3.8 Hydrology and Flooding/Water Quality

Environmental Setting

PHYSICAL SETTING

This section describes hydrological conditions in the San Diego region, the portion of San Diego County which is tributary to coastal waters. The term watershed, used in this section, refers to the region or area drained by a river, stream, or watercourse. The various public agencies responsible for water-related issues in the San Diego region are named within, together with a description of their activities.

Climatic and Hydrological Characteristics

The San Diego region has a Mediterranean climate, with more than 90 percent of the annual precipitation typically occurring during the 6-month period of November through April. Significant variation occurs in the geographic distribution of precipitation within San Diego County and from year to year. Carlsbad receives an average of 7 to 10 inches of precipitation annually.

For administrative purposes, the San Diego region is divided into 11 hydrologic units that flow from elevated regions in the east toward coastal lagoons, estuaries, or bays in the west. Each of the hydrologic units feature similar water quality characteristics, and all face similar water quality issues. Carlsbad is located within the Carlsbad Hydrologic Unit (HU).[1]

The Carlsbad HU is approximately 210 square miles in area extending from the headwaters above Lake Wolhford in the east to the Pacific Ocean in the west, and from Vista and Oceanside in the north to Solana Beach, Encinitas, and the community of Rancho Santa Fe to the south. The cities of Carlsbad, San Marcos, and Encinitas are entirely within this HU. There are numerous important surface hydrologic features within the Carlsbad HU including four unique coastal lagoons, three major creeks, and two large water storage reservoirs. The HU contains four major, roughly parallel hydrologic areas (HAs): Buena Vista (901.2), Agua Hedionda (904.3), Batiquitos (904.5), and San Elijo (904.6) HAs. Two smaller HAs, the Loma Alta (904.1) and the Canyon de

[1] Project Clean Water. 2012. "Carlsbad Watershed." Project Clean Water website. Accessed September 21, 2012. http://www.projectcleanwater.org/html/ws_carlsbad.html.

las Encinas (904.4), are also within the Carlsbad HU. Approximately 48 percent of the Carlsbad HU is urbanized. The dominant land uses are residential (29 percent), commercial/industrial (6 percent), freeways and roads (12 percent), agriculture (12 percent), and vacant/undeveloped (32 percent).[2]

Surface Water Quality

Surface water resources include coastal waters, reservoirs, and lake resources, as well as streams and rivers. Most of the surface flow in the streams and rivers of the San Diego region comes from precipitation runoff and storm events. As discussed above, precipitation occurs predominantly during the winter and spring months. By extension, streamflows are highest during this period. Surface flows during summer and fall months are typically low, and consist of urban runoff, agricultural runoff, and surfacing groundwater.

Major impacts to the Carlsbad HU include surface water quality degradation, sewage spills, beach closures, sedimentation, habitat degradation and loss, invasive species, and eutrophication. Pollutant conditions in the Carlsbad HU include bacterial indicators, eutrophic conditions, nutrients, sediments, sulfates, nitrates, and phosphates. The sources of these pollutants are varied and include urban runoff, agricultural runoff, sewage spills, livestock/domestic animals, and other natural sources. Each impaired lagoon is also identified in the San Diego Regional Water Quality Control Board (RWQCB) Investigation Order and Technical Report for Lagoons Total Maximum Daily Load Project – Order No. R9-2006-0076, which establishes monitoring requirements for dischargers. This order required monitoring to begin during the 2007–2008 wet weather monitoring season.

As identified in the RWQCB's Water Quality Control Plan for the San Diego Basin (Basin Plan), the designated beneficial uses for Buena Vista Creek, Agua Hedionda Creek, San Marcos Creek, and San Luis Rey River, which are located in the Carlsbad HU, may include the following:

- Municipal and domestic water supply,
- Agricultural water supply,
- Industrial service water supply,
- Contact water recreation,
- Non-contact water recreation,
- Warm freshwater habitat,
- Cold freshwater habitat,
- Wildlife habitat,
- Rare, threatened, and endangered species habitat, and

[2] Project Clean Water. No Date. "Carlsbad Watershed." Available: http://www.projectcleanwater.org/html/ws_carlsbad.html. Accessed: March 10, 2014.

- Hydropower generation.
- Buena Vista Lagoon

Buena Vista Lagoon is a 350-acre fresh water lagoon managed by the California Department of Fish and Wildlife (CDFW) as a nature reserve. Located on the border between Carlsbad and Oceanside, it became California's first ecological reserve in 1969. CDFW is the major property owner of the lagoon; however, a number of adjacent residential property owners have control of small portions of their property as they meet the lagoon's wetland boundary.

Although the lagoon itself is maintained as a nature reserve, much of the Buena Vista watershed is already developed. A large percentage of the watershed is under private ownership, making it difficult to acquire large tracts of land necessary to implement a comprehensive preserve system. The primary water quality issues within the watershed concern Buena Vista Lagoon, which is listed as impaired for nutrients, indicator bacteria, and sedimentation/siltation on the U.S. Environmental Protection Agency's (EPA's) 2008 303(d) list. The City of Vista has installed a series of check dams and a detention basin to assist in the removal of sediments traveling through the Buena Vista Creek, which is listed as impaired for selenium on the EPA's 2008 303(d) list.

Agua Hedionda Lagoon

Agua Hedionda Lagoon is located in Carlsbad between Tamarack Avenue and Cannon Road and is comprised of three inter-connected lagoons that are divided by the Interstate 5 (I-5) freeway and a railroad bridge. Cabrillo Power LLC owns and manages the lagoon water body, which provides cooling water for the electric producing generators at the Encina Power Plant. A small portion along the eastern edge of the lagoon is protected by CDFW and designated as a Marine Protected Area under the Marine Life Protection Act. The Agua Hedionda Ecological Reserve was acquired in 2000 by the CDFW and consists of 186 acres of wetland at the eastern end of the lagoon. The Agua Hedionda Lagoon is not listed as impacted on the EPA's 2008 303(d) list; however, Agua Hedionda Creek, which feeds into Agua Hedionda Lagoon, is listed as impaired for indicator bacteria, phosphorus, Total Nitrogen as N, toxicity, manganese, and selenium on the EPA's 2008 303(d) list.

Batiquitos Lagoon

The Batiquitos Lagoon consists of approximately 561 acres owned by both the CDFW and the California State Lands Commission and protected as a game sanctuary and bird estuary. The lagoon was originally open to the ocean, but over time the construction of transportation corridors and other development resulted in sediment closing off the lagoon. In the mid-1990s, a significant lagoon restoration and enhancement project, conducted by the City of Carlsbad, Port of Los Angeles, and other cooperating agencies, allowed for the lagoon to open to the ocean again, as it exists today. Based on the final agreement for the Batiquitos Lagoon Enhancement Project (1987), CDFW is responsible for ongoing maintenance and monitoring of the lagoon. Although Batiquitos Lagoon is not listed as impaired, two of the creeks that feed into Batiquitos Lagoon are listed: Encinitas Creek is listed as impaired for selenium and toxicity, and San Marcos Creek is

listed as impaired for DDE, phosphorus, selenium, and sediment toxicity on the EPA's 2008 303(d) list.

Beneficial uses for Buena Vista, Agua Hedionda, and Batiquitos Lagoons include the following:

- Contact water recreation,
- Non-contact water recreation,
- Commercial and sport fishing,
- Estuarine habitat,
- Wildlife habitat,
- Industrial service supply,
- Marine habitat,
- Aquaculture,
- Migration of aquatic organisms,
- Shellfish harvesting,
- Preservation of biological habitats of special significance,
- Rare, threatened, and endangered species habitat,
- Fish spawning, reproduction, and/or early development, and
- Warm freshwater habitat.

Water Quality and Pollution

A community's impact on water quality is closely related to the hydrologic context of a region and the sources and types of pollutants that can further degrade or impair the city's water bodies and resources. As additional development occurs in the Carlsbad, and in other communities within these watersheds, impervious surfaces may increase from the placement of roads, parking lots, buildings, and other infrastructure. These facilities will reduce the amount of water infiltration into the ground and will increase direct runoff into the city's creeks and lagoons, which could result in further water quality degradation and flooding concerns. In addition, if not controlled, development activities have the potential to cause soil erosion and sedimentation, which may result in increased rates of surface runoff, decreased water quality, and related environmental damage.

