in these areas. Additionally there are a few remaining vacant lots and underdeveloped properties located within developed areas that are also located adjacent to water bodies that could be subject to 100-year flood hazards identified on Figure 4.7-1 to include:

- The Swenson Site adjacent to Antonelli Pond;
- The Golf Club Drive area adjacent to Pogonip Creek; and
- Portions of the area along Seventh Avenue that is within the City's Sphere of Influence, but outside city limits; portions of which border Arana Gulch and the Small Craft Harbor area.

Additionally, some areas would be subject to inundation in the event of a tsunami as shown on Figure 4.7-2, and potential inundation due to dam failure.

The General Plan policies and actions outlined in Table 4.7-2 and existing City regulations will serve to manage development and prevent exposure to flood hazards. The plan supports land use restrictions in undeveloped flood areas (HZ6.4.7) and control of activities that may increase flood potential (HZ6.4.9). The plan also seeks to manage and maintain the San Lorenzo River floodway (CC5.1.7) and evaluate critical structures for ability to survive a flood (CC5.1.7). Development and maintenance of a Stormwater Master Plan (CC5.1) with implementation of the City's stormwater quality program (CC5.1.1) and stormwater pollution prevention program (CC5.1.10). The plan also seeks to reduce stormwater pollution (CC5.1.9). The proposed plan seeks to avoid or reduce risks from tsunami and dam failure (HZ6.6).

Furthermore, Section 24.14.400 ("Floodplain Management") sets forth requirements and procedures to protect properties against flood hazards and comply with National Flood Insurance Program requirements. The regulations set forth programs for floodplain management and specify circumstances in which floodproofing of structures may be required. The City's adopted "Local Hazard Mitigation Plan" (City of Santa Cruz, September 2007) also includes the mitigation strategy to protect structures and people from damages or loss of life due to flooding, tsunamis or dam failures.

Conclusion. Adoption and implementation of the proposed *General Plan 2030* would not directly result in new development, but new development accommodated by the plan could be subjected to flood hazards, including potential tsunami and dam failures. With implementation of the proposed *General Plan 2030* goals, policies and actions regarding flood management as summarized on Table 4.7.2, and adherence to City regulations and implementation of its hazard mitigation program, the proposed *General Plan 2030* would not locate structures in a 100-year floodplain or expose people to significant risk of loss, injury or death involving flooding. This is considered a less-than-significant impact.

Mitigation Measures

No mitigation measures are required as a significant impact has not been identified.

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