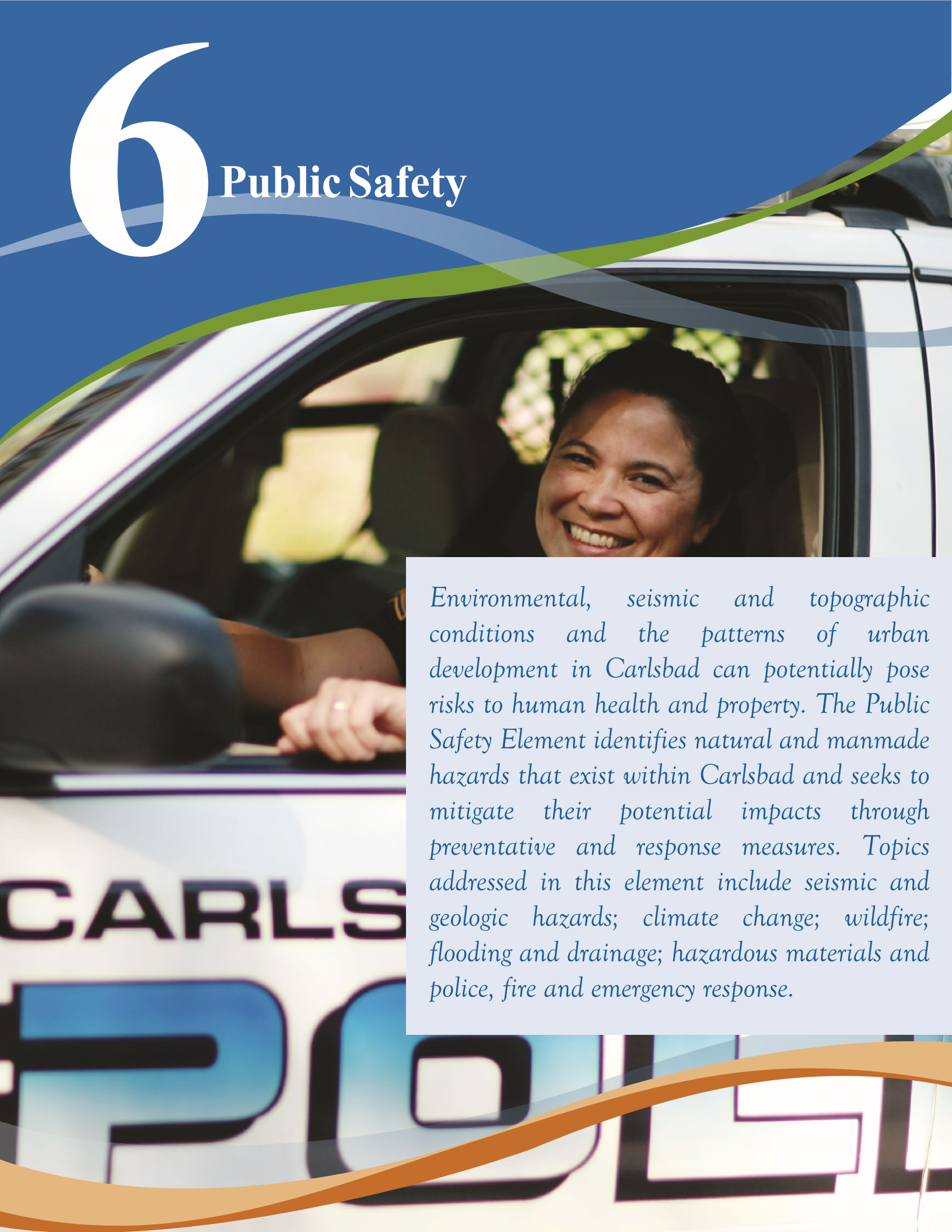
6 Public Safety



Environmental, seismic and topographic conditions and the patterns of urban development in Carlsbad can potentially pose risks to human health and property. The Public Safety Element identifies natural and manmade hazards that exist within Carlsbad and seeks to mitigate their potential impacts through preventative and response measures. Topics addressed in this element include seismic and geologic hazards; climate change; wildfire; flooding and drainage; hazardous materials and police, fire and emergency response.

6.1 Introduction

Background and Purpose

The purpose of this element is to acknowledge the risk posed by hazards, and to reduce the risk of injury, loss of life, property damage, and economic and social dislocation resulting from natural and manmade hazards. The development pattern in the Land Use and Community Design Element incorporates consideration of flooding risk, seismic safety and other hazards. The Public Safety Element contains the city's goals and policies to reduce the risks associated with identified hazards and integrate mitigating measures into the city's development review process.

Relationship to State Law

Government Code Section 65302(g) requires each California city and county to include within its general plan a safety element that addresses the protection of the community from any unreasonable risks associated with the effects of seismic and other geologically induced hazards, flooding, and fires. The safety element is required to include mapping of known seismic and other geological hazards. Where applicable, it must also address evacuation routes, peak load water supply requirements, minimum road widths and clearances around structures.

Government Code Section 65302(g) (as amended by SB 379 (2015)) requires cities and counties to include climate adaptation and resiliency strategies — as applicable to that city or county — in the safety elements of their general plans. The City of Carlsbad prepared a Climate Change Vulnerability Assessment (CCVA) which is available on the city website at the following link: https://www.carlsbadca.gov/departments/community-development/planning/general-plan/related-documents/-folder-769. The CCVA assesses how the community and natural and built assets in Carlsbad are vulnerable to climate change. The Public Safety Element of the General Plan includes adaptation implementation measures consistent with this legislation.

Government Code Section 65302(g) (as amended by SB 99 (2019)) requires a local government to identify residential developments in hazard areas that do not have at least two emergency evacuation routes. A residential emergency evacuation route analysis was conducted as part of this Public Safety Element update and is presented as Figure 6-13.

Government Code Section 65302(g) (as amended by SB 1035 (2018)) requires a jurisdiction's safety element to be revised to identify new information on fire hazards, flood hazards, and climate adaptation and resiliency strategies applicable to the city and county that was not

available during the previous revision of the safety element. The fire hazard and flood maps have been updated as Figure 6-1 and Figure 6-12.

State law also allows cities to address any other locally relevant issues in its safety element. In addition to those mentioned above, Carlsbad's Public Safety Element also addresses disaster preparedness and protection from other local health and safety hazards, such as fire, hazardous materials and airport hazards.

Relationship to Community Vision

The Public Safety Element is most closely tied to the following objective in the Community Vision:

Core Value 8: Support quality, comprehensive education and life-long learning opportunities, provide housing and community services for a changing population, and maintain a high standard for citywide public safety.

Relationship to Other General Plan Elements

The Public Safety Element is strongly correlated to the Land Use and Community Design Element and the Open Space, Conservation and Recreation Element. The Land Use and Community Design Element includes consideration of fire, seismic, flooding and other hazards in land use designations and their intensities. Through restrictions on the development of hazardous areas, identified by careful investigation as proposed in the Public Safety Element, the Land Use and Community Design Element supplements the policies of this element.

Related to the Open Space, Conservation and Recreation Element, areas subject to severe hazards, especially those related to seismic or flood-prone conditions, are designated for a reduced level of development or open space, or development is required to be set back from areas impacted by these factors.

Additionally, the Public Safety Element is related to the Mobility Element in that good street design and accessibility of the transportation system is vitally important in providing emergency services.

Furthermore, the Public Safety Element is related to the Housing Element and the Arts, History, Culture, and Education Element in that it identifies areas that may present hazardous conditions for residential structures and proposes precautionary measures related to older existing structures that may have historic or cultural significance.

Finally, the Public Safety Element is related to the Sustainability Element in that it establishes broad strategies to reduce local greenhouse gas emissions which contribute to climate change hazards that the Public Safety Element seeks to minimize. The Sustainability

Element promotes water conservation, reduction of the urban heat island effect, and energy efficiency which increase the city's resilience to climate change.

6.2 Regulatory Setting

Public safety is a topic that is subject to extensive federal, state, and local regulations that span a variety of safety topics. Some of the key regulations and regulatory agencies are summarized below. The city is not responsible for administering all of the regulations; rather, the following discussion provides examples of how public safety in Carlsbad is a shared responsibility among various government agencies. For a fuller discussion of the regulatory setting pertaining to safety, the Environmental Impact Report for the General Plan should be consulted.

Federal Programs and Regulations

Environmental Protection Agency

The United States Environmental Protection Agency (U.S. EPA) enforces the Federal Toxic Substances Control Act (1976) and the Resource Conservation and Recovery Act of 1976 (RCRA), which regulates the generation, transportation, treatment, storage, and disposal of hazardous waste. RCRA was amended in 1984 by the Hazardous and Solid Waste Act (HSWA), which affirmed and extended the "cradle to grave" system of regulating hazardous wastes (controlling hazardous waste from the time it is generated until its ultimate disposal). The use of certain techniques for the disposal of some hazardous wastes was specifically prohibited by the HSWA.

The 1980 Comprehensive Environmental Response, Compensation, and Liability Act, commonly known as Superfund, provides broad federal authority to respond directly to releases or threatened releases of hazardous substances that may endanger public health or the environment.

United States Department of Transportation

Transportation of chemicals and hazardous materials are governed by the United States Department of Transportation (DOT), which stipulates the types of containers, labeling, and other restrictions to be used in the movement of such material on interstate highways.

Federal Emergency Management Agency

The primary mission of the Federal Emergency Management Agency (FEMA) is to reduce the loss of life and property and to protect the nation from all hazards, including natural disasters, acts of terrorism, and other manmade disasters, by leading and supporting a risk-based, comprehensive emergency management system of preparedness, protection, response, recovery, and mitigation.

Disaster Mitigation Act

The Disaster Mitigation Act of 2000 requires a state mitigation plan as a condition of disaster assistance, adding incentives for increased coordination and integration of mitigation activities at the state level.

State Regulations

California Environmental Protection Agency

The management of hazardous materials and waste within California is under the jurisdiction of the California Environmental Protection Agency (Cal EPA). Cal EPA is responsible for developing, implementing, and enforcing the state's environmental protection laws that ensure clean air, clean water, clean soil, safe pesticides and waste recycling and reduction. Within Cal EPA are various departments, three of which are described as follows:

Office of Environmental Health Hazard Assessment

The California Office of Environmental Health Hazard Assessment oversees implementation of the Safe Drinking Water and Toxic Enforcement Act of 1986 (commonly known as Proposition 65), which aims to protect California citizens and the state's drinking water sources from chemicals known to cause cancer, birth defects, or other reproductive harm and to inform citizens about exposures to such chemicals.

California Department of Toxic Substances Control

The California Department of Toxic Substances Control (DTSC) implements the California Code of Regulations Title 22, Division 4.5, which provides standards for the management of hazardous waste. The DTSC has the authority to delegate enforcement of the state's hazardous waste regulations to local jurisdictions.

State Water Resources Control Board

The State Water Resources Control Board (SWRCB), as well as nine regional water quality control boards, implements various laws related to the protection of both potable and recycled water quality. The state and regional boards regulate wastewater discharges to surface and ground water; storm water discharges from construction, industrial, and municipal activities; discharges from irrigated agriculture; dredge and fill activities; alteration of federal water bodies; and other activities that could degrade water quality.

California Department of Transportation

The California Department of Transportation (Caltrans) manages more than 50,000 miles of California's highway and freeway lanes, provides inter-city rail services, permits more than 400 public-use airports and special-use hospital heliports and works with local agencies. Caltrans is also the first responder for hazardous material spills and releases that occur on those highway and freeway lanes and inter-city rail services.

California Division of Safety of Dams

The California Department of Water Resources, Division of Safety of Dams supervises the construction, enlargement, alteration, repair, maintenance, operation, and removal of dams and reservoirs for the protection of life and property. Included in this authority is the approval of dam inundation maps to identify potential flood prone areas that may be critically impacted during a dam failure or emergency incident. Approved inundation maps are used to support emergency action plans that dam owners are required to prepare pursuant to Water Code Section 6161.

California Office of Emergency Services

The California Office of Emergency Services (Cal OES) is responsible for assuring the state's readiness to respond to and recover from all hazards, emergencies, and disasters. Cal OES assists local governments in developing their own emergency preparedness and response plans, in accordance with the Standardized Emergency Management System and the State Emergency Plan, for earthquakes, floods, fires, hazardous material incidents, nuclear power plant emergencies, dam breaks, and acts of terrorism. Cal OES also administers the State of California Multi-Hazard Mitigation Plan (SHMP), which presents goals, strategies, and actions for reducing future disaster losses throughout the state. The SHMP is a federal requirement under the Disaster Mitigation Act of 2000 in order for the state to receive federal funds for disaster assistance.

Safe School Plan (California Education Code Sections 32280 et seq.)

This statute requires public schools to prepare a school safety plan that identifies strategies and programs that will ensure a high level of school safety related to child abuse reporting; disaster procedures; on-campus violence; discrimination and harassment; safe ingress and egress to and from school; safe and orderly environment conducive to learning; and school discipline.

Local Regulations

County of San Diego Department of Environmental Health and Quality

The County of San Diego Department of Environmental Health and Quality (DEHQ) protects public health and environmental quality and implements and enforces local, state, and federal environmental laws. DEHQ regulates the following: retail food safety; public housing; public swimming pools; small drinking water systems; mobile-home parks; onsite wastewater systems; recreational water; recycled water; aboveground and underground storage tanks and cleanup oversight; and medical and hazardous materials and waste. In addition, DEHQ serves as the Solid Waste Local Enforcement Agency and prevents disease carried by rats and mosquitoes.

California Environmental Protection Agency's Unified Program

Cal EPA oversees a unified hazardous waste and hazardous materials management and regulatory program, commonly referred to as the Unified Program. The purpose of this program is to consolidate and coordinate six different hazardous materials and hazardous waste programs, and to ensure that they are consistently implemented throughout the state. State law requires local agencies to implement the Unified Program. The County of San Diego DEHQ, Hazardous Materials Division is the local agency in charge of implementing the program in the county certified by the EPA as Certified Unified Program Agencies (CUPAs).

San Diego County Multi-Jurisdictional Hazard Mitigation Plan

The San Diego Multi-Jurisdictional Hazard Mitigation Plan (MJHMP) was developed in accordance with the Disaster Mitigation Act of 2000 and followed FEMA's Local Hazard Mitigation Plan guidance. Carlsbad is included in the MJHMP as an annex to the plan and can be found at this link: https://www.sandiegocounty.gov/oes/emergency_management/oes_jl_mitplan.html. The MJHMP incorporates a process where hazards are identified and profiled, the people and facilities at risk are analyzed, and mitigation actions are developed to reduce or eliminate hazard risk. The implementation of these mitigation actions, which include both short and long-term strategies, involve planning, policy changes, programs, projects, and other activities The County of San Diego Office of Emergency Services is responsible for coordinating with local jurisdictions and participating agencies to monitor, evaluate, and update the MJHMP.

Through the MJHMP Carlsbad is compliant with Government Code Sections 65302.6 and 8685.9 (also known as Assembly Bill 2140 or AB 2140) which limits the State of California's share of disaster relief funds

paid out to local governments to 75 percent of the funds not paid for by federal disaster relief efforts unless the jurisdiction has adopted a valid hazard mitigation plan consistent with Disaster Mitigation Act of 2000 and has incorporated the hazard mitigation plan into the jurisdiction's General Plan. In these cases, the State may cover more than 75 percent of the remaining disaster relief costs.

McClellan-Palomar Airport Land Use Compatibility Plan

The McClellan-Palomar Airport Land Use Compatibility Plan (ALUCP) is prepared by the San Diego County Regional Airport Authority to protect the safety of the public from airport related hazards. The ALUCP promotes compatibility between McClellan Palomar Airport and the land uses that surround it by addressing noise, overflight, safety, and airspace protection concerns. The ALUCP prevents exposure to excessive noise and safety hazards within the airports influence area (AIA), provides for the orderly growth of the airport and the area surrounding the airport, and safeguards the general welfare of the inhabitants within the vicinity of the airport and the public in general.

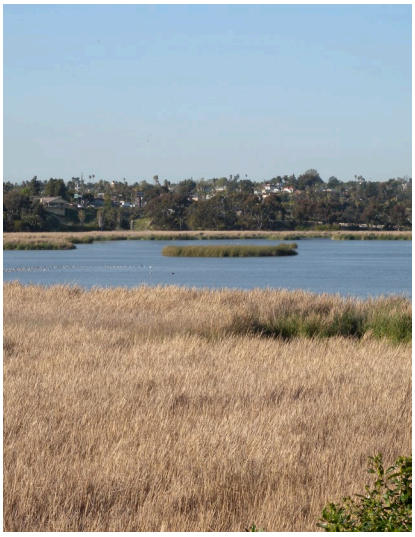
Carlsbad Municipal Code

Chapter 6.03 of the Carlsbad Municipal Code incorporates by reference Chapters 9 and 11 of Division 8 of Title 6 of the San Diego County Code of Regulatory Ordinances, which designates the County of San Diego DEHQ as the local agency responsible for implementing the state's Unified Program and specifies reporting, disclosure and monitoring requirements for hazardous materials and hazardous waste establishments.