An effective use of site, source and treatment control best management practices is crucial to the city's ability to minimize pollutants and reduce water quality impacts. One way to reduce urban runoff volume is to maximize the percentage of permeable surfaces throughout the city in order to allow increased percolation and minimize the amount of runoff directed to impervious areas (e.g., parking lots). In addition, pollutant sources can be minimized by incorporating landscaped areas, drought tolerant plant materials, and slow conveyance of runoff through vegetated areas. The City of Carlsbad currently employs a number of measures, including best management

practices (BMPs), to prevent pollutants and hazardous materials from entering municipal stormwater conveyance systems. As storm drains are not connected to sanitary sewer infrastructure, water conveyed to these drains are not treated prior to discharging into creeks, lagoons, and the ocean. Therefore, pollutants must be reduced and/or removed before entering urban conveyance systems. The city's Storm Water Protection Program conducts inspections, monitoring, and education and outreach to the public. Through this program, the city informs residents and businesses how to prevent pollutants and other hazardous materials from entering storm drains.

Groundwater

Groundwater consists of water within underground aquifers that is recharged from the land surface. The rate of groundwater recharge is affected by the permeability of the ground surface. Carlsbad is located within the semi-arid San Diego region, which experiences a slow rate of groundwater recharge by rainfall. There are 27 groundwater basins in San Diego County, many of which are impaired by nitrate, sulfate, total dissolved solids, and other contaminants.

The Batiquitos Lagoon Valley Groundwater Basin is located within Carlsbad. This basin is identified as Basin 9-22 and consists of 741 acres. The basin is bounded on the northeast by impermeable crystalline rocks, on the west by Batiquitos Lagoon, and otherwise by semi-permeable rocks on the La Jolla Formation. The average annual precipitation ranges from 7 to 15 inches within the basin area. The overall groundwater storage capacity and storage levels are currently unknown.[3] The groundwater in this basin is not considered a good source of irrigation or municipal use due to the high content of chloride, sulfate, and total dissolved solids.

Flooding and Coastal Hazards

FEMA Floodplains

Floodplains are areas of land located adjacent to rivers or streams that are subject to recurring inundation or flooding. Preserving or restoring natural floodplains helps with flood loss reduction benefits and improves water quality and habitat. Floods are typically described in terms of their statistical frequency. For example, a 100-year floodplain describes an area within which there is a 1 percent probability of a flood occurring in any given year. The Federal Emergency Management Agency (FEMA) prepares Flood Insurance Rate Maps (FIRMs), which identify 100-year and 500-year flood zones. As shown in Figure 3.8-1, the potential flood hazard areas identified on the FIRM maps include the entire coastline and the following major drainage basins:

- Buena Vista Creek and Buena Vista Lagoon
- Agua Hedionda Creek, its northern tributary, and the Agua Hedionda Lagoon
- San Marcos Creek and its northern tributary

[3] California Department of Water Resources. 2004. California's Groundwater—Bulletin 118. Available: http://www.water.ca.gov/groundwater/bulletin118/bulletin118update2003.cfm

- Batiquitos Lagoon
- Encinitas Creek

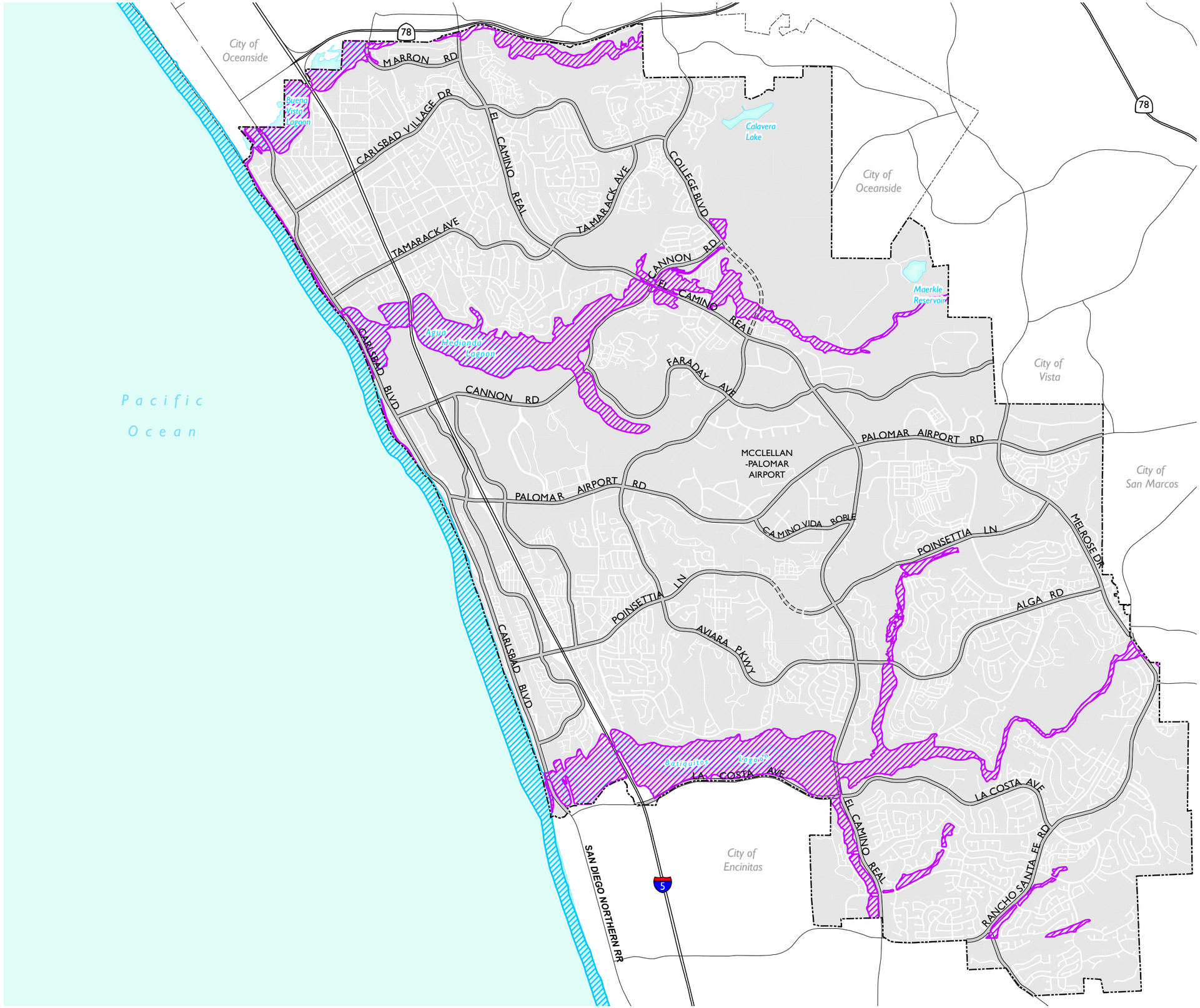
Most jurisdictions within San Diego County, including the City of Carlsbad, participate in the National Flood Insurance Program. Pursuant to the City of Carlsbad's Local Coastal Program (LCP) and Municipal Code Title 21 (Zoning), development is restricted within 100-year floodplain areas.

Dam Inundation

Dam inundation is caused by the release of impounded water from structural failure or overtopping of a dam. The San Diego County Multi-jurisdictional Hazard Mitigation Plan (HAZMIT) identifies dam failure risk levels based on dam inundation map data. There are four dams located within or adjacent to Carlsbad: Calavera, Maerkle, San Marcos, and Bressi. The Calavera, Maerkle, and San Marcos dams have been assigned high hazard ratings and have emergency action plans in place. The Bressi dam has a low hazard rating and also has an emergency action plan in place. These dams are periodically inspected by the State of California Division of Dam Safety. The Dam Inundation Zones within Carlsbad are shown on Figure 3.8-2.

Figure 3.8-1

PROPOSED GENERAL PLAN
Potential Flood Hazards



1% Annual Chance Coastal Flood Zone
(100 Year Flood - High Risk Coastal Areas)

1% Annual Chance Flood Zone
(100 Year Flood - High Risk Areas)

Highways

Major Street

Planned Street

Railroad

City Limits

500 ACRES

100 ACRES

0 0.5 1 2

Miles

Source: City of Carlsbad, 2013; FEMA, 2012; SANDAG, 2012; Dyett & Bhatia, 2013.

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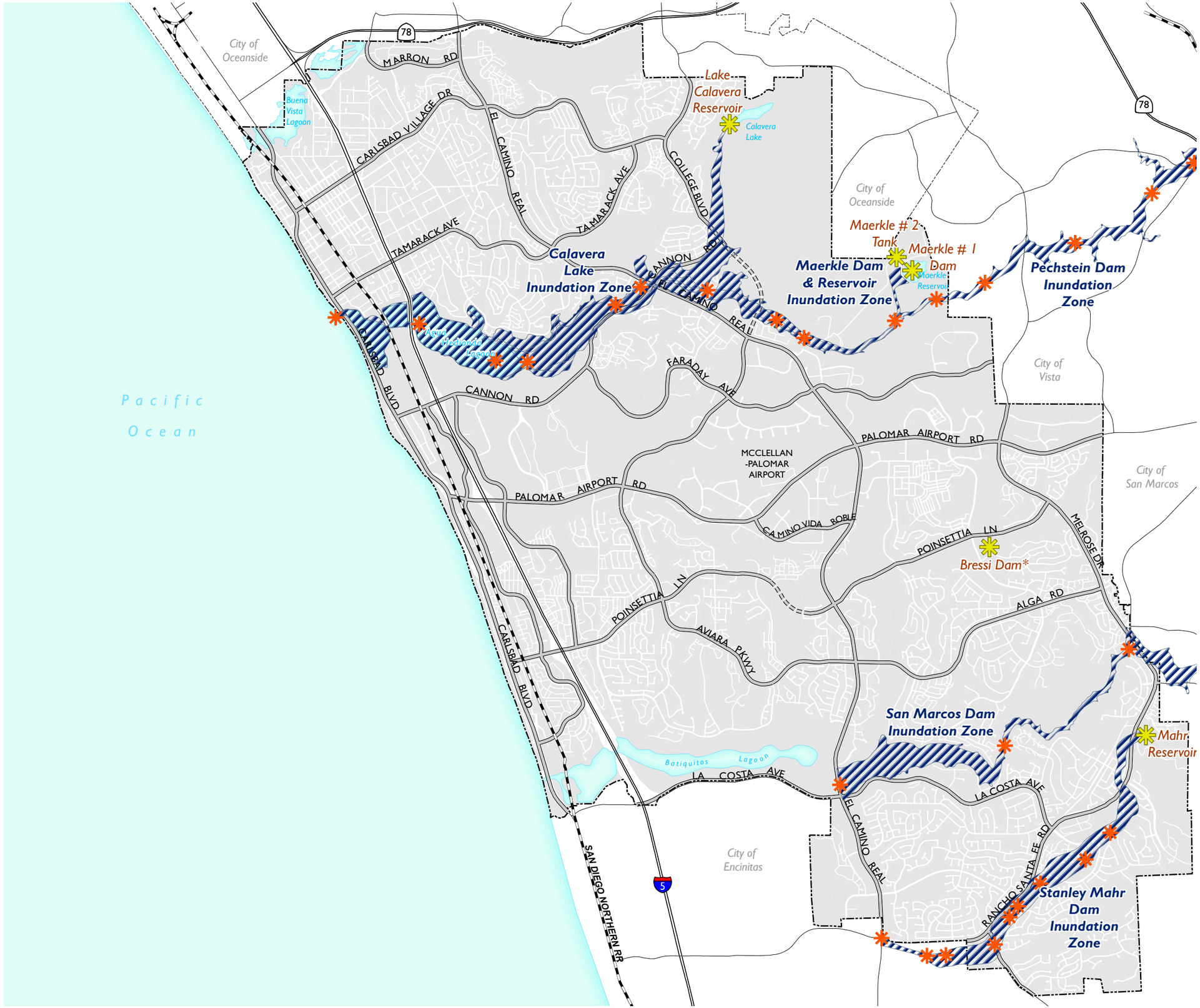
Figure 3.8-2

PROPOSED GENERAL PLAN
Dam Inundation Zones



- Dams & Reservoirs
- Dam Inundation Points
- Dam Inundation Areas
- Highways
- Major Street
- Planned Street
- Railroad
- City Limits

(*There is no inundation zone associated with Bressi Dam)

500 ACRES

100 ACRES

0 0.5 1 2

Miles

Source: City of Carlsbad, 2013; SANDAG, 2013; DUDEK, 2013; Dyett & Bhatia, 2013.

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Sea Level Rise

In California, sea levels have risen by as much as seven inches along the California coast over the last century, resulting in eroded shorelines, deterioration of infrastructure, and depletion of natural resources. The California State Lands Commission released a report related to sea level preparedness in California, which summarized the efforts of California, federal agencies and other coastal states to address sea level rise and provided recommendations to reduce the impacts of sea level rise on California's communities. In addition, the 2009 California Climate Adaptation Strategy summarizes the most recent science in predicting potential climate change impacts and recommends response strategies. The California Energy Commission's 2009 White Paper entitled, "The Impacts of Sea-Level Rise on the California Coast," also describes strategies to address the impacts of sea level rise in California communities. The HAZMIT has identified sea level rise as one of Carlsbad's (and other coastal cities) three primary climate change vulnerabilities (the other two being drought and fire). Areas within the city that are particularly vulnerable to sea level rise are those areas immediately adjacent to the coast, which are similarly vulnerable to coastal storms. Potential strategies to reduce the impacts of sea level rise on the city may include hard engineering (seawalls, breakwaters, levees) soft engineering (beach nourishment and/or replenishment, buffer areas) and restricting or reducing development near the coastal areas.

Safety and Management

Long-term prevention, mitigation efforts, and risk-based preparedness for specific hazards within the city are addressed as a part of the HAZMIT. The HAZMIT identifies specific risks for San Diego County and provides methods to help minimize damage caused by natural and manmade disasters. The final list of hazards profiled for San Diego County includes Wildfire/Structure Fire, Flood, Coastal Storms/Erosion/Tsunami, Earthquake/Liquefaction, Rain-Induced Landslide, Dam Failure, Hazardous Materials Incidents, Nuclear Materials Release, and Terrorism. Currently, the city is in the process of updating its mitigation strategies and action programs within the HAZMIT. Areas of potential concern for the city are coastal storms/erosion and tsunami. In order to improve the city's capacity to handle and convey water flows that may result from these events, as well as alleviate potential flooding and erosion impacts on public and private lands, structures, and infrastructure systems that may result, the city can evaluate opportunities to protect the coast from inundation and ease the stress on existing flood conveyance systems. Opportunities may include incorporating erosion and sedimentation control measures along the coast, improving storm drain infrastructure to divert flows or handle increased capacity, shifting a portion of Carlsbad Boulevard inland, and/or creating new wetland areas within the city's areas of potential concern to increase surface area for water flow conveyance.

Tsunamis and Seiches

Tsunamis are long wavelength ocean waves generated by sudden movements of the ocean bottom during events such as earthquakes, volcanic eruptions, or landslides. The County of San Diego maps zones of high risk for tsunami run-up for coastal areas throughout the county. As shown in Figure 3.8-3, the only areas identified within the City of Carlsbad as having risk for tsunami run-up are the immediate vicinity of the Buena Vista, Agua Hedionda, and Batiquitos lagoons.

Seiches are defined as wave-like oscillatory movements in enclosed or semi-enclosed bodies of water, such as lakes of reservoirs. Potential effects from seiches include flooding damage and related hazards in surrounding areas from spilling or sloshing waves, as well as increased pressure on containment structures. The County of San Diego maps zones of high risk for dam inundation throughout the county. The high risk areas are located east of the Agua Hedionda and Batiquitos lagoons.