6.3 Flooding and Coastal Hazards

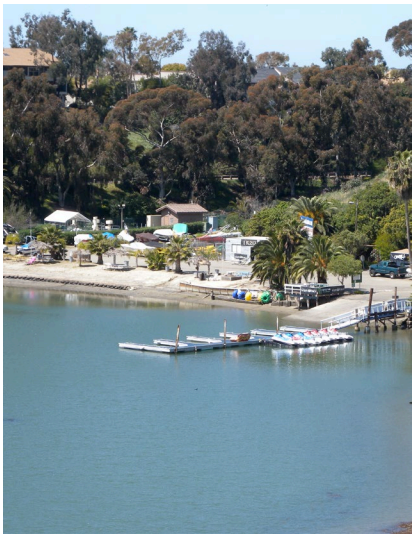
Surface Hydrology

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. Carlsbad is located within the Carlsbad Hydrologic Unit (HU), also referred to as the Carlsbad Watershed Management Area, which is approximately 210 square miles in area, extending from the headwaters above Lake Wohlford 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. Approximately 48% of the Carlsbad HU is urbanized. The dominant land uses are residential (29%), commercial/industrial (6%), freeways and roads (12%), agriculture (12%), and vacant/undeveloped (32%).[1]



Buena Vista Lagoon

Buena Vista Lagoon is a 350-acre freshwater lagoon owned by the State of California and 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 properties adjacent to the lagoon's wetland boundary. Although the lagoon itself is maintained as a nature reserve, much of the Buena Vista hydrologic area is already developed.



Agua Hedionda Lagoon

Agua Hedionda Lagoon is situated between Tamarack Avenue and Cannon Road and is comprised of three inter-connected lagoons, divided by the Interstate-5 freeway and a railroad bridge. Cabrillo Power LLC owns the three lagoon sections; the 66-acre outer lagoon adjacent to the Pacific Ocean, which primarily provides cooling water for the electric producing generators at the Carlsbad Desalination Plant; the 27-acre middle lagoon is home to the North Coast YMCA Aquatic Park; and the 295-acre inner lagoon extends approximately 1,800 yards in a southeasterly direction from the Interstate-5 freeway bridge. The City of Carlsbad Parks & Recreation Department allows recreational activities on the inner lagoon including boating – permitted crafts include jet skis and powerboats (western portion) and passive vessels

[1] Project Clean Water Website 2012, www.projectcleanwater.org/html/ws_carlsbad.html, accessed September 21, 2012

like sailboats and kayaks (eastern portion). At the eastern end of the lagoon is the Agua Hedionda Ecological Reserve, which was acquired in 2000 by the CDFW and consists of 186 acres of wetlands.

Batiquitos Lagoon

The Batiquitos Lagoon consists of approximately 561 acres owned by both the CDFW and the California State Lands Commission and is 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. Then, 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.

Stormwater Drainage

Much of the land area in Carlsbad is developed, resulting in impervious surfaces from the placement of roads, parking lots, buildings, and other infrastructure. These facilities reduce the amount of water infiltration into the ground, increase direct runoff into the city's creeks and lagoons, and cause soil erosion and sedimentation, which can result in water quality degradation and flooding concerns. Stormwater systems may be overwhelmed more frequently as more extreme rain events occur due to climate change, causing localized flooding which could impact properties and close streets, and impact water quality.

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 is 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 covers all phases of development through planning, construction and existing development and educates and monitors developers, businesses, municipal facilities, residents, school children, and the general public to help prevent pollutants and other hazardous materials from entering storm drains. The city also implements its Jurisdictional Runoff Management Plan which includes strategies to reduce non-stormwater flows and illegal discharges to the storm drain system and was developed to implement the requirements of the City's Municipal Storm Water Permit.

Flood Zones

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 one percent probability of a flood occurring in any given year. FEMA prepares Flood Insurance Rate Maps (FIRMs) that identify 100-year and 500-year flood zones. As shown in Figure 6-1, the potential flood hazard areas identified on the FIRM maps in Carlsbad 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
- 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 Plan and Carlsbad Municipal Code Title 21 (Zoning), development is restricted within 100-year floodplain areas.

FEMA relies on historical data to calculate flood frequencies and flood extent. Climate change is expected to increase rates of precipitation and the frequency of extreme precipitation events. These changing conditions could result in more frequent and severe riverine flooding which could impact properties within flood zones as well as emergency services, power, wastewater, and storm drainage infrastructure, exacerbating public health concerns.

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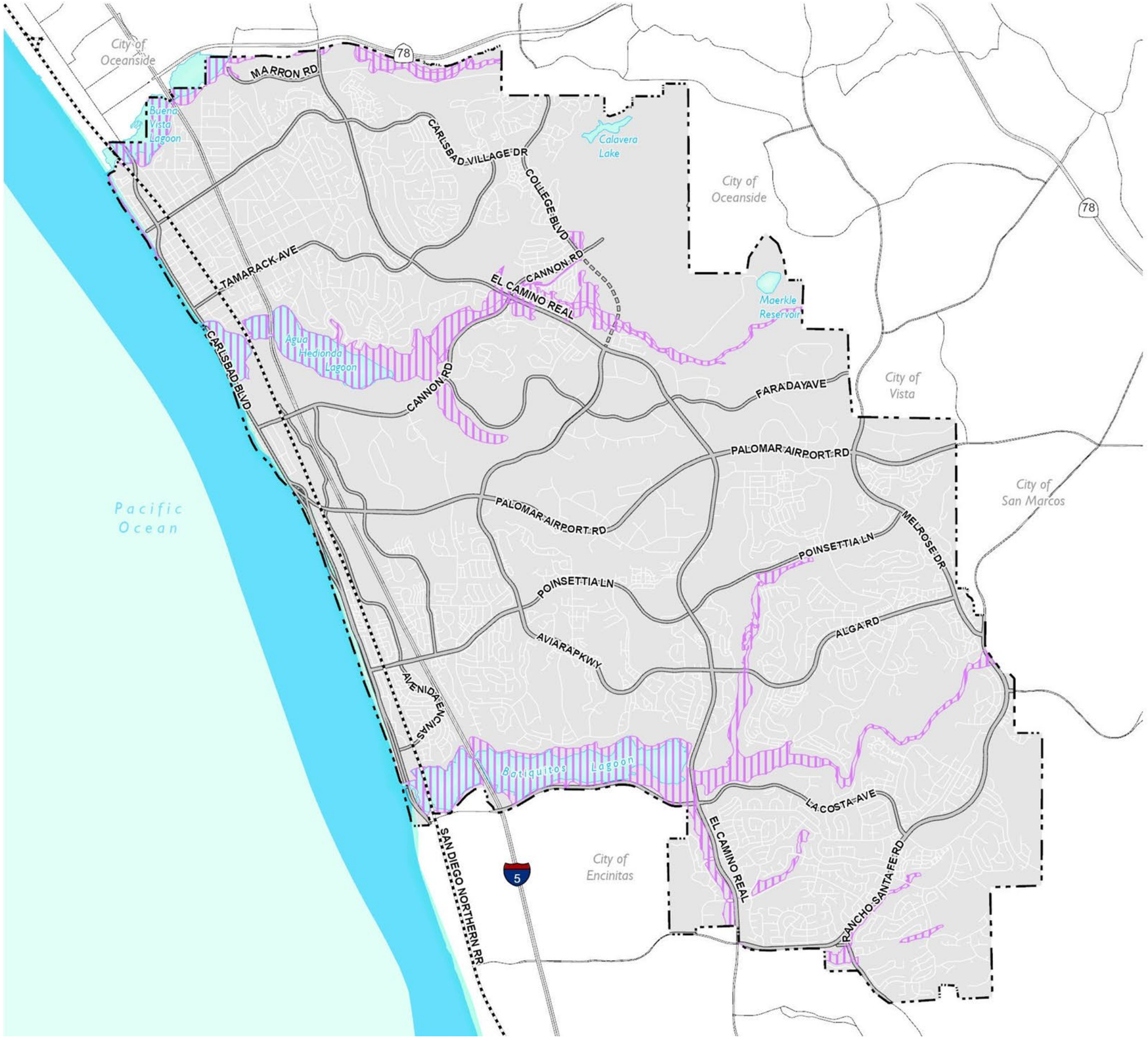

Figure 6-1: Potential Flood Hazards

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

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

Highways

Major Street

Planned Street

Railroad

City Limits

500 ACRES

100 ACRES

0 0.5 1 2

Miles

Source: City of Carlsbad, 2022; FEMA, 2019.

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Dam Inundation

Dam inundation can be caused by the release of impounded water from structural failure or overtopping of a dam. There are five dams and a reservoir located within or adjacent to the City of Carlsbad, as shown in Figure 6-2: the Calavera, Maerkle, Melrose Avenue, San Marcos, and Bressi dams, and the Stanley A. Mahr reservoir.

The San Diego County MJHMP identifies dam-failure risk levels based on dam inundation map data. The Calavera, Melrose Avenue and Stanley A. Mahr reservoir dams have been assigned high hazard ratings, Maerkle dam has an extremely high hazard rating, San Marcos dam has a significant hazard rating, and the Bressi dam has a low hazard rating. The California Division of Safety of Dams also classifies jurisdictional dams by downstream hazard potential. Calavera, Melrose Avenue, San Marcos and Stanley A. Mahr dams classify as high and Maerkle dam classifies as extremely high. Bressi dam is not a state jurisdictional dam.

The California Division of Safety of Dams jurisdictional dams and the reservoir have emergency action plans in place. Calavera dam is owned by Carlsbad and operated by Carlsbad Municipal Water District. Maerkle is both owned and operated by Carlsbad Municipal Water District. Dam owners are responsible for preparing emergency action plans. The other dams located within or adjacent to Carlsbad must coordinate with the city on the preparation of their emergency action plans. The San Marcos dam is owned and operated by Citizens Development Corporation, the Stanley A. Mahr Reservoir is owned by the public utility Vallecitos Water District, and the Melrose Avenue Dam is owned by the Rancho Carrillo Homeowners Association.

Dam owners are responsible for preparing Emergency Action Plans. These facilities are periodically inspected by the California Division of Safety of Dams.

Sea Level Rise

In California, sea levels have risen by as much as seven inches along the coast over the last century, resulting in eroded shorelines, deterioration of infrastructure, and depletion of natural resources. The San Diego County MJHMP identifies sea level rise as one of Carlsbad's primary climate change vulnerabilities. Carlsbad has prepared a Sea Level Rise Vulnerability Assessment (2017) which draws on several guiding documents to target adaptation planning efforts.

- California Coastal Commission adopted the *California Coastal Commission Sea Level Rise Policy Guidance*[2] which summarizes

[2] 2015 Sea Level Rise Policy Guidance, California Coastal Commission. https://documents.coastal.ca.gov/assets/slr/guidance/August2015/0a_ExecSumm_Adopted_Sea_

the best available science in predicting potential sea level rise impacts and recommends response strategies.

- Preparing for Climate Change: A Guidebook for Local, Regional, and State Governments, published by ICLEI-Local Governments for Sustainability (Snover, A.K. et al. 2007) describes strategies to address the impacts of sea level rise in communities.
- The California Adaptation Planning Guide, Planning for Adaptive Communities prepared by CalEMA, now known as CalOES, and the California Natural Resources Agency (CalEMA 2012)[3].

According to Cal-Adapt, an online tool (developed by the California Natural Resources Agency along with others), the historical average maximum (1961-1990) temperature in the Carlsbad area of 73.4 degrees F could increase by 4.0 to 7.0 degrees by the end of century period (2070-2099), depending on various emissions scenarios. According to the 2017 Carlsbad Sea Level Rise Vulnerability Assessment, sea level in Carlsbad could rise by as much as 1.6 feet by 2050 and 6.6 feet by 2100.

Areas within Carlsbad that are particularly vulnerable to sea level rise are those areas immediately adjacent to the coast and the lagoons, 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, wetlands restoration) and restricting or reducing development near the coastal areas.

In 2011, FEMA initiated the California Coastal Analysis and Mapping Project/Open Pacific Coast Study, which involves over 1,200 miles of new coastal flood hazard mapping and base-flood elevation determinations. Under this initiative, many coastal communities, including Carlsbad, will have coastal flood data and mapping updated for the first time in over 20 years. This study will improve the quality of the coastal data used for both floodplain management and planning purposes.

Climate change is expected to increase the rate of sea level rise. The Carlsbad Sea Level Rise Vulnerability Assessment prepared in 2017 evaluated 1.6 feet of sea level rise by 2050 and 6.6 feet of sea level rise by 2100 as outlined in Figure 6-3. There are 5 hazard zones outlined within the Carlsbad Sea Level Rise Vulnerability Assessment:

Level_Rise_Policy_Guidance.pdf. As of preparation of this General Plan, a 2018 update of the Sea Level Rise Policy Guidance has been adopted but was not used for the 2017 Sea Level Rise Vulnerability Assessment.

[3] 2012 California Adaptation Planning Guide, Planning for Adaptive Communities. As of preparation of this General Plan, a 2020 update of the Adaptation Planning Guide has been adopted but was not used for the 2017 Sea Level Rise Vulnerability Assessment