REGULATORY SETTING

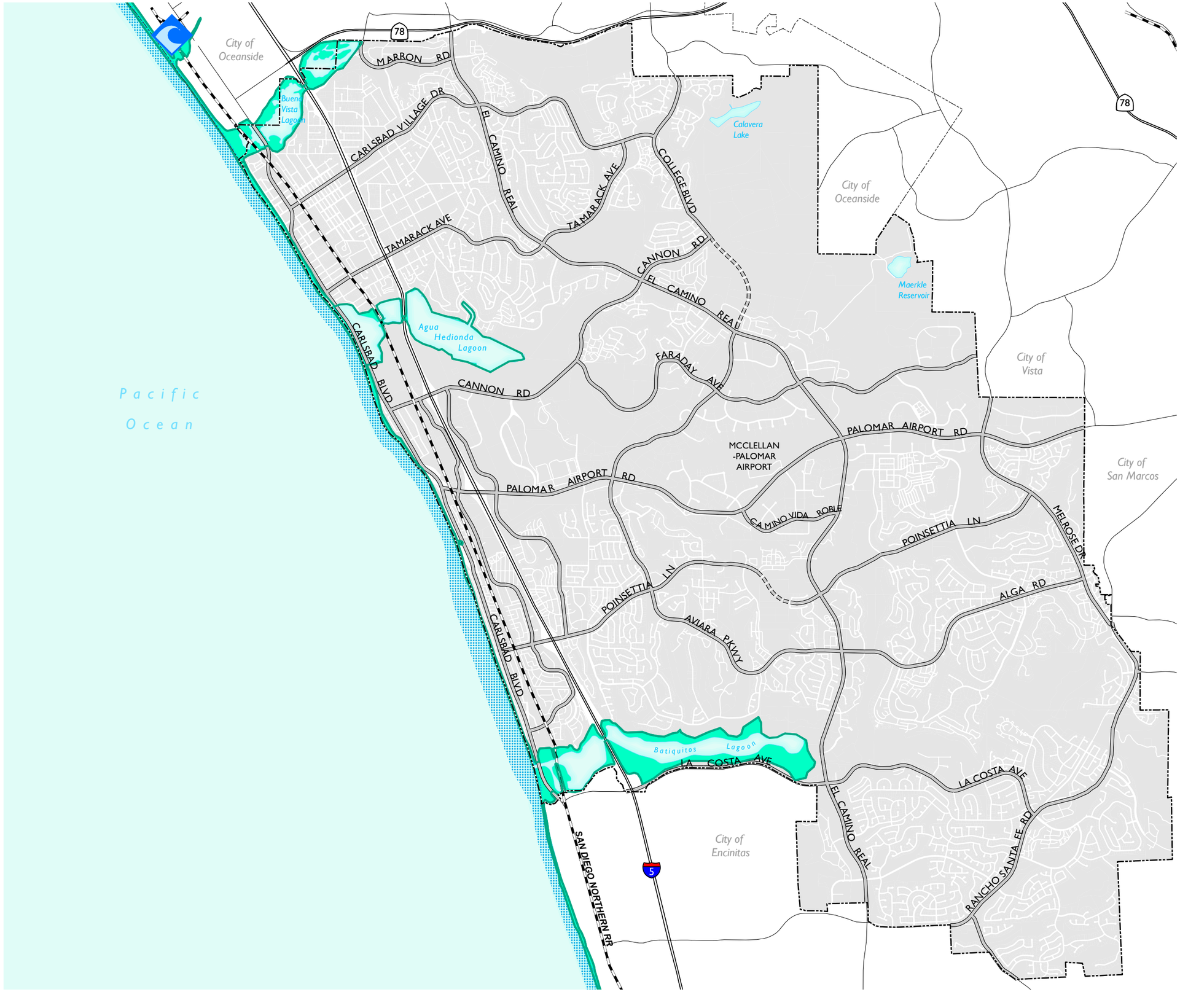
Federal Regulations

Federal Emergency Management Agency

FEMA prepares FIRMs, which identify 100-year flood zones within communities. The 100-year floodplain areas within the city are located around and adjacent to the three lagoons and associated major creeks (see Figure 3.8-1). Pursuant to the city's LCP and Municipal Code Title 21 (Zoning), development is restricted within 100-year floodplain areas. In addition, the city has identified specific areas where specific protection efforts are necessary; these areas include steep slopes, drainage/erosion, slope stability, seismic hazards, and floodplain development.

Figure 3.8-3

PROPOSED GENERAL PLAN
Maximum Tsunami Projected Run-up



Historic Tsunami Effect Felt

FEMA VE Zone (High Risk)

Maximum Tsunami Projected Runup

Highways

Major Street

Planned Street

Railroad

City Limits

500 ACRES

100 ACRES

0 0.5 1 2

Miles

Source: City of Carlsbad, 2013; SANDAG, 2012; Dyett & Bhatia, 2013.

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Federal Water Pollution Control Act of 1972 (Clean Water Act)

The EPA is the lead federal agency responsible for water quality management. The principle federal law regulating water quality in the United States is the 1972 Federal Water Pollution Control Act, also known as the Clean Water Act. The fundamental purpose of the Clean Water Act is the protection of designated beneficial uses of water resources. The Clean Water Act establishes a system of water quality standards, discharge limitations, and permits and requires states to adopt water quality standards to protect public health and welfare, enhance the quality of water, and serve the other purposes of the Clean Water Act. The Clean Water Act was amended in 1987 to include urban and stormwater runoff, which required many cities to obtain a National Pollutant Discharge Elimination System (NPDES) permit for stormwater conveyance system discharges. Section 402(p) of the Clean Water Act prohibits discharges of pollutants contained in stormwater runoff, except in compliance with a NPDES permit, as more fully described below.

Under Section 404 of the Clean Water Act, the U.S. Army Corp of Engineers (ACOE) regulates discharges of dredged or fill material into waters of the United States, requiring issuance of a Section 404 permit. Under Section 401 of the Clean Water Act, a state water quality certification must be obtained whenever an application for a federal permit for discharge of pollutants into waters of the United States is submitted, such as a Section 404 permit. The Section 401 certification requires that any activity affecting waters of the United States be in compliance with all applicable water quality standards, limitations, and restrictions.

Under federal law, the EPA has published water quality regulations under Volume 40 of the Code of Federal Regulations (40 CFR). Section 303 of the Clean Water Act requires states to adopt water quality standards for all surface waters of the United States. As defined by the Clean Water Act, water quality standards consist of two elements: (1) designated beneficial uses of the water body in question and (2) criteria that protect the designated uses. Section 304(a) requires the EPA to publish advisory water quality criteria that accurately reflect the latest scientific knowledge on the kind and extent of all effects on health and welfare that may be expected from the presence of pollutants in water. Where multiple uses exist, water quality standards must protect the most sensitive use.

National Wild and Scenic Rivers Act

The National Wild and Scenic Rivers Act was established in 1968 to maintain the natural beauty, biology, and wildness of designated "wild," "scenic," or "recreational" rivers threatened by the construction of dams, diversions, and canals. The act seeks to preserve these designated rivers in their free-flowing condition and protect their immediate environments for the benefit and enjoyment of present and future generations (16 U.S.C. 1271 et seq.).

State Regulations

Porter–Cologne Water Quality Act

The Porter–Cologne Water Quality Act is the principal state law enacted to establish requirements for adequate planning, implementation, management, and enforcement of water quality controls. The Porter–Cologne Act, which became Division 7 of the California Water

Code, established a regulatory program to protect water quality and beneficial uses of all state waters, outlined the responsibilities and authorities of the nine Regional Water Quality Control Boards (RWQCBs), and established the State Water Resources Control Board (SWRCB). For the San Diego Hydrologic Region, water quality is regulated by the RWQCB, Region 9 of the SWRCB. Each regional board is directed to create a water quality control plan, to include three main components: (1) beneficial uses that are to be protected; (2) water quality objectives that protect those uses; and (3) an implementation plan to accomplish those objectives.

Local Regulations

San Diego Basin—Region 9, Water Quality Control Plan

In accordance with the criteria in the California Porter–Cologne Water Quality Control Act, and other pertinent state and federal rules and regulations, each RWQCB is responsible for water quality control planning within their region, often in the form of a basin plan. San Diego County falls within the jurisdiction of Region 9 of the RWQCB. The San Diego Basin—Region 9, Water Quality Control Plan establishes standards for compliance in the San Diego Basin. The RWQCB is also responsible for implementing the provisions of the General Permit, including reviewing Storm Water Pollution Prevention Plans and monitoring reports, conducting compliance inspections, and taking enforcement actions.

San Diego Region Municipal Stormwater Permit (MS4 Permit)

The Clean Water Act amendments of 1987 established a framework for regulating stormwater discharges from municipal, industrial, and construction activities under the NPDES program. The NPDES permit program, as authorized by Section 402 of the Clean Water Act, was established to control water pollution by regulating point sources that discharge pollutants into waters of the United States. In California, the SWRCB administers the NPDES municipal stormwater permitting program through the nine regional boards. Pursuant to the Municipal Permit issued by the San Diego RWQCB, co-permittees are required to develop and implement construction and permanent stormwater BMP regulations addressing stormwater pollution associated with private and public development projects. Development projects are also required to include BMPs to reduce pollutant discharges from the project site in the permanent design. The Municipal Stormwater Permit outlines the individual responsibilities of the co-permittees including, but not limited to, the implementation of management programs, BMPs, and monitoring programs, within their jurisdiction and their watershed(s). BMPs associated with the final design are described in the Model Standard Urban Stormwater Mitigation Plan. The County of San Diego requires a stormwater management plan to describe potential construction and post-construction pollutants and identify BMPs to protect water resources.

In addition, the RWQCB's Municipal Separate Storm Sewer Systems permit requires control of hydromodification, or changes in the natural flow pattern (surface flow or groundwater) of an area due to development. Hydromodification can be managed by reducing runoff flow and volume, along with including BMPs that reduce volume.

Jurisdictional Urban Runoff Management Program

The city has developed a Jurisdictional Urban Runoff Management Program (JURMP) to comply with Municipal Permit Order No. R9-2013-0001, NPDES Permit No. CAS0109266, issued by the California RWQCB, San Diego Region. The permit was issued on May 8, 2013, and is valid for 5 years. The JURMP, therefore, helps to implement programs to reduce pollution in urban runoff, including programs to regulate new public and private land development during each of the three major phases of urban development, i.e., the planning, construction, and existing development (or use) phases.[4]

City of Carlsbad Grading and Drainage Ordinance

Carlsbad Municipal Code Title 15 is the city's Grading and Drainage Ordinance. The Grading Ordinance establishes minimum requirements for grading associated with development under Municipal Code Titles 20 (Subdivisions) and 21 (Zoning). The Grading Ordinance requires that a grading permit be obtained prior to grading, including the clearing and grubbing of vegetation. The permit requires a stormwater maintenance program, construction stormwater pollution prevention plan (SWPPP), and other such documentation and information as may be necessary to demonstrate that the grading work will be carried out in substantial compliance with all city codes and standards, and the requirements of the city's Landscape Manual.

Chapters 15.08 and 15.12 of the Grading Ordinance address drainage and stormwater management and discharge. The purpose of these chapters is to ensure the completion of drainage facilities, and to protect and enhance the water quality of receiving waters and wetlands in a manner pursuant to and consistent with the Clean Water Act and municipal permit. The city's efforts include prohibiting non-stormwater discharges to the stormwater conveyance system; eliminating discharges to the stormwater conveyance system from spills, dumping, or disposal of materials other than stormwater or permitted or exempted discharges; reducing pollutants in stormwater discharges to the maximum extent practicable; and reducing pollutants in stormwater discharges in order to achieve applicable water quality objectives for receiving waters within Carlsbad.

City of Carlsbad Storm Water Standards Manual

The Carlsbad Storm Water Standards Manual, Volume 4 of the Carlsbad Engineering Standards, is the city's Standard Urban Stormwater Management Plan (SUSMP) and does the following:

- Accommodates the requirements of the California RWQCB– San Diego Region Order No. R9-2001-01, NPDES Permit No. CAS0108758 Waste Discharge Requirements for Discharges of Urban Runoff from the Municipal Separate Storm Sewer Systems Draining the Watersheds of the County of San Diego, the San Diego Unified Port District, and the

[4] City of Carlsbad. 2008. Jurisdictional Urban Runoff Management Program. March 2008. Accessed August 27, 2013. http://www.carlsbadca.gov/services/environmental/Storm-Water-Protection/Pages/StudiesReports.aspx.

San Diego County Regional Airport Authority (Municipal Permit), and California RWQCB–San Diego Region Order No. R9-2007-01 (2007 Municipal Permit);

- Consolidates construction BMP standards into one location;
- Clarifies existing standards and incorporates the new standards; and
- Incorporates the requirements of the General Construction Permit, the General Linear Utility Permit, and the General Industrial Activity Permit. The manual consolidates all stormwater BMP standards for post construction, construction, and business activity requirements into one comprehensive manual, including hydromodification requirements and Low Impact Development (LID) requirements.

Every construction activity within Carlsbad that has the potential to negatively affect water quality must prepare a construction SWPPP. A SWPPP provides for temporary measures to control sediment and other pollutants during construction as required by the most recent statewide permit regulating construction activities. The SWPPP requirements in the Storm Water Standards Manual ensure compliance with the Carlsbad Grading and Drainage Ordinance. The Storm Water Standards Manual establishes a three-tiered system for the preparation of construction SWPPPs. The tiers range from Tier 3, representing the highest threat to water quality, to Tier 1, representing the lowest threat to water quality. The threshold triggers for each of the three tier levels are generally described below.

Tier 3 – Construction activities that impact 1 or more acres (individually or cumulatively through phased construction) or that, regardless of size, pose a significant potential for stormwater quality impairment must prepare a Tier 3 Construction SWPPP in conformance with the standards and requirements of the Construction General Permit and city standards.

Tier 2 – Construction activities that impact less than 1 acre and that pose a moderate threat to stormwater quality must prepare a Tier 2 Construction SWPPP in conformance with city standards. In the case of small linear utility projects, including construction of any conveyance pipe for transportation liquid material, the project must also demonstrate compliance with the General Linear Utility Permit.

Tier 1 – Construction activities that impact less than 1 acre and pose a low threat to stormwater quality must prepare a Tier 1 Construction SWPPP in conformance with city standards. In the case of small linear utility projects, the project must also demonstrate compliance with the General Linear Utility Permit.

Exempt – Construction activities that pose no threat to stormwater quality are exempt from the preparation of a construction SWPPP; however, the construction activities must still comply with all construction BMPs required pursuant to Title 15 of the Carlsbad Municipal Code, Grading and Drainage.

Typical construction BMPs include the following:

Minimizing disturbed areas. Clearing of land is limited to that which will be actively under construction in the near term; new land disturbance during the rainy season is minimized; and disturbance to sensitive areas or areas that would not be affected by construction is minimized.

Stabilizing disturbed areas. Temporary stabilization of disturbed soils is provided whenever active construction is not occurring on a portion of the site, and permanent stabilization is provided by finish grading and permanent landscaping.

Protecting slopes and channels. Outside of the approved grading plan area, disturbance of natural channels is avoided; slopes and crossings are stabilized; and increases in runoff velocity caused by the project is managed to avoid erosion to slopes and channels.

Controlling the site perimeter. Upstream runoff is diverted around or safely conveyed through the project and is kept free of excessive sediment and other constituents.

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

Projects that would result in the disturbance of 1 acre or more of land or would create more than 5,000 square feet of impervious surfaces are subject to the post-construction Priority Development Project requirements in the Carlsbad Storm Water Standards Manual and must prepare a storm water management plan. Projects that are limited to trenching and resurfacing associated with utility work that do not disturb more than 1 acre are subject to the post-construction standard storm water requirements. All projects must meet, at a minimum, standard storm water requirements, including the following LID requirements:

- Drain a portion of impervious areas into pervious areas, if any.
- Design and construct pervious areas, if any, to effectively receive and infiltrate runoff from impervious areas, taking into account soil conditions, slope, and other pertinent factors.
- Construct a portion of paved areas with low traffic and appropriate soil conditions with permeable surfaces.

City of Carlsbad Floodplain Management Regulations

The City of Carlsbad addresses flood hazards areas in its Floodplain Management Regulations (Municipal Code Chapter 21.110), which requires a special use permit for any development proposed in areas of special flood hazards and areas of flood-related erosion hazards. The Floodplain Management Regulations restrict or prohibit land uses considered unsafe in a floodplain. They address standards of construction such as anchoring of structures, construction materials and methods, and elevations and flood proofing. Developments that are not subject to the Floodplain Management Regulations are also reviewed by the City of Carlsbad Land Development Engineering Division for flooding potential. Proposed grading and drainage improvements are analyzed to ensure that drainage is not diverted from its natural drainage basin to another basin that was not designed to take that additional flow.

City of Carlsbad Coastal Shoreline Development Overlay Zone

The City of Carlsbad addresses coastal shoreline development in Chapter 21.204 of the Municipal Code. The land use regulations included in the Municipal Code provide for control over development and land use along the coastline so that the public's interest in maintaining the shoreline as a unique recreational and scenic resource, promoting public safety and access, and avoiding adverse geologic and economic effect of bluff erosion, is adequately protected. Geotechnical reports are required for all development within the overlay zone, and must include the potential for flooding due to sea surface super elevation, wave run-up, tsunami, and river flows. Mitigation measures and alternative solutions are required for any potential impact identified in a geotechnical report.