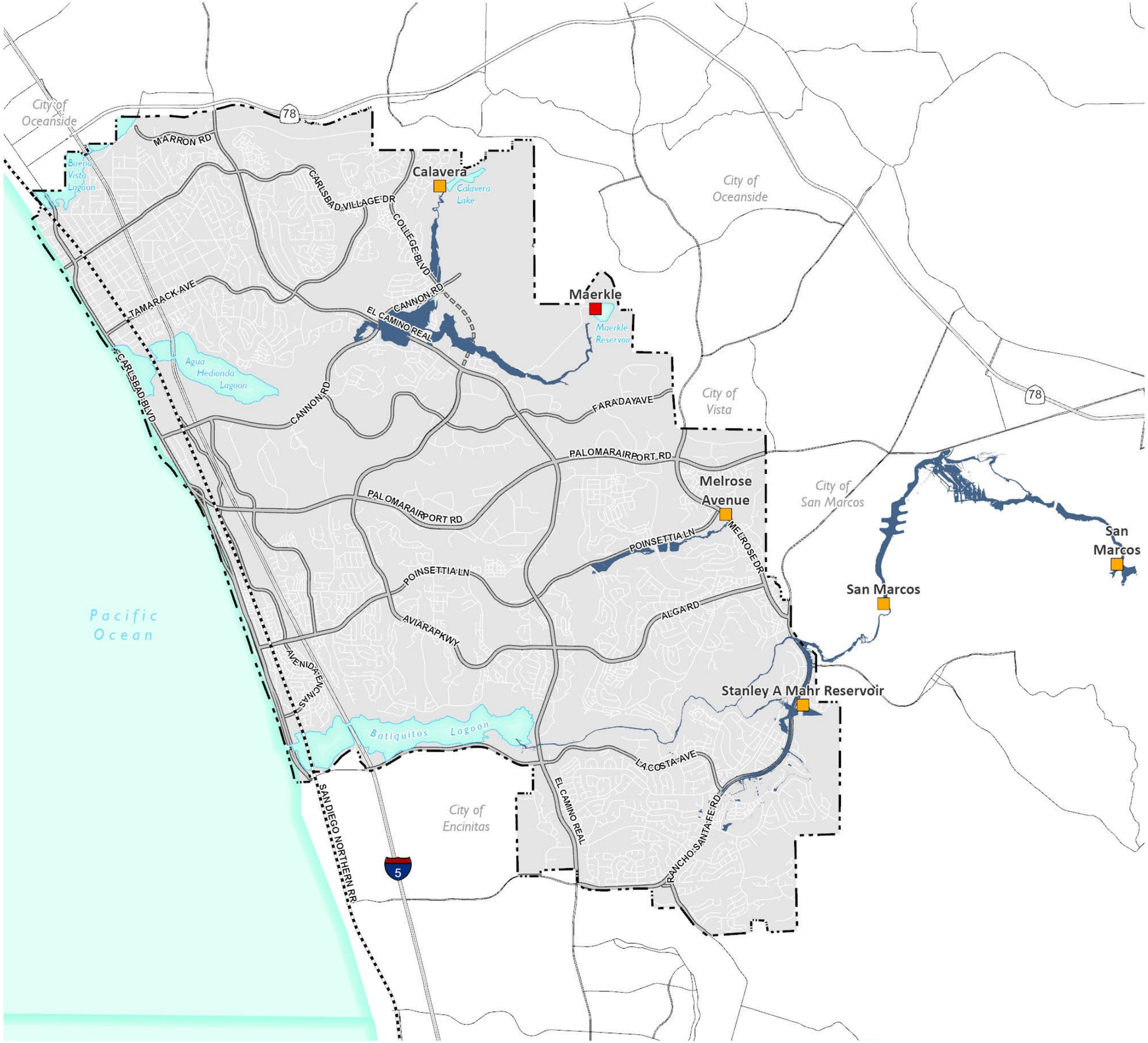


Figure 6-2: Dam Inundation Areas

Dam Inundation Areas

Dam Downstream Hazard

- Extremely High
- High

Highways

Major Street

Planned Street

Railroad

City Limits

500 ACRES

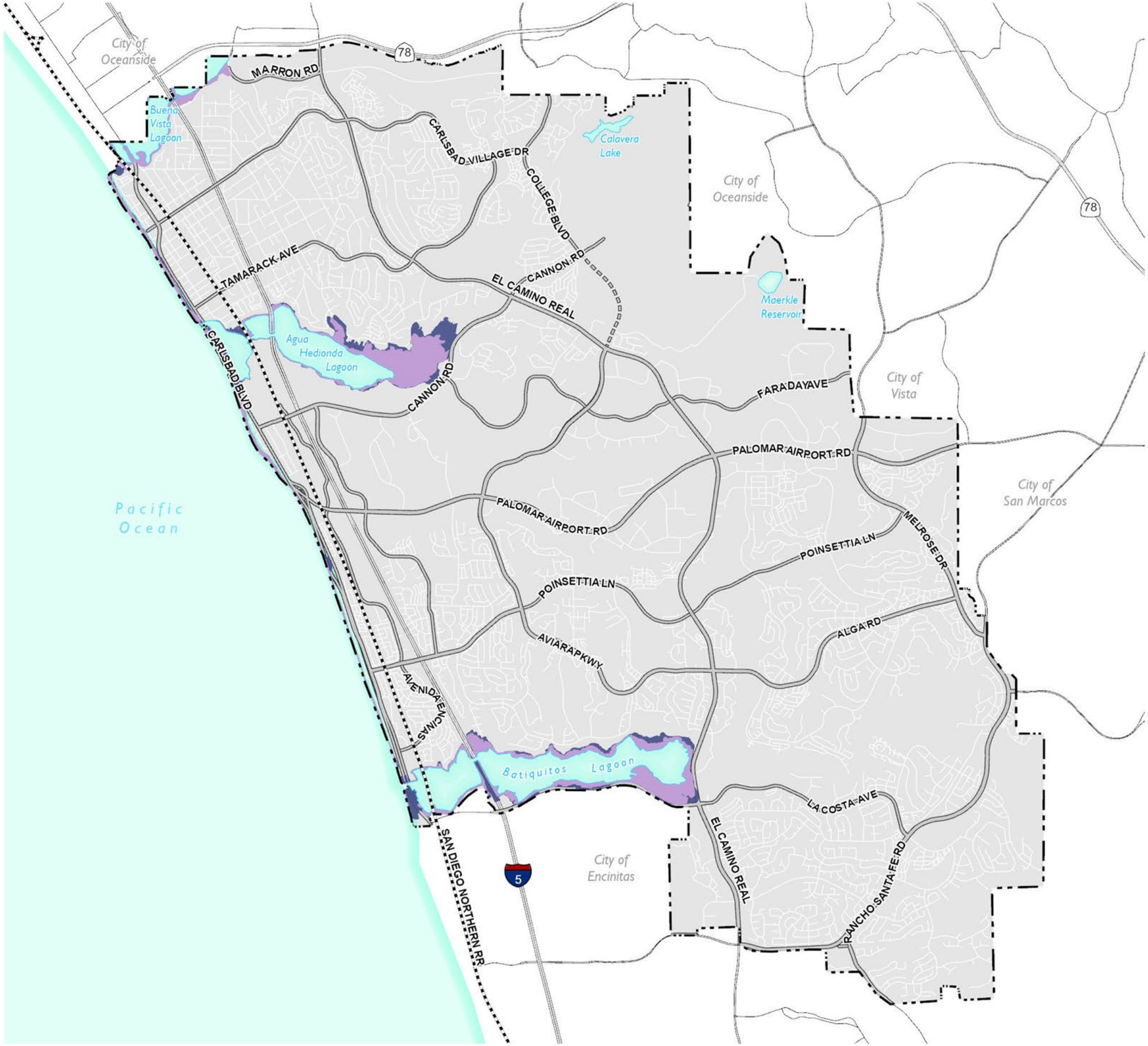
100 ACRES

0 0.5 1 2

Miles

Source: City of Carlsbad, 2022; California Department of Water Resources, DSOD, 2022.

Figure 6-3: Sea Level Rise Projections



Source: City of Carlsbad, 2022.

- Coastal Inundation Hazard Zone
- Lagoon Inundation Hazard Zone
- Bluff Hazard Zone
- Coastal Flood Hazard Zone
- Lagoon Flood Hazard Zone

Each of these hazard zones are based on modeling conducted to analyze impacts of sea level rise. The zones were used to better understand which assets would be affected.

According to the Carlsbad Sea Level Rise Vulnerability Assessment the following assets are considered to have moderate to high vulnerability to sea level rise:

- **Beaches:** Approximately seven acres of beach area is projected to be impacted by inundation/erosion in 2050. Vulnerability is rated high for the 2100 horizon due to the significant erosion expected as the beaches are squeezed between rising sea levels and bluffs or coastal structures
- **Public access ways:** A total of 12 vertical beach access ways exist within the Planning Zone of the Agua Hedionda Lagoon. A total of seven of these beach access ways were determined to be potentially impacted by coastal flooding by the year 2050. All 12 were found to be vulnerable to flooding and inundation by the year 2100. About 2.5 miles of horizontal access ways (trails) are vulnerable to flooding in the 2050-time horizon, and 7 miles of trails were found to be vulnerable by year 2100. Public access ways exist along the beach and lagoons in the city.
- **State parks:** The Tamarack State Beach parking lot becomes partially exposed to flooding during extreme storm events by 2050. Exposure to flooding increases in year 2100 and complete flooding of the Tamarack State Beach parking lot can be expected during extreme storms events.
- **Parcels:** A number of residential parcels in the vicinity of Terramar Point were determined to be exposed to bluff erosion hazards in the 2050 sea level rise scenario. Residential parcels along Terramar Point and the northern shoreline of Agua Hedionda Lagoon were found to be highly exposed to coastal hazards in 2100. The Hubbs Sea World Research Institute, the Carlsbad AquaFarm and the YMCA facility are also impacted as flood and tidal waters encroach onto these parcels.
- **Critical infrastructure:** There were no impacts to parcels identified as critical infrastructure for the 2050 planning horizon. The Encina Power Station and the Carlsbad Desalination Plant parcels were identified as being partially exposed to fluvial flooding from Agua Hedionda Lagoon as a result of sea level rise in 2100.

- **Transportation:** Approximately 4,229 linear feet of Carlsbad Boulevard within the Agua Hedionda Lagoon Planning Zone are exposed to bluff erosion hazards during the 2050 planning horizon (high exposure). Carlsbad Boulevard provides a vital north-south linkage within the city; thus, its sensitivity to sea level rise is high. Vulnerability remains high for the 2100 planning horizon as 15,326 linear feet of Carlsbad Boulevard are exposed to bluff erosion and flooding during an extreme storm event.
- **Environmentally sensitive lands:** Environmentally sensitive lands (e.g., lagoon, surrounding open lands, etc.) in the Agua Hedionda Lagoon area are exposed to increased tidal inundation and flooding with any rise in sea levels (high exposure). These assets are moderately sensitive to this exposure as wetland hydrology may be altered by the rising freshwater-saltwater interface and intertidal and subtidal ecosystems may be affected by changes in water depth and sunlight penetration.
- Additional, qualitative assessments were provided on impacts of sea level rise on visual resources, cultural resources, saltwater intrusion, and lifeguard services. Impacts were characterized as none to moderate.

The vulnerability of assets within Carlsbad to sea level rise are described below in Table 6–1.

TABLE 6–1: CITY WIDE VULNERABILITY ASSESSMENT FINDING

ASSET CATEGORY	HORIZON	IMPACTED ASSETS	OVERALL VULNERABILITY RATING
Beaches	2050	27 acres	Moderate
	2100	146 acres	High
2 Public Access Ways	2050	26 beach access ways 2.6 miles of lateral access ways	Moderate
	2100	37 beach access ways 7.3 miles of lateral access ways	Moderate
State Parks	2050	6 Parcels	Moderate-High
	2100	6 Parcels	Moderate-High
Parcels	2050	564 Parcels	Moderate
	2100	657 Parcels	High
Critical Infrastructure	2050	0 Parcels	Low
	2100	8 Parcels	Moderate
Transportation	2050	1.6 miles	High
	2100	5.8 miles	High
Environmentally Sensitive Lands	2050	1,088 acres	Moderate
	2100	1,164 acres	High

Source: City of Carlsbad Sea Level Rise Vulnerability Assessment. 2017.

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. As shown in Figure 6-4, 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. The California Geological Survey Tsunami Hazard Areas also encompass all three lagoons but with upland areas immediately surrounding the waterbodies mapped as at-risk. These Tsunami Hazard Areas identify exposure to tsunami hazards to help inform coastal evacuation planning. Development of essential/critical or larger structures within the Tsunami Design Zone layer, also depicted in Figure 6-4, must meet design standards per the California Building Code.

Seiches are defined as wave-like oscillatory movements in enclosed or semi-enclosed bodies of water such as lakes or reservoirs. Potential effects from seiches include flooding damage and related hazards from spilling or sloshing water, 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 in other communities upstream in the Carlsbad Watershed Management Area.

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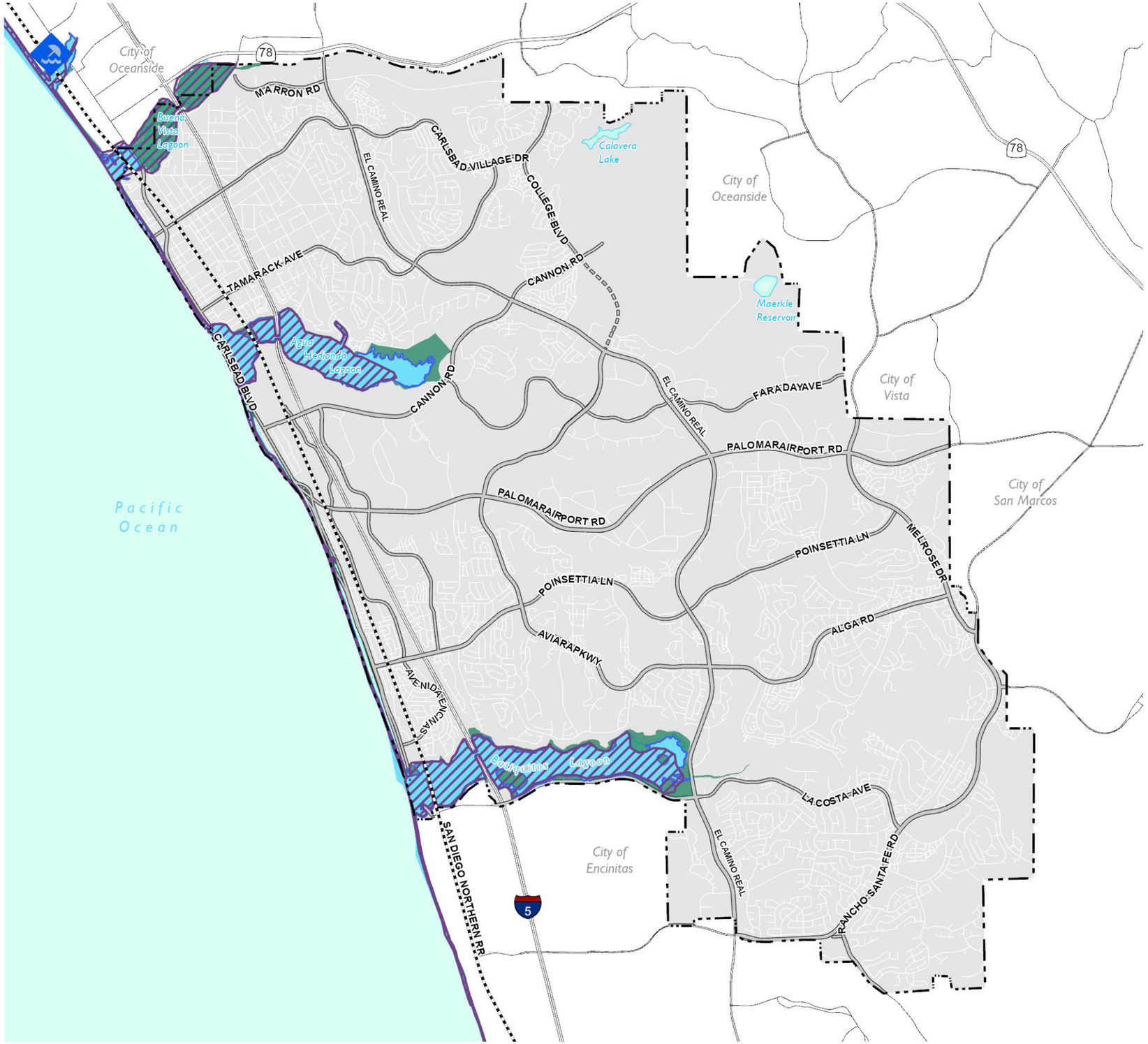
Figure 6-4: Maximum Tsunami Projected Run-Up



Historic Tsunami Effect Felt

Maximum Tsunami Projected Runup

Tsunami Hazard Area

Tsunami Design Zone

Highways

Major Street

Planned Street

Railroad

City Limits

500 ACRES

100 ACRES

0 0.5 1 2

Miles

Source: City of Carlsbad, 2022; CGS, 2022; ASCE Tsunami Hazard Tool, 2022.

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6.4 Geologic and Seismic Hazards

Geology and Soils

The City of Carlsbad is within the coastal portion of the Peninsular Ranges Geomorphic Province, a region characterized by northwest-trending structural blocks and intervening fault zones. Topographically, the Peninsular Ranges Province is composed of generally parallel ranges of steep-sloping hills and mountains separated by alluvial valleys. More recent uplift and erosion has produced the characteristic canyon and mesa topography present today in western San Diego County, as well as the deposition of surficial materials including Quaternary-age (less than approximately two million years old) alluvium, colluvium, and topsoil.[4] Figure 6-5 shows the local geology of Carlsbad.

Seismicity

There are no active faults that run directly through Carlsbad. Additionally, the California Geologic Survey does not include the City of Carlsbad on its list of cities affected by Alquist-Priolo Earthquake Fault Zones. The nearest fault to the city is the Newport-Inglewood-Rose Canyon Fault, which runs offshore of the western edge of the city and is considered active. Other faults in the region include the Coronado Bank, La Nacion, Elsinore, Agua Caliente, and San Jacinto.

Fault activity has the potential to result in ground shaking, which can be of varying intensity depending on the intensity of earthquake activity, proximity to that activity, and local soils and geology conditions. Although there are no active faults within Carlsbad, the city is located within a seismically active region and earthquakes have the potential to cause ground shaking of significant magnitude. Figure 6-6 shows the location and extent of the profiled earthquake faults within San Diego County based on a United States Geological Survey earthquake model that shows probabilistic peak ground acceleration. Although located near fault lines, Carlsbad lies within a medium-low probabilistic peak ground acceleration zone.

[4] Ibid.

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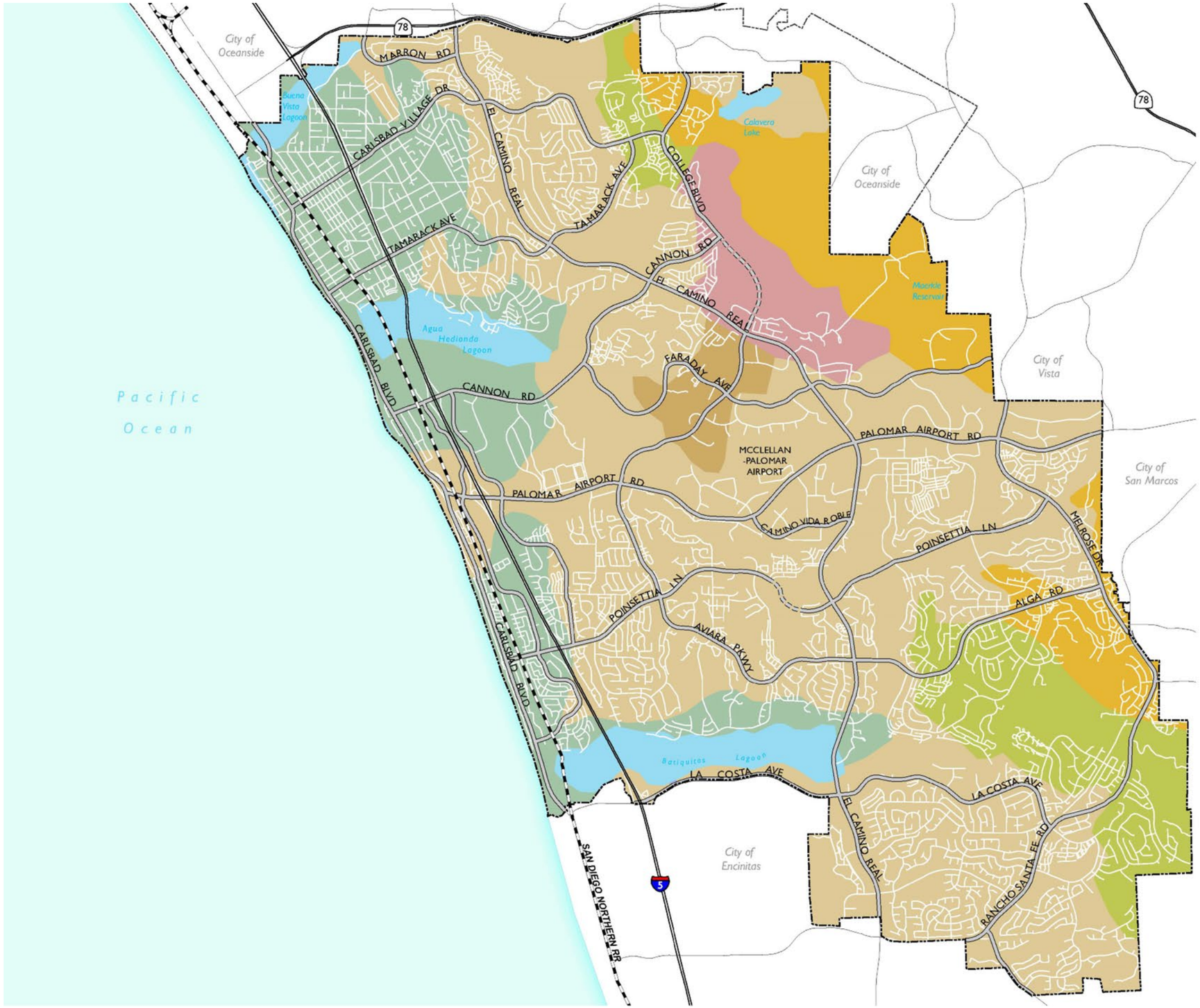
Figure 6-5: Geology



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

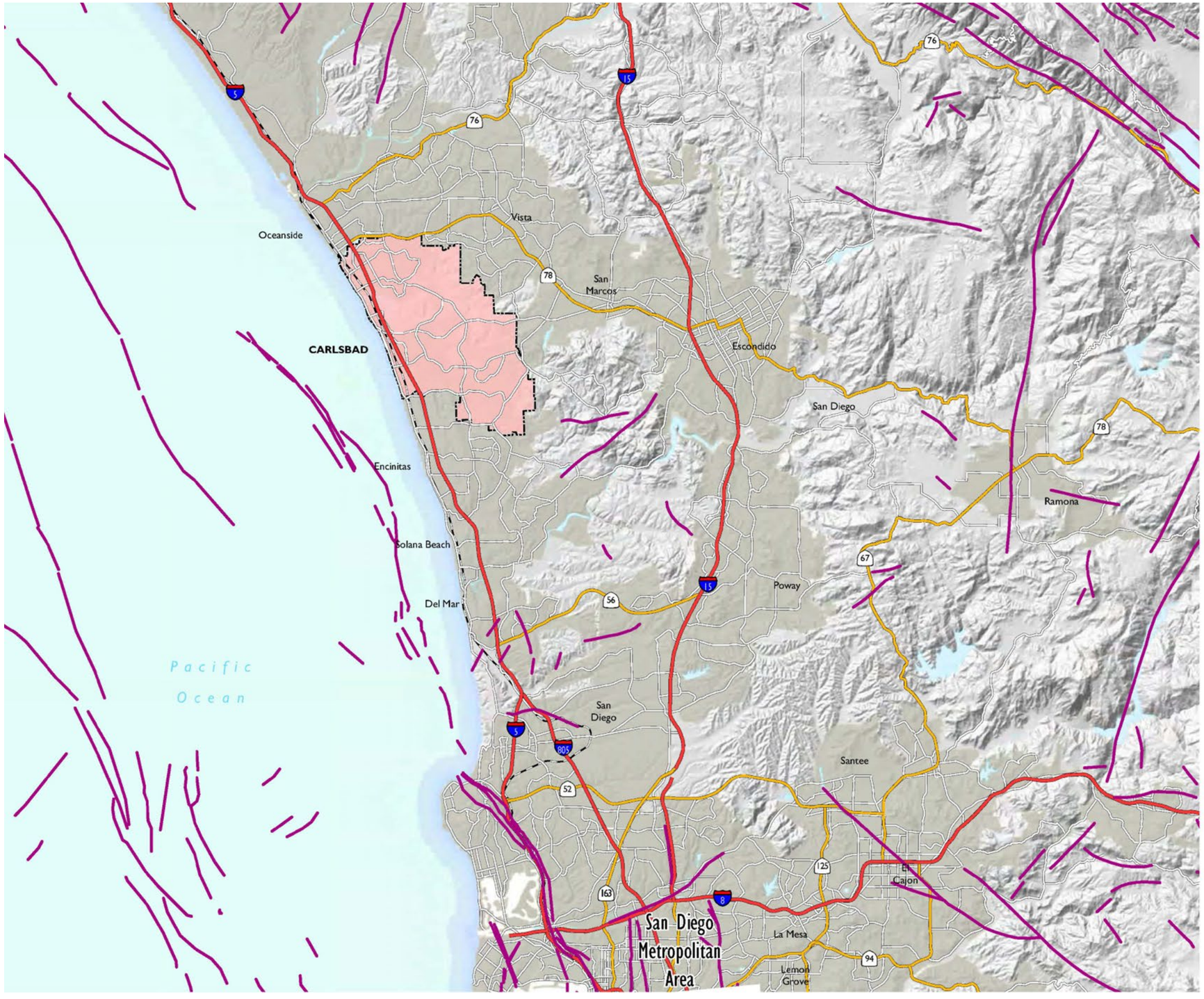


Figure 6-6: Earthquake Faults

- Earthquake Fault Lines
- Freeway
- Major Highway
- Minor Highway/Major Street
- Passenger Rail Lines
- County Lines
- City of Carlsbad
- Urban Areas

0 3 6 12
Miles

Source: ESRI, 2009; City of Carlsbad, 2013; DUDEK, 2013; USGS, 2002; Dyett & Bhatia, 2013.

Historical documents record that an earthquake centered either on the Rose Canyon or Coronado Bank faults struck San Diego on May 27, 1862, damaging buildings in Old Town and causing ground rupture near the San Diego River mouth. This earthquake is believed to have had a magnitude of about 6.0 based on descriptions of the damage it caused. The strongest recorded earthquake in the San Diego area was a magnitude of 5.3 on the Richter scale that struck on July 13, 1986 on the Coronado Bank fault, 25 miles offshore of Solana Beach. There have been several moderate earthquakes recorded within the Rose Canyon Fault Zone as well. On June 17, 1985, three earthquakes hit San Diego measuring 3.9, 4.0, and 3.9, respectively, and on October 28, 1986, a stronger earthquake with a magnitude of 4.7 occurred.[5]

Seismic Risk to Development

Earthquake damage to structures can be caused by ground rupture, liquefaction, ground shaking, and possibly inundation from tsunami (as discussed above). The level of damage at a location resulting from an earthquake will depend upon the magnitude of the event, the epicenter distance, the response of geologic materials, and the design and construction quality of structures.

During an earthquake, shaking of granular loose soil saturated with water can lead to liquefaction, a condition in which sediments below the water table temporarily lose strength during an earthquake and behave as a viscous liquid rather than a solid. As a result, this can cause structures to lose foundation-bearing capacity. Historically, seismic shaking levels in the San Diego region, including in Carlsbad, have not been sufficient enough to trigger liquefaction, and as such, the city generally has a low liquefaction risk. However, there are areas of the city that have a higher risk of liquefaction due to the presence of hydric soils or soils that are often saturated or characteristic of wetlands. These areas are limited to the immediate vicinity of the Buena Vista, Agua Hedionda, and Batiquitos Lagoons, as shown in Figure 6-7.

Additionally, in general, south facing slopes in Carlsbad are gentle grade and not prone to landslides, while north facing slopes are generally steeper and more susceptible to landslides. Areas where landslides could be induced by earthquakes are mapped as Figure 6-8.

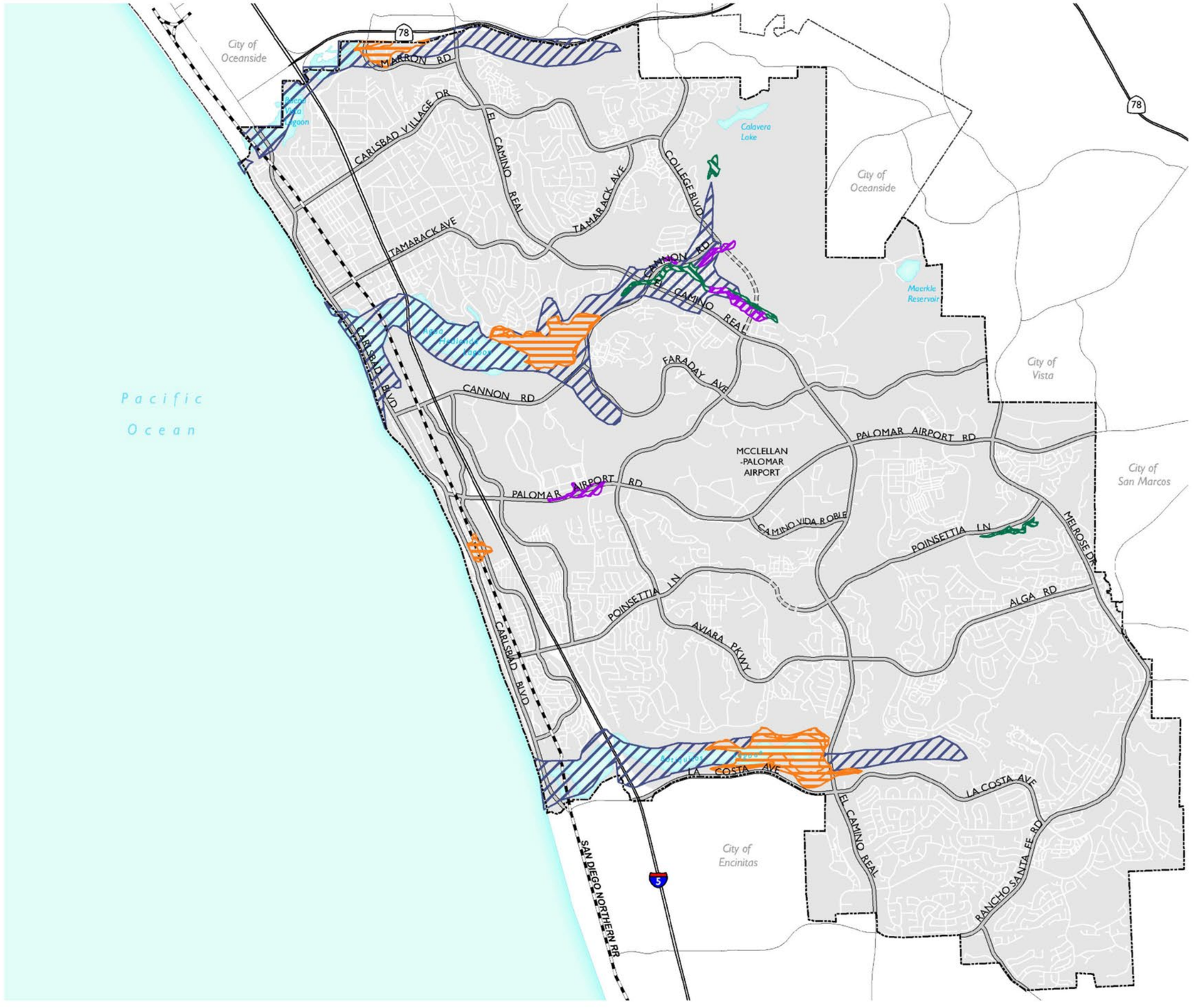
Development in a liquefaction hazard zone requires adherence to the guidelines for evaluating and mitigating seismic hazards as required by California Public Resources Code Section 2695(a). Before a development permit can be granted for a site within a seismic hazard zone, a geotechnical investigation of the site must be conducted, and appropriate mitigation measures incorporated into the project design. Mitigation of liquefaction hazards can include edge containment

[5] Deméré, Thomas A., Ph.D., San Diego Natural History Museum, Geology of San Diego County, California, http://www.sdnhm.org/archive/research/paleontology/sdfaults.html, accessed on September 25, 2012b

structures (e.g., berms, dikes, retaining walls, etc.), driving piles, removal or treatment of liquefiable soils, or modification of site geometry.

The city's Building Division implements and enforces the Carlsbad Municipal Code and the California Building Code regulations relative to seismic risk to development. Chapter 18.07 of the Carlsbad Municipal Code specifies the need and establishes guidelines for the seismic upgrade of unreinforced masonry buildings.

Figure 6-7: Liquefaction Hazards



Potential Liquefaction

- Riverwash
- Tidal flats
- Tujunga sand, 0 to 5 percent slopes
- Other Hazard

- Highways
- Major Street
- Planned Street
- Railroad
- City Limits

500 ACRES

100 ACRES

0 0.5 1 2

Miles

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

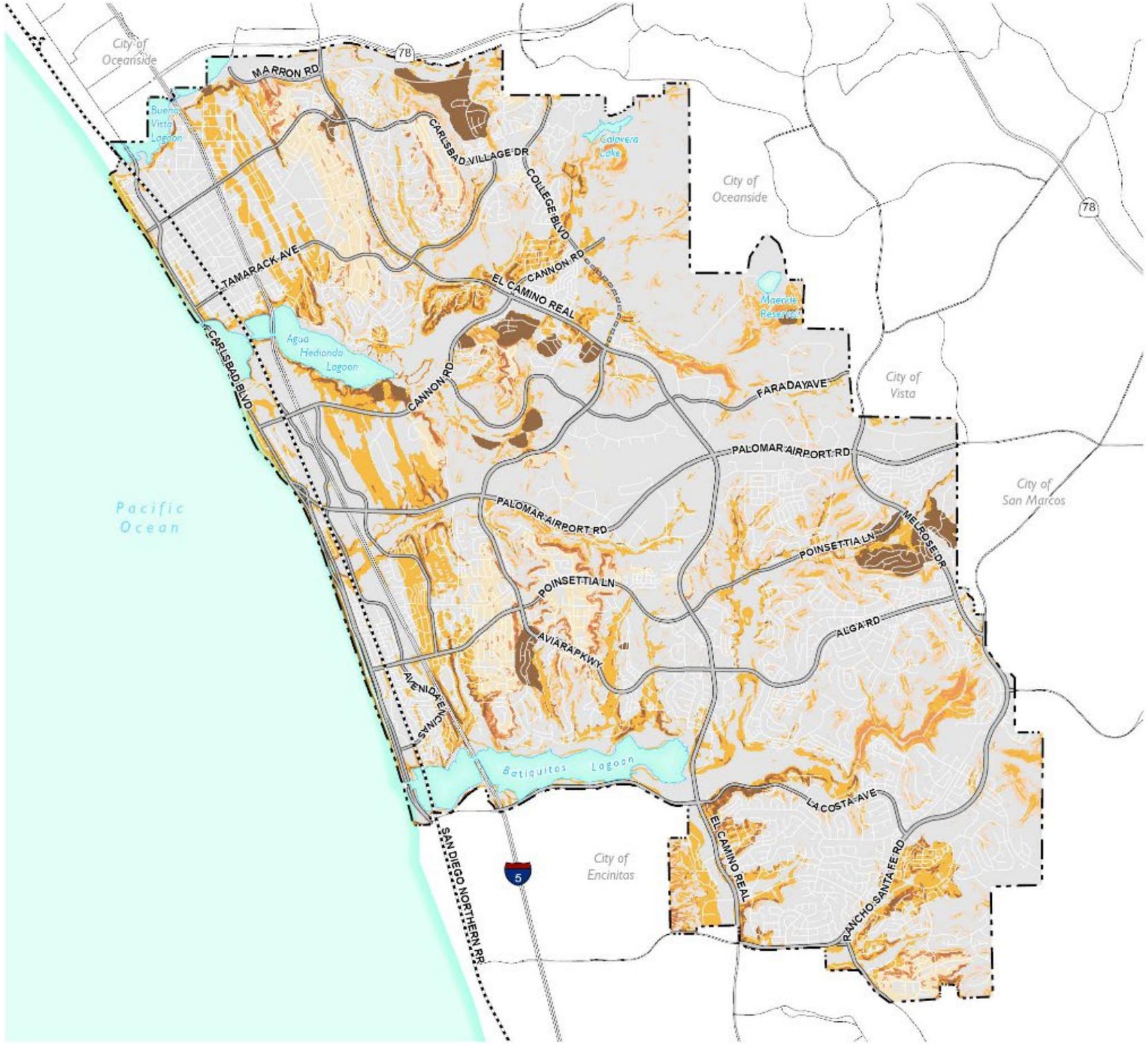


Figure 6-8: Landslide Susceptibility

Landslide Susceptibility

- 5
- 6
- 7
- 8
- 9
- 10

- Highways
- Major Street
- Planned Street
- Railroad
- City Limits

500 ACRES

100 ACRES

0 0.5 1 2

Miles

Source: City of Carlsbad, 2022; CGS, Map Sheet 58, 2018.