Impact Analysis

SIGNIFICANCE CRITERIA

For the purposes of this Program EIR, a significant impact would occur if the proposed General Plan would:

- Violate any federal, state, or local water quality standards or waste discharge requirements;
- Substantially deplete groundwater supplies or interfere substantially with groundwater recharge, such that there would be a net deficit in aquifer volume or a lowering of local groundwater tables;
- Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or by increasing the rate or amount of surface runoff, in a manner that would result in substantial erosion, siltation, or flooding on- or off-site;
- Create or contribute runoff that would exceed the capacity of existing or planned storm drain systems, or that would provide substantial additional sources of polluted runoff;
- Otherwise substantially degrade water quality;
- Place housing within a 100-year flood hazard area 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 which would impede or redirect flood waters;
- 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; and
- Expose people or structures to inundation by seiche, tsunami, or mudflow.

METHODOLOGY AND ASSUMPTIONS

Potential impacts resulting from implementation of the proposed General Plan were evaluated based on relevant information from FEMA, the County of San Diego, and City of Carlsbad. Based on a review of relevant hydrology and water quality plans, and maps, this Program EIR presents the potential for impacts to hydrology, water quality, and flooding to occur as a result of implementation of the proposed General Plan. Programmatic impacts are discussed in broad, qualitative terms. This assessment does not satisfy the need for project-level California Environmental Quality Act (CEQA) analysis for individual projects. Individual projects under the proposed General Plan will require a project-level analysis at the time they are proposed based on the details of the projects and the existing conditions at the time such projects are pursued.

SUMMARY OF IMPACTS

Future development under the proposed General Plan could result in impacts to water quality, hydrology, flooding, or other inundation hazards; however, federal, state, and local regulations, as well as policies in the proposed General Plan would ensure that impacts of the proposed General Plan would be less than significant. Compliance with the city's SUSMP would ensure water quality standards are not violated and would ensure protection of water quality during construction and operation of future development within the city. In addition, the proposed General Plan goals and policies would further reduce any potential impacts by ensuring compliance with the city's NPDES permit and reduction of stormwater runoff. Potential flooding impacts would be avoided through compliance with the city's Floodplain Management Regulations (Municipal Code Chapter 21.110) and the proposed General Plan goals and policies, which restrict or prohibit land uses considered unsafe in a floodplain. Implementation of the proposed General Plan would therefore result in less than significant impacts to hydrology, flooding, and water quality.

IMPACTS

Impact 3.8-1 Development under the proposed General Plan would not violate any federal, state, or local water quality standards or waste discharge requirements. (*Less than Significant*)

The proposed General Plan would have a significant environmental impact if it would violate water quality standards and waste discharge requirements set out in Municipal Permit Order No. R9-2007-0001, NPDES Permit No. CAS0108758, issued by the San Diego RWQCB. Violation of these permits could occur if the proposed General Plan would substantially increase pollutant loading levels in the sanitary sewer system or in groundwater underlying the city, either directly through the introduction of pollutants generated by industrial land uses, or indirectly through stormwater pollution. As NPDES Permit CAS0108758 is based on the federal Clean Water Act, the Porter–Cologne Water Quality Control Act (Division 7 of the Water Code, commencing with Section 13000), applicable state and federal regulations, all applicable provisions of statewide water quality control plans and policies adopted by the SWRCB, the Water Quality Control Plan for the San Diego Basin adopted by the RWQCB, the California Toxics Rule, the California Toxics

Rule Implementation Plan, and NPDES compliance would ensure compliance with other applicable plans and regulations pertaining to water quality.

The proposed General Plan would allow for additional development within the city that would increase the amount of impervious surfaces and could therefore increase the amount of runoff and associated pollutants during both construction and operation. However, as described in the Regulatory Setting section above, the city's SUSMP requires every construction activity within Carlsbad that has the potential to negatively affect water quality to prepare a construction SWPPP. The SWPPP requirements in the city's Storm Water Standards Manual ensure compliance with the Carlsbad Grading and Drainage Ordinance. Projects that would result in the disturbance of one acre or more of land or would create more than 5,000 square feet of impervious surfaces are subject to the post-construction priority development project requirements in the Carlsbad Storm Water Standards Manual and must prepare a storm water management plan. Projects that are limited to trenching and resurfacing associated with utility work that do not disturb more than one acre are subject to the post-construction standard storm water requirements. All projects must meet, at a minimum, standard storm water requirements, including the following LID requirements:

- Drain a portion of impervious areas into pervious areas, if any.
- Design and construct pervious areas, if any, to effectively receive and infiltrate runoff from impervious areas, taking into account soil conditions, slope, and other pertinent factors.
- Construct a portion of paved areas with low traffic and appropriate soil conditions with permeable surfaces.

Implementation of these practices would reduce the volume of runoff from impervious surfaces and increase the amount of natural filtration of pollutants from storm water occurring on site, generally improving the quality of storm water before it enters the city's storm water system. In addition, the SUSMP accommodates the requirements of the city's NPDES Permit, thereby ensuring NPDES compliance.

Furthermore, the proposed General Plan, which would guide development in the city over the next 20 years, contains goals and policies pertaining to water quality, as listed below. The proposed goals and policies promote the protection of the city's natural water bodies, prevent water pollution from agricultural run-off and other sources, ensure preparation and implementation of applicable water quality plans, require incorporation of BMPs, and otherwise ensure compliance with the city's NPDES Permit and other related regulations. Overall, the proposed General Plan policies would promote improved water quality in the city and continued compliance with federal, state, and local water quality regulations, and would ensure that water quality is protected to the maximum extent practicable. Therefore, implementation of the proposed General Plan and the city's SUSMP would ensure that impacts are less than significant.

Proposed General Plan Policies that Reduce the Impact

Open Space, Conservation, and Recreation Element

Agricultural Resources

4-P.48 Ensure that the grading of agricultural lands is accomplished in a manner that minimizes erosion of hillsides and minimizes stream siltation and to maintain the appearance of natural hillsides and other land forms wherever possible.

4-P.49 Prevent agricultural run-off and other forms of water pollution from entering the storm drain system and polluting the city's water bodies.

Water Quality

4-G-12 Promote the protection of Carlsbad's creeks, lagoons, ocean, and other natural water bodies from pollution.

4-P.56 Work with the stakeholders in the community and region, such as but not limited to the San Diego Regional Water Quality Control Board (RWQCB), California Fish and Wildlife, US Fish and Wildlife, Coastal Commission, Army Corps of Engineers, Environmental Protection Agency, neighboring cities, counties, businesses, residents, and non-profit groups, to comply with applicable federal, state and local regulations related to water quality in our region, consistent with the city's current NPDES Municipal Storm Water Permit issued by the RWQCB or other related regulations. Prepare and implement any applicable plans such as a Water Quality Improvement Plan, Integrated Regional Water Management Plan, Load Reduction Plan, or others as needed to comply with applicable regulations.

4-P.57 Require developments to incorporate structural and non-structural best management practices (BMPs) to mitigate or reduce the projected increases in pollutant loads. Do not allow post-development runoff from a site that would cause or contribute to an exceedance of receiving water quality objectives or has not been reduced to the maximum extent practicable.

4-P.58 Implement water pollution prevention methods to the maximum extent practicable, supplemented by pollutant source controls and treatment. Use small collection strategies located at, or as close as possible to, the source (i.e., the point where water initially meets the ground or source of potential pollution) to minimize the transport of urban runoff and pollutants offsite and into a municipal separate storm sewer system (MS4).

4-P.59 Make any necessary structural control changes to the storm water conveyance system to remove or reduce storm water pollutant levels.

4-P.60 Conduct analysis of the effectiveness of the overall pollution prevention programs in Carlsbad consistent with the city's NPDES Municipal Storm Water Permit issued by the RWQCB or other related regulations.

4-P.61 Continue to implement a program to detect and eliminate illicit connections to storm drains and illegal discharges of non-storm water wastes into storm water conveyance systems.

4-P.62 Continue to implement a program for the testing and monitoring of storm water and/or non-storm water flows consistent with the city's NPDES Municipal Storm Water Permit issued by the RWQCB or other related regulations.