6.5 Airport Hazards

For land use policies related to the airport, see Chapter 2: Land Use and Community Design. For noise policies related to the airport, see Chapter 5: Noise Element.

The McClellan-Palomar Airport, located in Carlsbad, serves the northern part of San Diego County. The airport, owned and operated by the County of San Diego, is defined by the Federal Aviation Administration (FAA) as a commercial service airport that, in addition to private aircraft, has regularly scheduled commercial flights to Los Angeles International Airport (LAX). Long-term extension projects for the McClellan-Palomar Airport, including 800 feet of runway extension of Runway 6/24 and Taxiway A, are set forth in the McClellan-Palomar Airport Master Plan that was approved by the County of San Diego in October 2021.[6] The McClellan-Palomar Airport Land Use Compatibility Plan (ALUCP) is prepared according to FAA requirements and adopted by the San Diego County Regional Airport Authority acting as the Airport Land Use Commission for the County of San Diego. The ALUCP provides measures to minimize the public's exposure to excessive noise and safety hazards within areas around the airport and identifies areas likely to be impacted by noise and flight activity created by aircraft operations at the airport. These impacted areas include the Airport Influence Area (AIA), the Clear Zone, and the Flight Activity Zone. The AIA, shown in Figure 6-9, includes a large portion of the City of Carlsbad, as well as portions of the cities of Vista, San Marcos, and Escondido.

Within the AIA, the ALUCP establishes six safety zones for the purpose of evaluating safety compatibility of new/future land use actions. The safety zone boundaries depict relative risk of aircraft accidents occurring near the airport and are derived from general aviation aircraft accident location data and data regarding the airport's runway configuration and airport operational procedures. The ALUCP limits development intensities in these zones by imposing floor area and lot coverage maximums, by incorporating risk reduction measures in the design and construction of buildings, and/or by restricting certain uses altogether. Generally, allowable uses and development intensities range from most restrictive in Safety Zone 1 to least restrictive in Safety Zone 6 (these are shown in Figure 6-9). For example, all residential and virtually all non-residential uses are considered incompatible land uses in Zone 1, while all land uses in Zone 6 are considered to be either compatible or conditionally compatible with the airport.

The FAA establishes airspace protection zones in the airspace above and surrounding airports in order to protect aircraft from obstructions such as buildings, towers, etc. in navigable airspace. Airspace protection

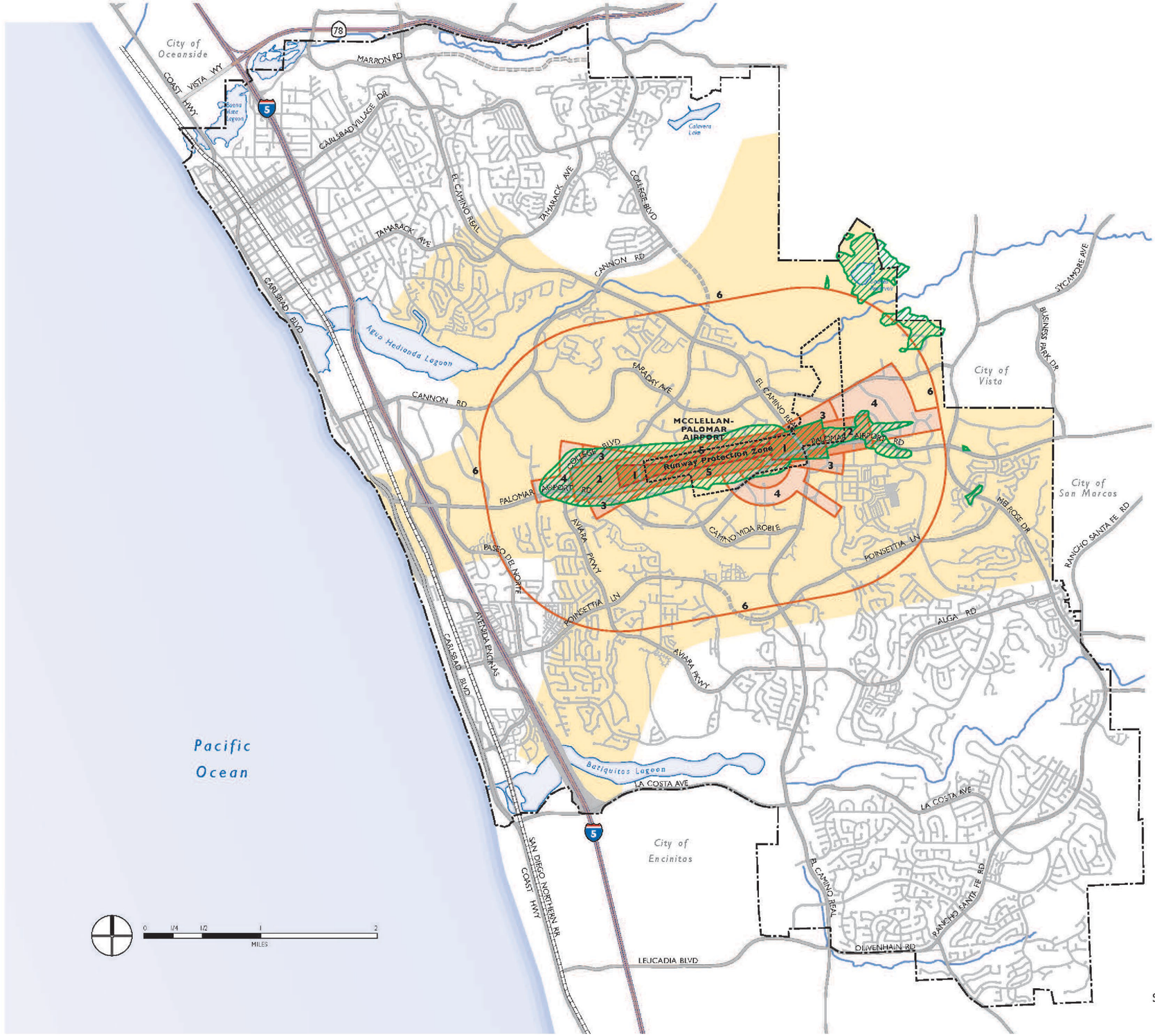
[6] McClellan-Palomar Airport Master Plan Update. October 2021. https://www.sandiegocounty.gov/content/dam/sdc/dpw/AIRPORTS/palomar/documents/Master-Plan-Update/2021/H-Master_Plan_Update_2021.pdf

zones are defined in Part 77 of the Code of Federal Aviation Regulations; the protected airspace around McClellan-Palomar Airport is depicted in Figure 6-9.

The ALUCP also requires that certain development projects record overflight notification documents in order to provide constructive notice to current and prospective property owners of aircraft activity within the vicinity of the airport. Under certain circumstances, developers of specific properties may be required to grant avigation easements to the airport owner (County of San Diego). Among other things, an avigation easement grants the right of flight in the airspace above the property, allows the generation of noise and other impacts associated with overflight, restricts the height of structures, trees and other objects on the property, prohibits potential on ground flight hazards (sources of light/glare, etc.) and permits access to the property to remove or mark objects exceeding the established height limit. Figure 6-9 depicts the avigation easement and overflight notification areas surrounding the airport.

The city requires review of all proposed development projects within the AIA. New development proposals must process a site development plan, or other development permit, and be found to be consistent or conditionally consistent with applicable land use compatibility policies with respect to noise, safety, airspace protection, and overflight, as contained in the ALUCP. Additionally, development proposals are required to comply with FAA regulations concerning the construction or alteration of structures that may affect navigable airspace.

Figure 6-9: McClellan-Palomar Airport Influence Area/Safety Zones



- Airport Safety Zones
  - Zone 1- Runway Protection Zone
  - Zone 2 - Inner Approach/Departure Zone
  - Zone 3 - Inner Turning Zone
  - Zone 4 - Outer Approach/Departure Zone
  - Zone 5 - Sideline Zone
  - Zone 6 - Traffic Pattern Zone
- Avigation Easement Areas*
- Airport Overflight Notification Area (only applies to new resdiential development)
- Airport Property Boundary
- City Limits
- Major Road
- Planned Road
- Railroad

*Defined as the Runway Protection Zone or within the contour of the 65 dB CNEL or areas where the ground penetrates a Part 77 airspace surface.

Source: McClellan-Palomar Airport Land Use Compatibility Plan, 2010.

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6.6 Railroad Hazards

For Mobility policies related to the railroad, see Chapter 3: Mobility. For noise policies related to the railroad, see Chapter 5: Noise Element. Safety hazards related to transportation of hazardous materials are discussed in Section 6.7, below.

The North County Transit District (NCTD) owns the north/south railroad that parallels Carlsbad's entire seven-mile coastline, as well as Interstate-5 and Carlsbad Boulevard. NCTD operates the Coaster commuter rail service on this rail line and owns two passenger rail stations located within the city: Carlsbad Village and Carlsbad Poinsettia stations. The Atchison, Topeka & Santa Fe freight line and the Amtrak passenger service also use the rail line through the city.

The railroad, while providing a vital service for passenger transit and goods movement through the city, presents potential safety concerns in the city. The railroad acts as a barrier and restricts east/west access for emergency services; it also results in the potential for train collisions with automobiles, bicyclists and pedestrians. From 2018 through 2023, a total of 12 train incidents have occurred between the Carlsbad Village and Poinsettia Coaster stations, all involving pedestrians and all unfortunately fatal.

As part of the North Coast Corridor (NCC) Program, the San Diego Association of Governments (SANDAG) plans, during the next 20 years, to construct nearly $820 million in improvements to the San Diego County rail corridor, including a primary effort to double track the corridor from Orange County to downtown San Diego. Double tracking the rail corridor through San Diego County will add the capacity for approximately 100 more railcars per day through the corridor. To date, the majority of the rail corridor has been double tracked with approximately two miles remaining as single-tracked through the City of Carlsbad: 1.1 miles through the Village from the Oceanside border on the north to Pine Avenue on the south and 0.75 miles near the southern border with Encinitas, including the Batiquitos Lagoon bridge.[7] Other infrastructure improvements planned by SANDAG include bridge and track replacements, new platforms, pedestrian under-crossings, and other safety and operational enhancements.

Along the rail corridor through Carlsbad, SANDAG is considering two options for double tracking the railroad: at-grade tracks and grade-separated tracks (railroad tracks located in a trench below street grade). The city is working closely with SANDAG and other agencies to encourage and support the grade separated option, which would increase east-west crossings and improve east-west access for emergency services and would reduce the potential for train collisions with automobiles, bicyclists and pedestrians.

[7] LOSSAN Coastal Rail Corridor. SANDAG. https://lossanmap.sandag.org/

6.7 Hazardous Materials

Hazardous materials include a wide variety of substances commonly used in households and businesses. Motor oil, paint, solvents, lawn care and gardening products, household cleaners, gasoline, and refrigerants are among the diverse range of substances classified as hazardous materials. Nearly all businesses and residences generate some amount of hazardous waste. Certain businesses and industries, including gas stations, automotive service and repair shops, printers, dry cleaners, and photo processors, generate larger amounts of such substances. Hospitals, clinics, and laboratories generate medical waste, much of which is also potentially hazardous.

Some hazardous materials present a radiation risk. Radioactive materials, if handled improperly, or if radiation is accidentally released into the environment, can be dangerous because of the harmful effects of certain types of radiation on the human body.

Hazardous Materials Transport

Major transportation routes within Carlsbad include Interstate 5 and State Route 78, surface streets, and the San Diego Northern railroad. There are high pressure fuel lines along El Camino Real and other areas, as shown in Figure 6-10. These transportation routes and pipelines are used to transport hazardous materials from suppliers to users. Transportation accidents involving hazardous materials could occur on any of the routes, potentially resulting in explosions, physical contact by emergency response personnel, environmental degradation, and exposure to the public.

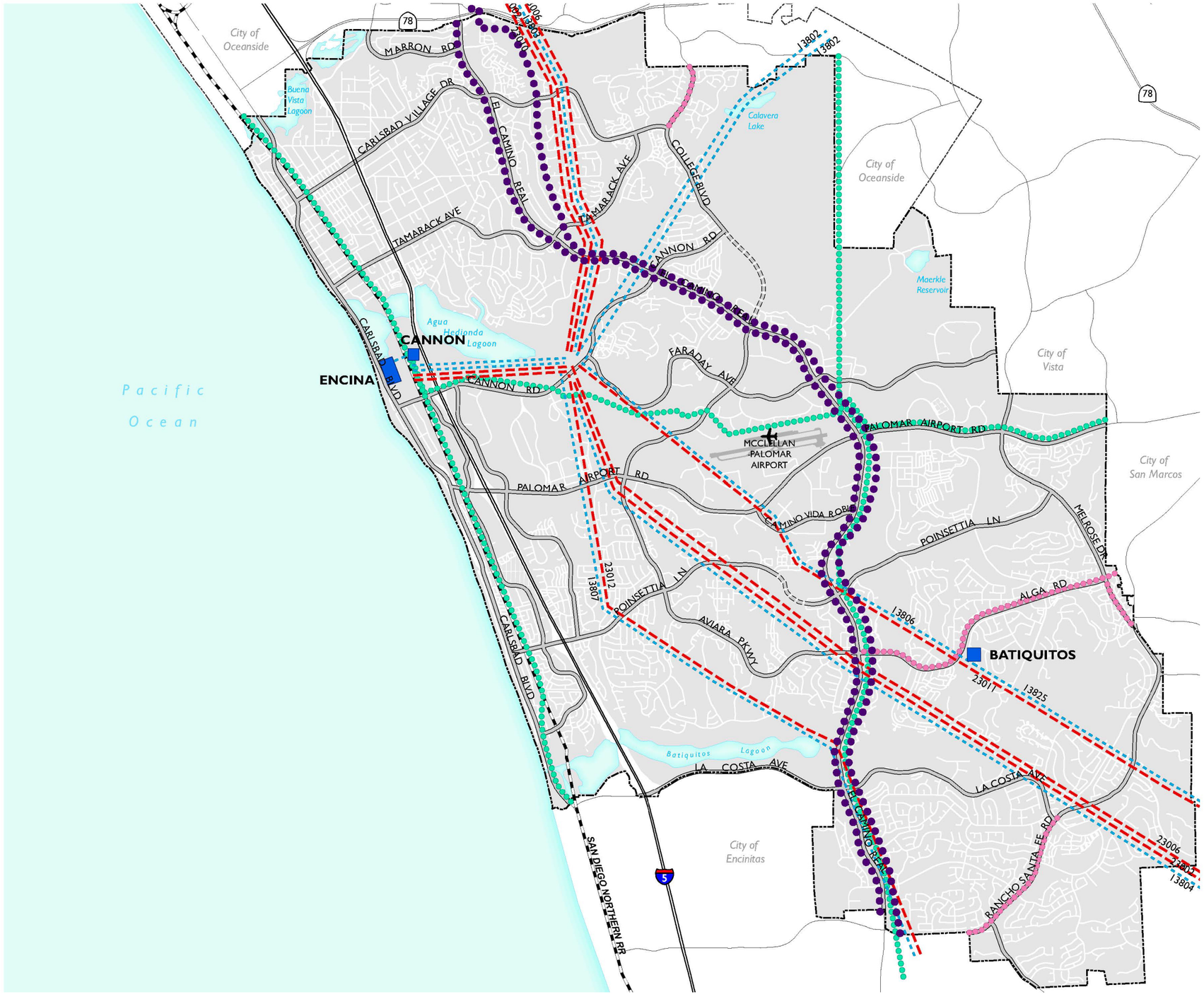
Hazardous Materials Facilities

The County of San Diego, through its Certified Unified Program Agency (CUPA), has recorded (as of 2012) approximately 338 facilities within Carlsbad that store and maintain chemical inventories that exceed mandatory disclosure amounts of any single chemical in excess of 55 gallons, 500 pounds or 200 cubic feet. In addition, there are 180 facilities within the city that are registered with the U.S. EPA as generators of hazardous waste.

Potential Environmental Hazards

Sites within the City of Carlsbad where the presence of hazardous materials present potential environmental hazards were identified using information from state databases and a review of online regulatory files for select sites. The databases used were EnviroStor, which identifies hazardous waste facility and cleanup sites, and SWRCB GeoTracker, which identifies permitted underground storage tanks

Figure 6-10: Electric and Gas Trasmission Lines



Electric Substations

Electric Transmission Lines*

230 KV

138 KV

Gas Transmission Lines*

Above 200 psi

Above 60 psi

Petroleum Gas Mains

Highways

Major Street

Planned Street

Railroad

City Limits

* Note that the location of electric transmission lines and gas transmission pipelines are approximate. The map provides a generalized guide and is not an authoritative depiction of where the risks are more likely. A site-specific study should be performed for detail analysis.

500 ACRES

100 ACRES

0 0.5 1 2

Miles

Source: City of Carlsbad, 1994; SANDAG, 2013; Dyett & Bhatia, 2013.