4-P.63 Preserve, where possible, natural watercourses or provide naturalized drainage channels within the city. Where feasible, implement restoration and rehabilitation opportunities.

4-P.64 Coordinate the needs of storm water pollution management with habitat management, flood management, capital improvement projects, development, aesthetics and other open space needs.

Mitigation Measures

None required.

Impact 3.8-2 Development under the proposed General Plan would not 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 local groundwater tables. (*Less than Significant*)

As described in the Environmental Setting section above, the only groundwater basin within the city is the Batiquitos Lagoon Valley Groundwater Basin. The groundwater in this basin is not considered a good source of irrigation or municipal use due to the high content of chloride, sulfate, and total dissolved solids. The proposed General Plan would allow for additional development within Carlsbad that could increase demands for water; however, this increase in water demand would not impact local groundwater supplies as the primary purveyor of water for the city is the Carlsbad Municipal Water District (CMWD), which currently does not utilize any local groundwater or surface water supplies to serve the city. However, it is projected that groundwater may become a water supply resource for the city; if this is to occur, the Mission Basin of the San Luis Rey River has the most potential as a viable source of water. Other groundwater basins have been analyzed, but would not serve as reliable resources at a high enough quality and would only be able to supply a minimal portion of CMWD's needs. It should be noted that the CWMD Water Master Plan of 2011 identifies new groundwater supply wells, as listed for capital improvement program (CIP) funding in the future. These potential groundwater well projects fall under the following categories: Rancho Carlsbad well water supply facilities, and new facilities to produce, treat, and deliver groundwater to CMWD from the Mission Basin of the San Luis Rey River. The master plan noted that the feasibility of costs and current technology

available were not positive indicators of the Mission Basin as a reliable groundwater resource. At the time this analysis was written, CWMD was reevaluating its plans for utilization of groundwater in the Mission Basin; therefore, impacts to this potential groundwater sources are unknown at this time.

As described under Impact 3.8-1, the city's Storm Water Standards Manual contains numerous goals and policies to prevent stormwater pollution that could affect groundwater quality. In addition, the proposed General Plan policies listed below would help to reduce water usage and future demands for groundwater. Overall, impacts on groundwater associated with the proposed General Plan would be less than significant.

Proposed General Plan Policies that Reduce the Impact

Sustainability Element Policies

9-P.5 Undertake measures to expand the use of recycled water for landscape irrigation and commercial and industrial process water. Encourage potential future customers identified in the latest Recycled Water Master Plan to retrofit their water systems to utilize recycled water as it becomes available and cost-effective to do so.

9-P.6 Promote the use of on-site gray water and rainwater collection systems through education, expedited permitting review, fee exemptions and other measures.

Mitigation Measures

None required.

Impact 3.8-3 Development under the proposed General Plan would not substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or by increasing the rate or amount of surface runoff, in a manner that would result in substantial erosion, siltation, or flooding on- or off-site. (*Less than Significant*)

Implementation of the proposed General Plan would not involve the direct alteration of existing streams, rivers, or other drainage patterns. However, future development/redevelopment allowed under the proposed General Plan could impact the existing drainage system. Increases to impervious surfaces, such as roofs, patios, driveways, and parking areas would lead to increased stormwater flow. The proposed General Plan would allow for additional development that would increase the amount of impervious surfaces within the city and could therefore increase runoff from these sites into the local storm drains and creeks in Carlsbad. An increase in runoff volumes could result in hydromodification effects to the creek systems within the city, which occur when rainfall runoff is increased from impervious areas above the natural rainfall rate that would otherwise occur.

However, the city recognizes the importance of water quality and preventing hydromodification. As described above, any development that would occur under the proposed General Plan would be subject to the erosion and runoff control provisions contained in the Carlsbad SUSMP and the city's Grading and Drainage Ordinances. Specific development occurring during buildout of the proposed General Plan would also comply with flood damage prevention measures contained in Chapter 21.110 of the city's Municipal Code. These measures restrict development in areas of special flood hazards and control erosion, which would in turn limit and control the alteration of existing drainage patterns. Adherence to local regulations would ensure that, in the course of development under the proposed General Plan, watercourses and drainage patterns would not be altered in a manner that would significantly increase the rate or amount of either runoff or erosion, thereby causing on- or off-site flooding. In addition, the proposed General Plan goals and policies are intended to preserve natural watercourses or naturalized drainage channels, and to ensure future development incorporates BMPs to reduce runoff from a site. For these reasons, impacts associated with the proposed General Plan would be less than significant.

Proposed General Plan Policies that Reduce the Impact

Open Space, Conservation, and Recreation Element Policies

The proposed General Plan Policies 4-P.56, 4-P.57, and 4-P.63, listed above, would help to reduce impacts to existing drainage.

Mitigation Measures

None required.

Impact 3.8-4 Development under the proposed General Plan would not create or contribute runoff that would exceed the capacity of existing or planned storm drain systems, or that would provide substantial additional sources of polluted runoff. (*Less than Significant*)

Implementation of the proposed General Plan would not involve the direct alteration of existing streams, rivers, or other drainage patterns. However, future development/redevelopment allowed under the proposed Plan could impact the existing drainage system. Increases to impervious surfaces, such as roofs, patios, driveways, and parking areas would lead to increased stormwater flow.

As described under Impact 3.8-1, the City of Carlsbad's Grading and Drainage Ordinances and Storm Water Standards Manual ensure compliance with NPDES permit requirements, as well as with applicable state and federal laws. Additionally, every construction activity within Carlsbad that has the potential to negatively affect water quality must prepare a construction SWPPP. The SWPPP requirements in the Storm Water Standards Manual ensure compliance with the Carlsbad Grading and Drainage Ordinance. Projects that would result in the disturbance of one acre or more of land or would create more than 5,000 square feet of impervious surfaces are subject to the post-construction priority development project requirements in the Carlsbad Storm Water Standards Manual and must prepare a Storm Water Management Plan. Projects that are

limited to trenching and resurfacing associated with utility work that do not disturb more than one acre are subject to the post-construction standard storm water requirements.

Furthermore, the proposed General Plan, which would guide development in the city over the next 20 years, contains goals and policies pertaining to water quality, as listed below. The proposed goals and policies promote the protection of the city's natural water bodies, prevent water pollution from agricultural run-off and other sources, ensure preparation and implementation of applicable water quality plans, require incorporation of BMPs, and otherwise ensure compliance with the city's NPDES Permit and other related regulations. Overall, the proposed General Plan goals and policies would promote improved water quality in the city and continued compliance with federal, state, and local water quality regulations, and would ensure that water quality is protected to the maximum extent practicable.

Compliance with the city's current regulations and the proposed General Plan policies listed below would ensure that the runoff as a result of future development under the proposed General Plan would not exceed the capacity of existing or planned storm drain systems or generate substantial pollutant runoff. Therefore, impacts would be less than significant.

Proposed General Plan Policies that Reduce the Impact

Open Space, Conservation, and Recreation Element Policies

Proposed General Plan Goal 4-G.12 and Policies 4-P.48 and 4-P.56, through 4-P.63, listed above would help to reduce impacts to the storm drainage system.

Mitigation Measures

None required.

Impact 3.8-5 Development under the proposed General Plan would not otherwise substantially degrade water quality. (*Less than Significant*)

As described under Impact 3.8-1, the proposed General Plan would allow for new development that could potentially degrade water quality; however all development would be subject to the city's Grading and Drainage Ordinances and the Storm Water Standards Manual, as described above. Furthermore, the proposed General Plan, which would guide development in the city over the next 20 years, contains goals and policies pertaining to water quality, as described previously. Overall, the proposed General Plan goals and policies would promote improved water quality in the city and continued compliance with federal, state, and local water quality regulations, and would ensure that water quality is protected to the maximum extent practicable. Therefore, the proposed General Plan would not substantially degrade water quality and impacts would be less than significant.

Proposed General Plan Policies that Reduce the Impact

Open Space, Conservation, and Recreation Element Policies

Proposed General Plan Goal 4-G.12 and Policies 4-P.48 and 4-P.56, through 4-P.63, listed above would help to reduce impacts to water quality.

Mitigation Measures

None required.