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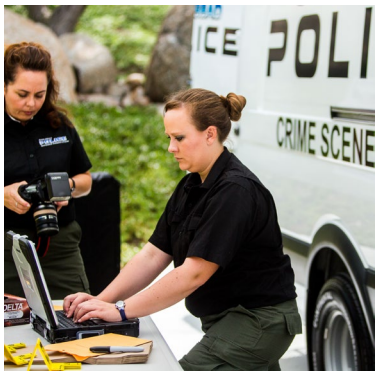
(UST) and cleanup sites. The databases included the following types of sites: release sites (cleanup sites), UST sites, permitted hazardous waste facilities, wastewater treatment tiered permit facilities, and proposed school sites evaluated by the California DTSC for the presence of hazardous materials.

The hazardous materials sites identified in the EnviroStor and GeoTracker databases were evaluated as part of the General Plan Environmental Impact Report (EIR) in order to rank the sites in terms of potential environmental concern.

Using the databases, a total of 214 hazardous materials sites with 126 unique listings were identified within Carlsbad (see the General Plan EIR for details of the listings). A total of 110 of those unique site listings have had known releases, while the remaining 16 have not had known releases. The San Diego Regional Water Quality Control Board's Geographic Environmental Information Management System is a data warehouse that tracks regulatory data about underground fuel tanks, fuel pipelines and public drinking water supplies using GeoTracker; as information in the database is periodically updated, the database should be consulted for current information.

6.8 Police, Fire, and Emergency Management

Police Services



The Carlsbad Police Department conducts its safety services out of the Carlsbad Police and Fire Headquarters located on Orion Way. The Police and Fire Headquarters location is depicted on Figure 6-11. The patrol division is the core of the Police Department's law enforcement services, responding to more than 100,000 calls for service annually. Although responding to 911 calls and street patrols are the majority of the patrol division's activity, other special services in the department include, the homeless outreach team, crime suppression team, investigations unit, traffic unit, school resource officers, canine units, bicycle patrol, crisis negotiations, bilingual services, SWAT and Psychiatric Emergency Response Teams (PERT).

In May 2012, the Carlsbad Safety Training Center was completed to provide necessary training for local police, fire and other safety workers. The training center is located next to the Police and Fire Headquarters, and includes classrooms, a shooting range and structures that can be used to simulate fires in residential and commercial buildings as well as help police conduct tactical training.

Anticipated Space Needs for the Police Department

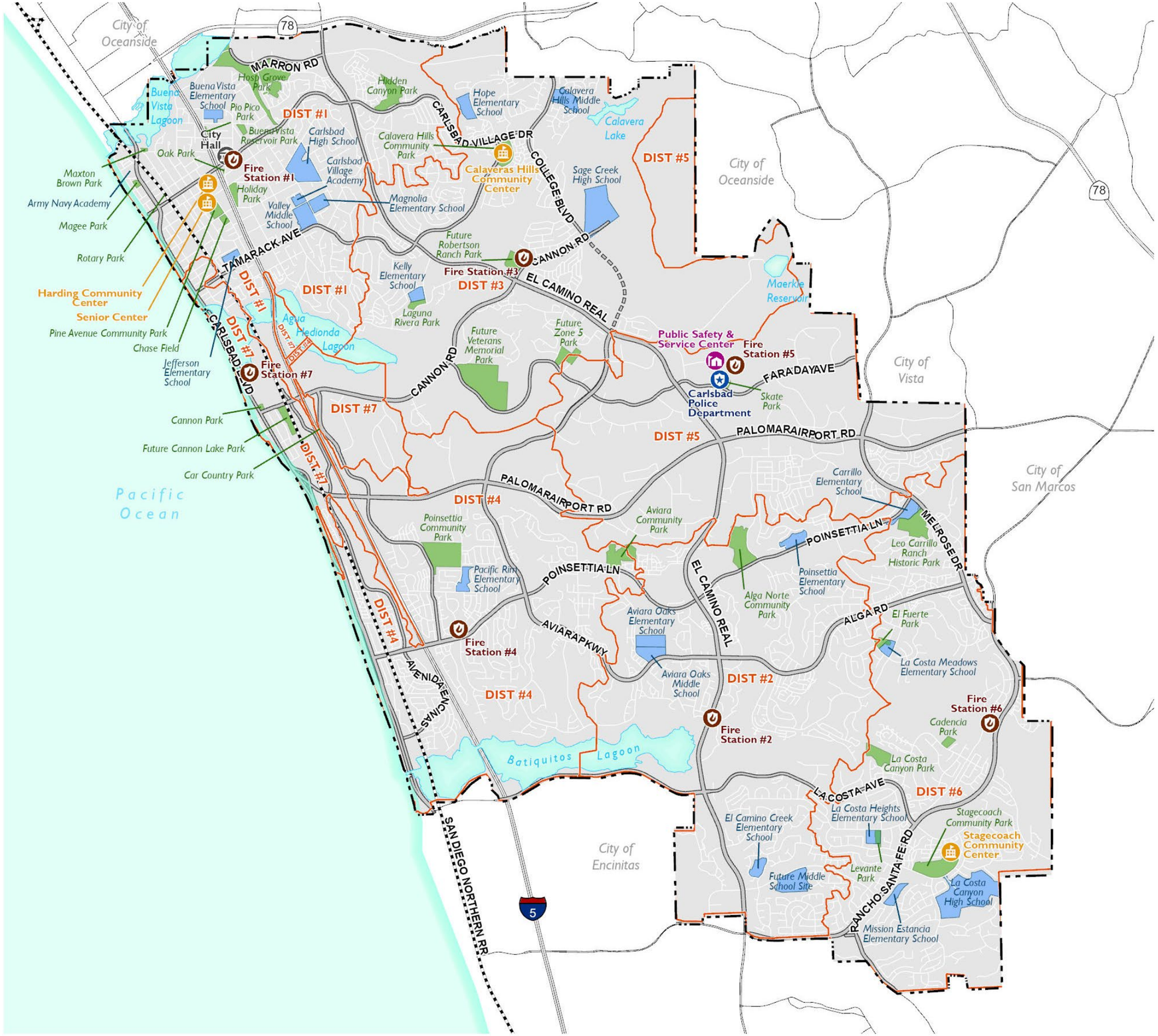
To accommodate population growth, the Police Department expects to grow to a point where it will need to occupy the space inside the Police and Fire Headquarters that is currently occupied by the Fire Administration. Alternative solutions the Police Department is considering include relocating the Fire Administration to another facility or expanding the Police and Fire Headquarters to accommodate Police Department growth and the continued presence of Fire Administration. Also needed by the Police Department is a secure storage facility for evidence storage to include large pieces of evidence, such as vehicles.

Fire and Emergency Medical Services

The City of Carlsbad has seven fire stations, indicated in Figure 6-11. The oldest of the stations was constructed in 1966, while the newest was completed in 2023.

The Fire Department is divided into two Bureaus, the Bureau of Fire Operations and Bureau of Community Risk Reduction and Resilience. Fire Operations is the largest Bureau within the Carlsbad Fire Department and is responsible for fire suppression, rescue, emergency medical service delivery, marine safety, and disaster mitigation. The

Figure 6-11: Public Safety Services



- Police Station
- Fire Station
- City Hall
- Community/Senior Centers
- Safety Training Center
- Public School
- Existing and Planned Parks
- Fire District
- Highways
- Major Street
- Planned Street
- Railroad
- City Limits

500 ACRES
100 ACRES

0 0.5 1 2
Miles

Source: City of Carlsbad, 2022.

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The Fire Department delivers advanced life support level care on all fire engines, fire ladder trucks and ambulances and provides advanced life support via lifeguard services along the city's northern most beach, commonly referred to as "North Beach". Currently, more than 75 percent of the city's fire suppression personnel are licensed paramedics; frequently multiple paramedics are available on-scene at emergency incidents.

City of Carlsbad SWAT medics are firefighter/paramedics on special assignment working alongside the Carlsbad Police Department SWAT team. SWAT medics are also deployed with Carlsbad police officers in support of other law enforcement units such as the San Diego Sheriff's SWAT team and the regional law enforcement task force.

TABLE 6–2: FIRE STATIONS SUMMARY

STATIONS	BUILT	ADDRESS	STAFFING DESCRIPTION
1	1966	1275 Carlsbad Village Dr.	Crew of five: captain, engineer, two paramedic / firefighters and one emergency medical technician
2	2022	1906 Arenal Rd.	Crew of five: captain, engineer, two paramedic/firefighters and one emergency medical technician
3	2016	3465 Trailblazer Way	Crew of five: captain, engineer, two paramedic/firefighters and one emergency medical technician
4	1986	6885 Batiquitos Dr.	Crew of three: captain, engineer and paramedic/firefighter
5	1988	2540 Orion Way	Crew of four: duty battalion chief, captain, engineer, and paramedic/firefighter
6	2009	7201 Rancho Santa Fe Rd.	Crew of five: captain, engineer, two paramedic/firefighters and one emergency medical technician
7	2023	4600 Carlsbad Blvd.	Crew of six: captain, engineer, three paramedic/firefighters and one emergency medical technician

Anticipated Space Needs for the Fire Department

Based on needs identified by the Carlsbad Police Department for additional space, considerations will need to be made for the relocation of Fire Administration in close proximity to Fire Station No. 5 and the Carlsbad Safety Training Center. Consideration of the relocation of Fire Prevention staff to the same location as Fire Administration should also be made.

The Fire Department completed its first Fire Station Master Plan in 2023 to help identify current and future fire station needs with city growth in mind. Increased service demands, changes in staffing, and the increasing size of fire apparatus require considerations for increasing the number and capabilities of these city facilities.

The Fire Station Master plan also incorporates the potential of adding additional fire stations based on recommendations of the Fire Department Standards of Coverage. The Standards of Coverage is a document used by fire departments to assess local risks and demographics and determine the level of protection needed to

minimize those risks. The current standards of coverage account for increases in growth and subsequent increases in demands for service by anticipating the need for two additional Fire Stations (station eight and nine) as growth occurs.

Wildland Fire Hazards

The California Department of Forestry and Fire Protection (CAL FIRE) has mapped Fire Hazard Severity Zones throughout California. The Fire Hazard Severity Zone (FHSZ) maps are developed using a science-based and field-tested model that assigns a hazard score based on the factors that influence fire likelihood and fire behavior.[8] Many factors are considered such as fire history, existing and potential fuel (natural vegetation), predicted flame length, blowing embers, terrain, and typical fire weather for the area. There are three levels of hazard in the State Responsibility Areas: moderate, high, and very high. Currently only Very High Fire Hazard Severity Zones (VHFHSZ) are identified in local government jurisdictions. The large amounts of open space and wildland make Carlsbad susceptible to brush fires year-round. The proximity of native vegetation and the climate of the region contribute to sections of the city having VHFHSZs, as illustrated in Figure 6-12. Specifically, the central and eastern portions of Carlsbad are mapped within VHFHSZs.[9]

The frequency, area, and severity of wildfires have increased significantly within San Diego County over the past two decades. Recent fires of the Boulevard, Park, and Poinsettia fires have occurred in city limits in January 2022, January 2021, and May 2014 respectively. For Carlsbad this trend of increased wildfires is projected to continue through mid and end-century projections. Wildfire events are a product of temperature increases compounded with precipitation declines creating wildfire prone conditions. San Diego County's wildfires are influenced by Santa Ana Winds and fuel availability.

Critical facilities are facilities in either the public or private sector that provide essential products and services to the public, are otherwise necessary to preserve the welfare and quality of life in the city, or fulfills important public safety, emergency response, and/or disaster recovery functions. The city's critical facilities have been identified based on city staff designations. They include schools, fire stations, police stations, transportation systems, libraries, parks, city hall, hospitals, utility systems, and planned critical facilities.

[8] County of San Diego, 2010, San Diego County Multi-Jurisdiction Hazard Mitigation Plan, page 4-89.

[9] County of San Diego, 2010, San Diego County Multi-Jurisdiction Hazard Mitigation Plan, page 4-93 and 4-94.

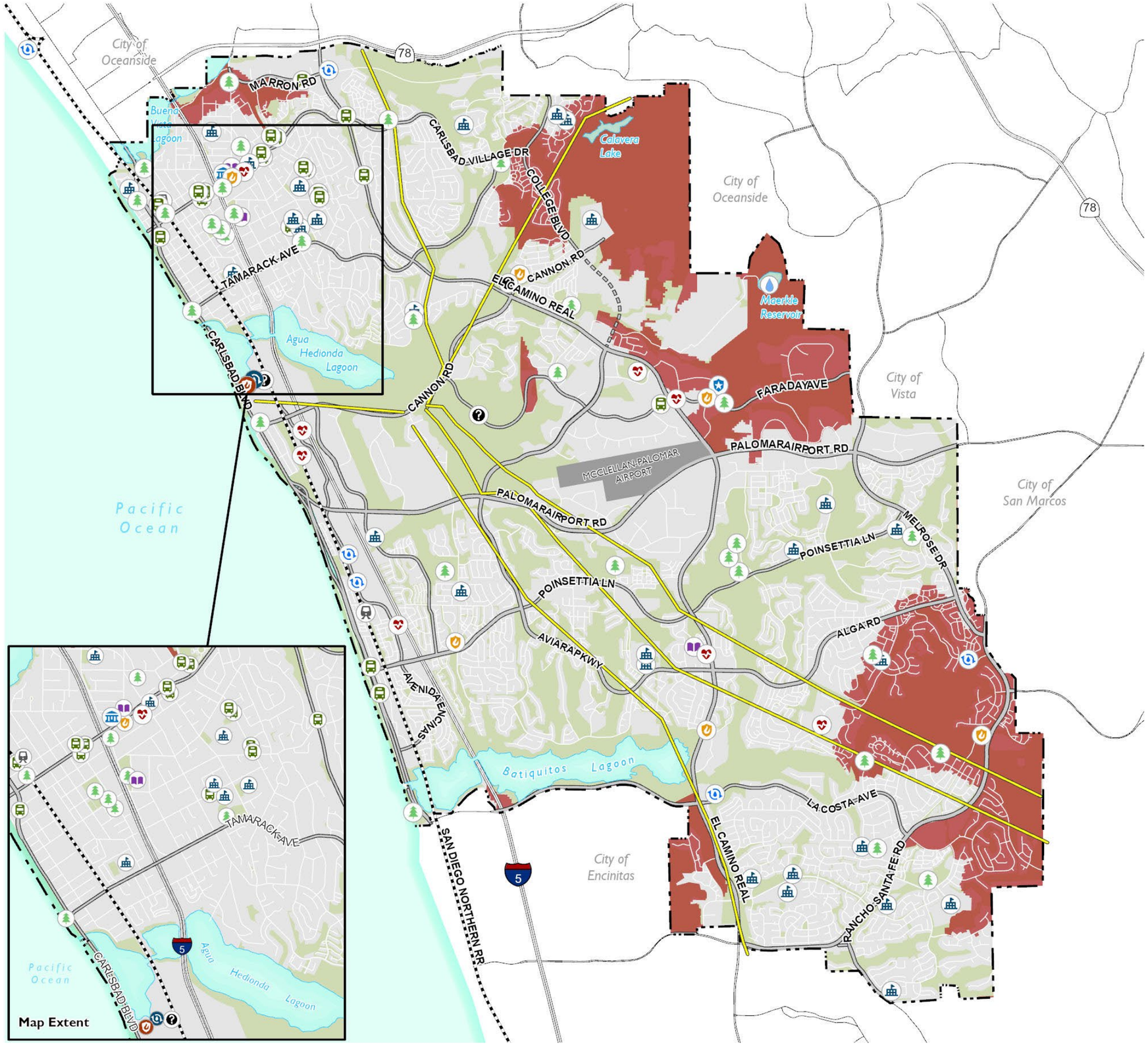

Figure 6-12: Fire Hazard Severity Zones

Critical Facilities/Infrastructure

- Train Station
- Bus Stop
- Hospitals/Medical Facility
- Carlsbad City Hall
- Carlsbad Police Department
- Fire Station
- Fire Station #7 - Temporary
- School
- Library
- Park
- Waste Water Facility
- Carlsbad Desalination Plant (CDP)
- Squires Reservoir
- Planned Facility
- Electrical Transmission Line
- Railroad
- Airport
- Open Space

Fire Hazard Severity Zones
Local Responsibility Areas (LRA)

- Very High

- Highways
- Major Street
- Planned Street
- City Limits

500 ACRES
100 ACRES

0 0.5 1 2
Miles

Source: City of Carlsbad, 2022; CalFire, 2009.

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There are several critical facilities within the city's VHFHSZ including four parks, three schools, two fire stations, the police department, and the wastewater treatment facility. Several roads and residential areas are also located within the city's VHFHSZ. Several fires have afflicted the boundaries of Carlsbad including the Boulevard, Park, and Poinsettia fires. Wildfires can create risk of injury, death, or financial hardship if personal property is damaged as well as physical damage to all other assets. Wildfires can also result in cascading risks for vulnerable populations, such as when power or communication infrastructure is damaged.

Urban Fire Hazards

Urban fire risk in Carlsbad is greatest in older structures and neighborhoods built before modern building codes for fire safety and building systems were in place. Other factors affecting urban fire risk and relative likelihood of loss of life or property include building age, height and use; storage of flammable material; building construction materials; availability of sprinkler systems; and proximity to a fire station and hydrants.

Peakload Water Supply Requirement

The Carlsbad Fire Department requires a minimum flow of water for fire protection in accordance with the adopted amended California Fire Code and the Insurance Services Office standards. Certain standards are based on type of construction, type of use and any built-in fire protection (sprinklers, etc.).

There are sites within the city that are in need of fire flow capacity upgrades. As noted in the 2019 Water Master Plan, capital improvement projects regarding pipe upsizing have been identified at several sites in Carlsbad including at Robertson Ranch and within Quarry Creek. There are currently no known water flow pressure or supply deficiencies in Carlsbad. The Carlsbad Fire Marshal reviews proposed projects to ensure adequate fire hydrant locations, water flow pressure, and access for emergency vehicles is provided.

Minimum Road Widths and Clearances Around Structures

Clear emergency vehicle access to buildings is important. Such access is regulated by the adopted and amended California Fire Code and applicable Carlsbad engineering standards.

6.9 Emergency Management and Resilience

Coordination and Management

Chapter 6.04 of the Carlsbad Municipal Code defines the organization, power and duties of the City of Carlsbad emergency organization. The City of Carlsbad Fire Department's Office of Emergency Management and Resilience directs, conducts, and implements city-level emergency plans, programs, training, and exercises and coordinates multi-department citywide emergency operations. The strategic focus of the Emergency Management and Resilience program is contained in the mission statement: "To provide leadership to the City of Carlsbad and throughout the whole community to ensure each organization is prepared to prevent, protect against, mitigate, respond to, and recover from all threats and hazards."

By resolution, the city has adopted the State of California Standardized Emergency Management System (SEMS), National Incident Management System (NIMS) and Incident Command System (ICS) as its emergency management systems. The City of Carlsbad Emergency Operations Plan (EOP) establishes processes and procedures for coordinating multi-department and multi-jurisdictional emergency response, defines the city's organizational emergency response structure, and identifies roles and responsibilities. The city's EOP identifies the Emergency Operations Center (EOC) as the location from which centralized emergency management would be performed during a large-scale emergency or business disruption. The purpose of the Emergency Operations Center (EOC) is to coordinate and support city-level emergency operations. Primary functions of the EOC include information sharing and resource coordination, public information and public emergency notification, coordination with external agencies and EOCs, and implementation of executive decisions and priorities.

All City of Carlsbad employees are disaster service workers, and employees across multiple city departments are trained EOC responders and emergency shelter workers. Emergency preparedness and disaster response information is shared with the public through the City of Carlsbad's website, emergency mass notification systems, social media including the countywide "emergency" mobile application, and traditional media.

Evacuation Routes

Carlsbad is a participant in the Unified Disaster Council (UDC) San Diego Operational Area Emergency Operations Plan (September 2022) which contains evacuation routes resulting from a variety of emergencies. Evacuation routes in this document are incorporated by reference in

this General Plan; the document can be accessed at https://www.sandiegocounty.gov/content/dam/sdc/oes/emergency_management/plans/op-area-plan/2022/EOP2022_Complete%20Plan.pdf.

Single access points of entry and exit were identified in compliance with SB 99 (see Figure 6-13 and consistent with OPR's 2022 technical advisory document on Fire Hazard Planning. OPR's guidance clarifies that cities and counties must identify residential developments with less than two evacuation routes located in any hazard zone considered by the Safety Element. This analysis took a conservative approach and assessed all Carlsbad residential developments for single access entry and exit points, as most of the city is in at least one hazard risk zone.

The process to identify the residential developments that have less than two routes that can be used for emergency evacuation in Carlsbad included:

1. Identifying residential neighborhoods based on residential land use designations consistent with the Carlsbad General Plan Land Use Designations Map.
2. Identification of roads that connect to major and minor streets as identified by SANDAG by a single route were identified and marked.
3. The number of assessor parcel number boundaries adjacent to a marked road were counted.

In low density residential land use areas with single family homes, the number of parcels with driveway access to the street were counted and included as a single entry/exit neighborhood if there were 30 or more units serviced by the local road. The 30 or more units threshold is consistent with the California Public Resources Code Section 4290.5 which defines subdivision as an existing residential development of more than 30 dwelling units[10].

4. Medium and high-density land use areas were evaluated using the same methodology of or more dwelling units.

Figure 6-13 identifies multiple residential developments in Carlsbad with a single access point of entry/exit. There are single access neighborhoods located throughout Carlsbad, including one adjacent to coastal hazard zones and six located within or adjacent to city designated Wildland Preplan areas. Wildland Preplan areas are areas within VHFHSZ with existing evacuation plans as determined by the city. Single access points, particularly in wildfire hazard zones, can make emergency evacuations problematic during an emergency, such as a wildfire.

[10] Assembly Bill 2911 added Section 4290.5 to the Public Resources Code requiring the California Board of Forestry and Fire Protection to identify existing subdivisions with more than 30 dwelling units located in the State Responsibility Area or Local Responsibility Area Very High Fire Hazard Severity Zone without a secondary means of egress route that are at significant fire risk.

Figure 6-13 also illustrates the major evacuation routes within Carlsbad, including the routes outlined by the Police Department Evacuation Plans developed in 2011 identified in Table 6–3. The map of evacuation routes is further organized by Wildland Preplans in Carlsbad including Hosp Grove, Calavera Hills, Sunny Creek Road, Box Canyon, Dank Tank, and Green Valley. Additional evacuation routes identified in these preplan areas include connections to Interstate 5 from Sunny Creek Road, Rancho Santa Fe Road, La Costa Avenue, Levante St-El Camino Real, Calle Barcelona-Leucadia Boulevard, and Palomar Airport Road/West San Marcos Boulevard.

TABLE 6–3: POLICE DEPARTMENT EVACUATION PLANS (2011)

EVACUATION PLAN FOR WILDLAND PREPLAN AREAS	EVACUATION ROUTE(S)
Old Carlsbad (Beats 1,2 & 3	• Carlsbad Village Drive to I-5 • Las Flores to I-5 • Tamarack Avenue to I-5 • Cannon to I-5 • Jefferson Street to Highway 78
Calavera Area (Beat 4)	• Carlsbad Village Drive to El Camino Real • College Boulevard to Highway 78 • Carlsbad Village Drive to I-5 • Tamarack Avenue to I-5 • El Camino Real to Cannon Road to I-5
Industrial Core Area (Beat 5)	• W/B Cannon to I-5 or E/B Cannon to El Camino Real. • W/B Faraday to Cannon to I-5 or E/B Faraday to El Camino Real to Melrose. • W/B Palomar Airport Rd to I-5 or E/B Palomar Airport Rd. to El Camino Real to Melrose and beyond.
La Costa – Olivenhain Area	• La Costa Ave. to I-5 • Rancho Santa Fe Road to Olivenhain Road to Leucadia Blvd. to I-5 • Levante St. to El Camino Real to La Costa Ave. to I-5 • Calle Barcelona to Leucadia Blvd. to I-5
Poinsettia West Area (Beat 6 & 7)	• Aviara Parkway to I-5 • El Camino Real to Palomar Airport Rd. • El Camino Real to La Costa Ave • El Camino Real to Poinsettia Ln.
Poinsettia East Area (Beat 6/7 East)	• Melrose Drive to Palomar Airport Road/Rancho Santa Fe. • El Fuerte to Palomar Airport Rd./Alga Rd. • Alicante to Poinsettia Ln./Alga Rd • El Camino Real to Palomar Airport Rd./La Costa Ave. • Palomar Airport Rd. to I-5/Business Park • Poinsettia Ln. to Alga Rd. or El Camino Real • Alga to Aviara Parkway/El Camino Real/Melrose Dr.

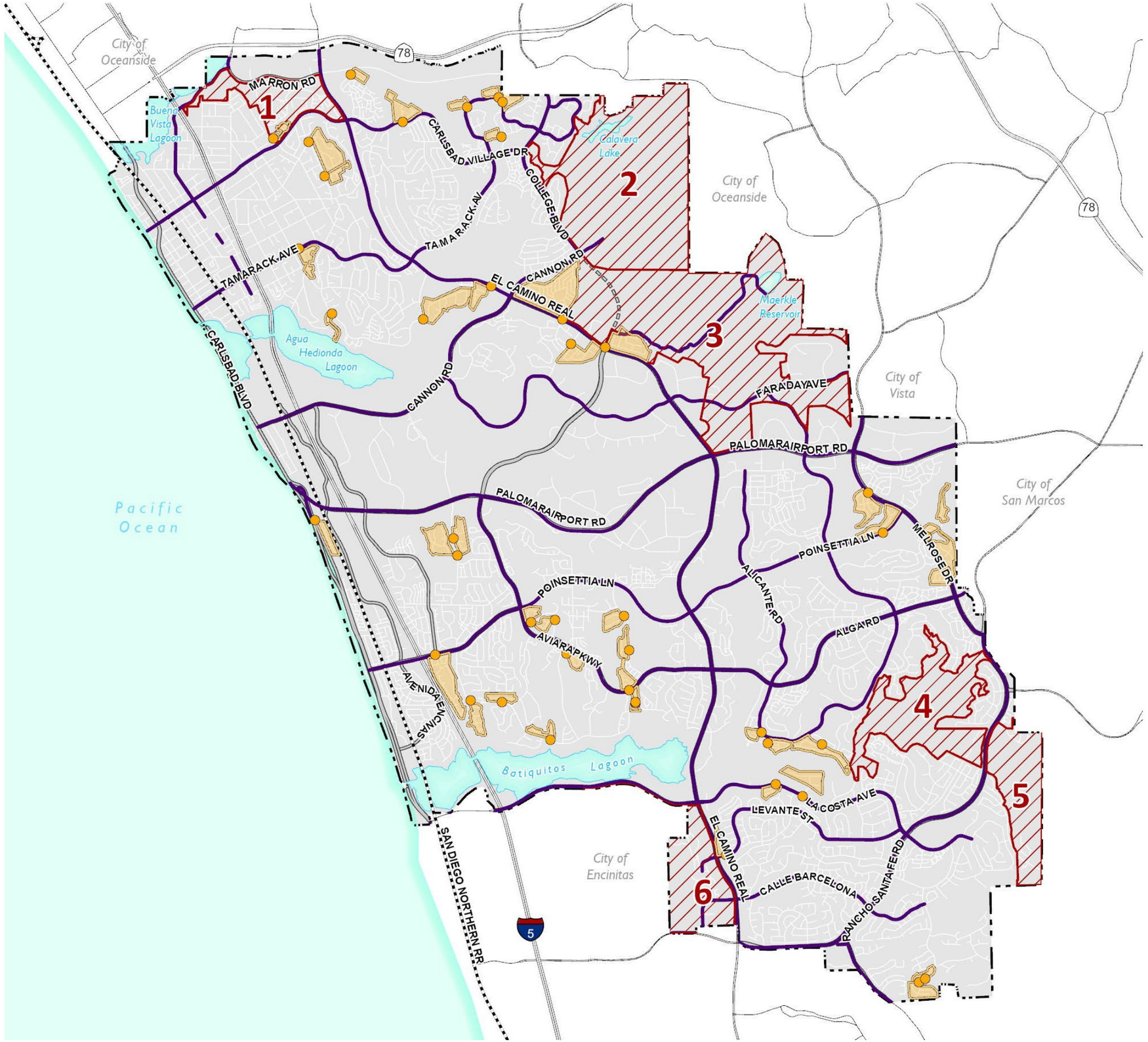

Figure 6-13: Single Access Roads

- Evacuation Routes
- Wildland Preplan Areas
- Single Entry and Exit Neighborhood
- Point of Single Entry and Exit
- Highways
- Major Street
- Planned Street
- Railroad
- City Limits

Source: City of Carlsbad, 2022.

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Evacuation capacity, safety, and viability were analyzed in compliance with AB 747. The evacuation routes identified in Table 6–3 include a citywide network of arterial roadways with a maximum capacity of 1,800 vehicles per hour per lane that can be utilized in unique combinations to provide effective transportation during a range of emergency scenarios. Dependent on the type and location of the emergency, evacuation locations include the Pine, Stagecoach, and Calavera Hills community centers.

The performance standard for the city's circulation system is guided by the General Plan Mobility Element as follows:

- Implementing Policy 3-P.4: Implement the city's Multi-modal Level of Service methodology and maintain Level of Service D or better for each mode of travel for which the Multi-modal Level of Service standard is applicable….

The greatest threat to the capacity of identified evacuation routes is either an existing low volume design and/or over capacity utilization, typically associated with peak hour commute trips. Critical points would include intersections of major arterials, at-grade railroad crossings, and freeway interchanges.

Identified evacuation routes constrained due to low volume design (two lane roadways) include:

- Las Flores Drive
- Levante Street
- Jefferson Street

Morning/evening peak hour congestion, represented as failing level of service and documented in the Fiscal Year 2021-22 Growth Management Plan Monitoring Report Circulation Section in 2022, affects the following evacuation route segments:

- Palomar Airport Road between Avenida Encinas and Paseo del Norte (interchange at I-5)
- Cannon Road between Avenida Encinas and Paseo del Norte (interchange at I-5)
- El Camino Real between Marron Road and the border with Oceanside (interchange at SR 78)
- Palomar Airport Road between El Fuerte Street and Melrose Drive
- El Camino Real between Cannon Road and College Boulevard
- El Camino Real between Aviara Parkway and La Costa Avenue
- La Costa Parkway between I-5 and El Camino Real

The identified evacuation network is generally free from constraint due to physical hazards during emergencies. Over the past 20 years, only minor impacts to evacuation routes have been experienced in the form of flooding,

fire hazard, landslide, hillside collapse, downed trees/overhead utilities, etc. Even though multiple routes include either overpasses or underpasses, the threat of constraint from these features is low given the relatively young age of the infrastructure and lack of structural issues to date. None of the identified evacuation routes experiences regular or chronic constraints that would present a vulnerability to that route or the network as a whole.

The City of Carlsbad has emergency operations plans and mutual aid agreements with other responsive agencies that can, to a large extent, utilize the roadway network effectively through operational changes to maximize existing capacity in the most effective manner.

6.10 Climate Change

Climate change is already having, and will continue to have, myriad adverse impacts on the Earth's natural and built systems, resources, and the human populations that rely on them. While climate change is a global phenomenon, the effects will vary locally based on the natural and built environment and systems in place. Generally, climate change is anticipated to amplify existing hazards including but not limited to extreme heat, drought, wildfires, landslides, flooding, sea level rise, and air quality. The City of Carlsbad prepared a Climate Change Vulnerability Assessment (CCVA) which is available on the city website at this link: https://www.carlsbadca.gov/departments/community-development/planning/general-plan/related-documents/-folder-769. The CCVA assesses how the community and natural and built assets in Carlsbad are vulnerable to climate change. In Carlsbad, climate conditions and associated natural hazards are expected to change in the following ways:

- **Extreme heat**: Extreme heat days occur when the maximum temperature is above 92.5°F. The annual number of extreme heat days is projected to increase by as much as 22 days per year by 2100.
- **Drought**: Climate change will increase the likelihood that low-precipitation years will coincide with above-average temperature years. Warming temperatures increase seasonal dryness and the likelihood of drought due to decreased supply of moisture and increased atmospheric demand for moisture as evaporation from bare soils and evapotranspiration from plants increases.
- **Wildfire:** Carlsbad is expected to experience an increase in the number of days with extreme wildfire risk, from 14 days annually to 63 days by mid-century and 113 days by end-century.
- **Landslides:** Triggered by extreme bouts of precipitation on wildfire burn scars, the susceptibility of the larger San Diego region to landslides is projected to increase as precipitation variability increases and wildfires increase in frequency, area, and severity.
- **Riverine and Stormwater Flooding**: Climate change may cause low-lying areas throughout Carlsbad to experience more frequent flooding and could increase the extent of 100-year floods.
- **Air Quality**: Due to extended droughts, more frequent wildfires, increased ambient temperatures, and sporadic natural filtrations of fog and wind air quality in Carlsbad may decline significantly.

- **Sea Level Rise**: The Carlsbad Sea Level Rise Vulnerability Assessment anticipates 1.6 feet of sea level rise by 2050 and 6.6 feet of sea level rise by 2100. Impacts to coastal assets are described in detail under Section 6.3.