Impact 3.8-6 Development under the proposed General Plan would not place housing within a 100-year flood hazard area on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map. (*Less than Significant*)

The proposed General Plan would allow for residential development within the city, including an approximately ten-acre parcel located north of the undeveloped Sunny Creek commercial site. The ten-acre parcel is currently designated for low-medium density residential use (0-4 du/ac) and is proposed to be designated for medium-high residential use (8-15 du/ac). If the increased density is approved, the proposed General Plan would locate multi-family residential uses within a 100-year flood hazard area of the Agua Hedionda creek near the northwest corner of El Camino Real and College Boulevard, as identified in Figure 3.8-1. However, Carlsbad requires a special use permit for any development proposed in areas of special flood hazards and areas of flood-related erosion hazards (Municipal Code Chapter 21.110). The city's Floodplain Management Regulations restrict or prohibit land uses considered unsafe in a floodplain. Furthermore, the proposed General Plan goal and policies, listed below would further reduce potential impacts to residential development within the 100-year flood hazards areas. Therefore, the proposed General Plan would result in less than significant impacts related to placing housing within a 100-year flood hazard area.

Proposed General Plan Policies that Reduce the Impact

Public Safety Element Policies

The following goal and policies would reduce potential impacts associated with flood hazards.

6-G.1 Minimize injury, loss of life, and damage to property resulting from fire, flood, hazardous material release, or seismic disasters.

6-P.1 Enforce the Cobey-Alquist Floodplain Management Act and the city's Floodplain Management Regulations to prohibit construction of structures in a designated floodway where such development would endanger life or significantly restrict the carrying capacity of the designated floodway; and to regulate development within other areas of special flood hazard, flood related erosion hazard and mudslide hazard to ensure such development does not adversely affect public health and safety due to water and erosion hazards, or result in damaging increases in erosion, flood height or velocities.

6-P.2 Continue to implement and pursue flood control programs that reduce flood hazards, such as the city's Grading Ordinance and the Floodplain Management Regulations.

6-P.3 Cooperate and coordinate with federal, state and local jurisdictions, and agencies involved in the mitigation of flood hazards from dam inundation, tsunamis, sea level rise, and major flood events.

6-P.4 Require all proposed drainage facilities to comply with the city's Standard Design Criteria to ensure they are properly sized to handle 100-year flood conditions.

6-P.5 Require installation of protective structures or other design measures to protect proposed building and development sites from the effects of flooding.

6-P.6 Enforce the requirements of Titles 18, 20, and 21 pertaining to drainage and flood control when reviewing applications for building permits and subdivisions.

6-P.7 Comply with all requirements of the California Department of Water Resources' Division of Safety of Dams to ensure adequate flood control.

6-P.8 Comply with Federal Emergency Management Agency (FEMA) requirements to identify flood hazard areas and control development within these areas in order for residents to qualify for federal flood insurance. Cooperate with FEMA on shoreline flooding hazards and other mapping efforts.

Mitigation Measures

None required.

Impact 3.8-7 Development under the proposed General Plan would not place within a 100-year flood hazard area structures which would impede or redirect flood waters. (*Less than Significant*)

The proposed General Plan would allow for additional development within the city, including an approximately ten-acre parcel located north of the undeveloped Sunny Creek commercial site The ten-acre parcel is currently designated for low-medium density residential use (0-4 du/ac) and is proposed to be designated for medium-high residential use (8-15 du/ac). If the increased density is approved, the proposed General Plan would locate multi-family residential uses within a 100-year flood hazard area of the Agua Hedionda creek near the northwest corner of El Camino Real and College Boulevard, as identified in Figure 3.8-1. However, Carlsbad requires a special use permit for any development proposed in areas of special flood hazards and areas of flood-related erosion hazards (Municipal Code Chapter 21.110). The Floodplain Management Regulations restrict or prohibit land uses considered unsafe in a floodplain. Developments that are not subject to the Floodplain Management Regulations are also reviewed by the City of Carlsbad Land Development Engineering Division for flooding potential. Proposed grading and drainage improvements are analyzed to ensure that drainage is not diverted from its natural drainage basin to another basin that was not designed to take that additional flow. In addition, the proposed

General Plan goal and policies listed below would further reduce any potential impacts associated with structures located within flood hazard areas. Therefore, compliance with the city's regulations regarding building within flood hazard areas and the proposed General Plan policies, ensure that impacts would be less than significant.

Proposed General Plan Policies that Reduce the Impact

Public Safety Element Policies

Proposed Plan Goal 6-G.1 and Policies 6-P.4 through 6-P.11, listed above, would reduce potential impacts related to flooding.

Mitigation Measures

None required.

Impact 3.8-8 Development under the proposed General Plan would not 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. (*Less than Significant*)

As described above, implementation of the proposed General Plan is not anticipated to result in any significant impacts in terms of placing structures within a 100-year flood hazard area. However, there are four dams located within or adjacent to the city: Calavera, Maerkle, San Marcos, and Bressi dams. The Calavera, Maerkle, and San Marcos dams have been assigned high hazard ratings and have emergency action plans in place. The Bressi dam has a low hazard rating and also has an emergency action plan in place. These dams are periodically inspected by the State of California Division of Dam Safety.

Dam failure is considered a low-probability event, caused most often by age, poor design, or structural damage resulting from earthquake or flood. With continued evaluation of dam stability and continued compliance with state regulations, impacts associated with flooding due to dam failure are not anticipated.

Additionally, the City of Carlsbad requires a special use permit for any development proposed in areas of special flood hazards and areas of flood-related erosion hazards (Municipal Code Chapter 21.110). The Floodplain Management Regulations restrict or prohibit land uses considered unsafe in a floodplain. The proposed General Plan includes an approximately ten-acre parcel located north of the undeveloped Sunny Creek commercial site. The ten-acre parcel is currently designated for low-medium density residential use (0-4 du/ac) and is proposed to be designated for medium-high residential use (8-15 du/ac). If the increased density is approved, the proposed General Plan would locate multi-family residential uses within a 100-year flood hazard area of the Agua Hedionda creek near the northwest corner of El Camino Real and College Boulevard, as identified in Figure 3.8-1. However, compliance with City regulations pertaining to development within flood hazard areas would reduce potential impacts related to this development. The proposed General Plan also contains the goal and policies listed below that would further reduce

the risk of loss, injury, or death due to flooding, as a result of dam or levee failure. Therefore, impacts would be less than significant.

Proposed General Plan Policies that Reduce the Impact

Public Safety Element Policies

Proposed General Plan Goal 6-G.1 and Policies 6-P.4 through 6-P.11, listed above, would reduce potential impacts related to flooding.

Mitigation Measures

None required.

Impact 3.8-9 Development under the proposed General Plan would not expose people or structures to inundation by seiche, tsunami, or mudflow. (*Less than Significant*)

In the San Diego region, a major earthquake of magnitude 7.0 or greater along the underwater San Diego Trough fault system could potentially trigger a tsunami. Tsunamis generated in Hawaii, Alaska, and elsewhere would lose their destructive energy due to the distance of travel and the geographic features off the coast of Southern California, which acts as a buffer. As shown in Figure 3.8-3, the only areas identified within Carlsbad as having risk for tsunami run-up are the immediate vicinity of the Buena Vista, Agua Hedionda, and Batiquitos lagoons.

Seiches are defined as wave-like oscillatory movements in enclosed or semi-enclosed bodies of water such as lakes of reservoirs. Potential effects from seiches include flooding damage and related hazards in surrounding areas from spilling or sloshing waves, as well as increased pressure on containment structures. The County of San Diego maps zones of high risk for dam inundation throughout the county. The high risk areas are located east of the Agua Hedionda and Batiquitos lagoons.

Development along the coast is controlled by the city's LCP, which applies standards to protect, maintain, enhance, and restore the overall quality of the coastal zone. Additionally, the City of Carlsbad addresses coastal shoreline development in Chapter 21.204 of the Municipal Code. Geotechnical reports are required for all development within the overlay zone, and must include the potential for flooding due to sea surface super elevation, wave run-up, tsunami, and river flows. Mitigation measures and alternative solutions are required for any potential impact identified in a geotechnical report. Compliance with the city's existing regulations pertaining to coastal development and the proposed General Plan goal and policies listed below will ensure the impacts associated with seiche, tsunami, or mudflow would be less than significant.

Proposed General Plan Policies that Reduce the Impact

Public Safety Element Polcies

Proposed General Plan Goal 6-G.1 and Policies 6-P.4 through 6-P.11, listed above, would reduce potential impacts due to inundation by seiche, tsunami, or mudflow.

Mitigation Measures

None required