Though climate change affects everyone in a community, not all people are impacted equally. For example, historically disadvantaged communities, people of color, outdoor workers, elderly and very young community members, lower-income populations, and those with chronic health conditions tend to experience increased exposure and/or physiological sensitivity to climate hazards and a reduced capacity to adapt.[11] As recommended by the California Adaptation Planning Guide several data sources and tools were used in evaluating both population and climate hazard vulnerabilities including the U.S. Census 2015-2019 American Community Survey, Cal-Adapt, California's Fourth Climate Change Assessment, The California Healthy Places Index, and CalEnviroScreen 4.0. The following vulnerable populations have been identified in Carlsbad consistent with the California Adaptation Planning Guide and the Southern California Adaptation Planning Guide:

- **Individuals with High Outdoor Exposure**, including outdoor workers and people experiencing homelessness, face disproportionate direct exposure to climate hazards, causing them to be extremely vulnerable to the effects of climate change.
- **Under-resourced individuals** often do not have access or the ability to afford resources needed to prepare for, cope with, and recover from climate change impacts. Individuals who are unemployed or are low-income often face financial barriers when preparing for and recovering from climate change hazards. Individuals in these groups often live in homes that are less protected against climate hazards.
- **Individuals Facing Societal Barriers** also face additional impacts of climate change. Non-white individuals are more likely to live in high hazard risk areas and less likely to be homeowners, which leaves them vulnerable to climate hazards.
- **Individuals with chronic health conditions or health related sensitivities** are socially and physiologically vulnerable to climate change impacts and hazards. Older adults and individuals with disabilities may have limited or reduced mobility, mental function, or communication abilities, making it difficult to evacuate during or prepare for a climate hazard

[11] The California Adaptation Planning Guide describes factors that contribute to disproportionate impacts from climate change: "There are many reasons why some groups of people are more susceptible to climate related hazards—limited access to financial resources, health challenges or disabilities (physical, cognitive, behavioral, and all other forms), living or working conditions that result in greater exposure to hazard events, physical or social isolation, historical and current marginalization or deprivation of resources, and reduced agency or ability to make decisions. These are all factors that can lead to a greater potential for harm, and many people fall into more than one category." (Page 62)

event. They may also have medical needs for electricity which may be impacted during a public safety power shutoff or climate hazard event.

Natural and recreational resources, buildings and facilities, and infrastructure and critical services are also vulnerable to the effects of climate change and were evaluated in detail in the Climate Change Vulnerability Assessment:

- **Natural resources** are highly vulnerable to extreme heat, drought, wildfire, flooding, and sea level rise. Vulnerability for natural resources includes the risk of habitat conversions and damage, mortality, and scarcity of resources for plants and wildlife.
- **Buildings and facilities** in the city are highly vulnerable to sea level rise (detailed discussion provided in Section 6.3). Buildings and facilities located in inundation zones are at risk of structural damage from sea level rise. Several facilities are in the wildfire hazard severity zones of Carlsbad. These buildings and facilities are at risk of structural damage from wildfire.
- **Infrastructure and dependent populations** experience additional cascading impacts around power outages from downed utility lines, power safety shut offs and grid overload. All forms of power outages can affect how critical services are able to perform their needed functions during a hazard. Infrastructure and critical services are also highly vulnerable to extreme heat, flooding, and air quality

Table 6–4 below summarizes each asset grouping's highest vulnerabilities by hazard along with corresponding policies that address the primary vulnerabilities in the Goals and Policies section.

TABLE 6–4: CLIMATE CHANGE VULNERABILITY ASSESSMENT HIGH VULNERABILITY FINDINGS

CLIMATE HAZARD	IMPACT SCORE	ADAPTIVE CAPACITY SCORE	VULNERABILITY SCORE	CORRESPONDING POLICY
Vulnerable Populations				
Extreme Heat	High	Medium	4-High	6-P.85
Wildfire	High	Medium	4-High	6-P.55, 6-P.66 6-P.79
Riverine and Stormwater Flooding	Medium	Low	4-High	6-P.1, 6-P.6
Air Quality	High	Low	5-High	6-P.82, 6-P.84, 6-P.85, 6-P.88
Sea Level Rise	High	Medium	4-High	6-P.79
Natural and Recreational Resources				
Extreme Heat	High	Low	5-High	6-P.80
Drought	High	Low	5-High	6-P.80, 6-P.81
Wildfire	High	Medium	4-High	6-P.80
Riverine and Stormwater Flooding	High	Medium	4-High	6-P.12
Air Quality	Medium	Low	4-High	6-P.81
Sea Level Rise	High	Medium	4-High	6.P.13
Buildings and Facilities				
Extreme Heat/Warm Nights	Medium	Low	4-High	6-P.84, 6-P.89
Sea Level Rise	Medium	Low	4-High	6-P.13
Infrastructure and Critical Facilities				
Extreme Heat	High	Low	5-High	6-P.89, 6-P.90
Drought	High	Medium	4-High	6-P.51
Riverine and Stormwater Flooding	High	Low	5-High	6-P.5, 6-P.89
Air Quality	High	Low	5-High	6-P.85, 6-P.89
Sea Level Rise	Medium	Low	4-High	6-P.13

Local actions can help to mitigate the additional risks associated with climate change and increase community resilience. Cities that plan now will have the best options for adapting to climate change. Carlsbad is currently preparing a comprehensive update to its Climate Action Plan (CAP), which is a roadmap identifying specific actions the city and its partners intend to take to reduce local greenhouse gas emissions. Implementation of the policies in the Public Safety Element and the measures and actions in the CAP are complementary and mutually beneficial, working to both reduce the city's carbon contributions and increase its resilience in the face of worsening climate change impacts.

The city has a long history of taking action to reduce the effects of climate change by cutting local greenhouse gas emissions, beginning with the adoption of the city's first Climate Action Plan in 2015. Since that time, the city has been active in implementing sustainability programs envisioned by the CAP, including steps being taken by the Sustainable Materials Management division to divert and reduce waste,

the Watershed Protection division to protect water resources, and the Habitat Management division to increase protection of natural habitats. As Carlsbad expands existing efforts in planning and implementation for responding to climate change, an opportunity exists to create stronger, more equitable communities for everyone. Many of the actions needed to reduce the impacts of climate change will provide additional co-benefits to the community, including but not limited to increased public safety and public health, reduced greenhouse gas emissions, and greater economic stability.

6.11 Goals and Policies

Goals

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

6-G.2 Minimize safety hazards related to aircraft operations in areas around the McClellan-Palomar Airport.

6-G.3 Maintain safety services that are responsive to citizens' needs to ensure a safe and secure environment for people and property in the community.

6-G.4 Minimize safety hazards related to emergency service, automobile, bicycle and pedestrian access across the railroad.

6-G.5 Adequately prepare for climate change-related hazards, including but not limited to sea-level rise, extended drought, extreme heat, and more frequent and severe flooding, extreme weather, and wildfires.

Policies

Flooding Hazards

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 public drainage facilities to comply with the city's Standard Design Criteria to ensure they are properly sized to handle 100-year flood conditions. Incorporate updated hydrology and hydraulic data as it becomes available.

6-P.5 Require installation of protective structures or other design measures to protect proposed building and development sites, existing infrastructure, and critical services from the effects of flooding. Utilize, where possible, nature-based solutions and pervious pavement to assist in protection.

6-P.6 Encourage the use of permeable materials and surfaces in new development and road repaving to decrease surface water runoff during storms.

6-P.7 Promote the use of green infrastructure such as swales to manage stormwater runoff.

6-P.8 Enforce the requirements of Carlsbad Municipal Code Titles 15, 18, 20, and 21 pertaining to drainage and flood control when reviewing applications for building permits and subdivisions.

6-P.9 Comply with all requirements of the California Department of Water Resources' Division of Safety of Dams and California Office of Emergency Services to ensure dam safety and adequate flood incident preparedness and response.

6-P.10 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.

6-P.11 Provide language-accessible materials to vulnerable populations on flood hazard exposure and available resources. Identify and improve access to flood mitigation and adaptation related services for vulnerable populations including evacuation-based transportation, home improvements, and resources to combat cascading impacts of negative economic and health impacts.

6-P.12 Monitor and research the potential impacts of climate change and flooding on local habitat and wildlife.

Sea Level Rise Hazards

6-P.13 Regulate new development, redevelopment and lot creation, which requires a coastal development permit, to avoid exposure to sea level rise hazards such as erosion, flooding, inundation, groundwater changes and shoreline migration throughout the lifespan of the proposed development.

6-P.14 Encourage development projects to deposit dredge spoils on the beach if the material is suitable for sand replenishment and is consistent with environmental protection policies.

6-P.15 Give priority to non-structural shoreline protection options and limit or prohibit hard shoreline protective devices.

6-P.16 Require removal or relocation of structures away from sea level rise hazards if public health and safety risks exist, if essential services can no longer be maintained, if the structures are no longer on private property due to migration of the public trust boundary, or if the development requires new or augmented shoreline protective devices that would not otherwise be permitted.

6-P.17 Develop sea level rise adaptation plans for assets vulnerable to sea level rise.

6-P.18 Collaborate with other local, regional, state, and federal entities to monitor sea level rise impacts and promote restoration or enhancement of natural ecosystems.

6-P.19 Continue to build community awareness about sea level rise hazards and future vulnerabilities.

Geology and Seismicity

6-P.20 Allow for consideration of seismic and geologic hazards at the earliest possible point in the development process, preferably before comprehensive engineering work has commenced.

6-P.21 Maintain geotechnical report guidelines identifying specific requirements for various levels of geotechnical evaluation, including reconnaissance studies, preliminary geotechnical investigation reports, and as-graded geotechnical reports.

6-P.22 Use information in Figure 6-5 as a generalized guideline for planning purposes and in determining the type and extent of geotechnical report to be required for a proposed development project. When a geotechnical report is required, submission of the report and demonstration that a project conforms to all mitigation measures recommended in the report prior to city approval of the proposed development (as required by state law).

6-P.23 Require a geotechnical investigation and report of all sites proposed for development in areas where geologic conditions or soil types are susceptible to liquefaction. Also require demonstration that a project conforms to all mitigation measures recommended in the geotechnical report prior to city approval of the proposed development (as required by state law).

6-P.24 Prohibit location of critical structures directly across known earthquake faults unless a geotechnical and/or seismic investigation is performed to show that the earthquake fault is neither active nor potentially active.

6-P.25 Require applicants to conduct detailed geologic and seismic investigations at sites where the construction of critical structures (high-occupancy structures and those that must

remain in operation during emergencies) and structures over four stories are under consideration.

6-P.26 In accordance with California state law, deny subdivision maps if a project site is not physically suitable for either the type or density of a proposed development because of specific, adverse impacts on public health and safety conditions, such as geologic, seismic, or other hazards and there is no feasible method to satisfactorily mitigate or avoid such adverse impacts.

6-P.27 Require qualified geotechnical engineering professionals to review grading plans and inspect areas of excavation during and after grading, to evaluate slope stability and other geotechnical conditions that may affect site development and public safety. In areas of known or suspected landslides and/or adverse geologic conditions, the following determinations should be made: extent of landslide, depth-to-slide plane, soil types and strengths, presence of clay seams and ground water conditions.

6-P.28 Continue to regulate development, including remodeling or structural rehabilitation, to ensure adequate mitigation of safety hazards on sites having a history or threat of seismic dangers, erosion, subsidence, or flooding.

6-P.29 Regularly inspect locations with high landslide susceptibility directly following major storm and atmospheric events.

6-P.30 Develop mitigation strategies for new areas deemed at risk to slope instability by considering the risks associated with climate change impacts which are anticipated to cause more frequent landslides from more extreme and frequent rain events and wildfires.

6-P.31 Minimize risks from landslides by requiring new development to be sited outside of hazard areas, when possible, and to incorporate design that minimizes the potential for damage.

Airport Hazards

6-P.32 Ensure that development in the McClellan-Palomar Airport Influence Area is consistent with the land use compatibility policies contained in the McClellan-Palomar Airport Land Use Compatibility Plan.

See also policies in the Land Use and Community Design Element related to McClellan-Palomar Airport.

Railroad Hazards

6-P.33 Gather historic incident data from police reports regarding pedestrian/bicycle and train incidents to develop a better understanding of the conditions resulting in collisions. Evaluate if there are any common factors, such as time, location, population group, point of entry and exit, and determine if there

are underlying causes contributing to the incidents. Evaluate a program to address underlying issues and the potential effectiveness of the program.

6-P.34 Coordinate with other agencies and private entities to investigate methods of improving service safety along and across the rail corridor, such as through development of a grade separated rail corridor that includes grade separated street crossings at Grand Avenue, Carlsbad Village Drive, Tamarack Avenue and Cannon Road, as well as new pedestrian and bicycle crossings at Chestnut Avenue, the Carlsbad Village and Poinsettia COASTER stations, and other appropriate locations.

See also policies in the Mobility and Noise Elements related to the railroad.

Soils and Hazardous Materials

6-P.35 Limit hazards associated with the manufacture, use, transfer, storage and disposal of hazardous materials and hazardous wastes through enforcement of applicable local, county, state and federal regulations.

6-P.36 Coordinate with the County of San Diego and use the San Diego County Multi-Jurisdictional Hazard Mitigation Plan (MJHMP) as a guide for implementing actions to reduce hazardous waste impacts.

6-P.37 Regulate locations for the manufacture, storage, and use of hazardous materials within the city through implementation of Carlsbad Municipal Code Title 21 (Zoning Ordinance).

6-P.38 Regulate development on sites with known contamination of soil and groundwater to ensure that construction workers, future occupants, and the environment as a whole, are adequately protected from hazards associated with contamination, and encourage cleanup of such sites. Provide documentation that development sites are not impacted by former/current site uses, including but not limited to, agricultural chemicals, aerially deposited lead, common railroad contaminants, and hazardous material storage and/or use.

6-P.39 Provide hazardous materials emergency incident responses. Coordinate such responses with applicable federal, state and county agencies.

6-P.40 Maintain regulations that require proper storage and disposal of hazardous materials to reduce the likelihood of leakage, explosions, or fire, and to properly contain potential spills from leaving the site.

6-P.41 Enhance and expand the use of desilting/pollutant basins to function as hazardous material spill control facilities to prevent the spread of contaminants to downstream areas.

6-P.42 Support public awareness and participation in household hazardous waste management, solid waste, and recycling programs.

Police, Fire and Emergency Management

6-P.43 Maintain adequate Police and Fire Department staff to provide adequate and timely response to all emergencies according to department standards, as well as continuous community outreach providing education for emergency situations.

6-P.44 Encourage physical planning and community design practices that deter crime and promote safety.

6-P.45 Maintain close coordination between planned improvements to the circulation system within the city and the location of fire stations to assure adequate levels of service and response times to all areas of the community.

6-P.46 Consider site constraints in terms of hazards and current levels of emergency service delivery capabilities when making land use decisions. In areas where population or building densities may be inappropriate to the hazards present, take measures to mitigate the risk of life and property loss.

6-P.47 Coordinate the delivery of fire protection services through auto aid and mutual aid agreements with other agencies when appropriate.

6-P.48 Enforce the most current California Building and Fire codes, adopted by the city, to provide fire protection standards for all existing and proposed structures.

6-P.49 When future development is proposed to be placed in fire hazard severity zones and/or adjacent to fire hazard severity zones, require applicants to comply with the city's adopted Landscape Manual, which includes requirements related to fire protection, and calls for preparation of a fire protection plan when a proposed project contains or is bounded by hazardous vegetation or is within an area bounded by a Very High Fire Hazard Severity Zone, or as determined by the Fire Code official or their representative.

Wildfires

6-P.50 Coordinate with Carlsbad Municipal Water District, Olivenhain Municipal Water District, and Vallecitos Water District to ensure that water pressure for existing developed areas is adequate for firefighting purposes during the season and time

of day when domestic water demand on a water system is at its peak.

6-P.51 Permit development only within areas that have adequate water resources available, to include water pressure, onsite water storage, or fire flows.

6-P.52 Maintain and implement Wildland/Urban Interface Guidelines for new and existing development within neighborhoods that are proximal to existing fire hazard severity zones. Decrease the extent and amount of edge or wildland urban interface where development is adjacent to fire hazard severity zones.

6-P.53 Use strategies, such as community organization volunteer partnerships and environmentally friendly fuel reduction and weed abatement approaches, as prevention measures to minimize the risk of fires. Engage in fire hazard reduction projects, including community fuel breaks and private road and public road clearance.

6-P.54 To increase resistance of structures to heat, flames, and embers, review current building code standards and other applicable statutes, regulations, requirements, and guidelines regarding construction, and specifically the use and maintenance of non-flammable materials (both residential and commercial). Promote the use of building materials and installation techniques beyond current building code requirements, to minimize wildfire impacts as well as fire protection plans for all development.

6-P.55 In planned developments that may occupy the wildland urban interface, High and Very High Fire Hazard Severity Zones, increase resilience during a potential wildfire evacuation through:

- Enforcing visible address numbers painted on sidewalks.
- Applying special construction features found in California Building Code Chapter 7A for developments in Very High Fire Hazard Severity Zones & High Fire Hazard Severity Zones areas.
- Developing and/or adapting multiple language accessible materials for how to prepare your family and home for an evacuation and go kit.
- Identifying and preparing at risk and vulnerable populations that may need assistance to evacuate.
- Maintaining existing critical evacuation routes, community fuel breaks, emergency vehicle access.
- Requiring adequate access (ingress, egress) to new development, including safe access for emergency response vehicles

- Identification of anticipated water supply for structural fire suppression.
- Developing fuel modification plans for all new developments.

6-P.56 Evaluate soils and waterways for risks from flooding, water quality, and erosion to ensure that they are suitable to support redevelopment following a large fire.

6-P.57 In the event of a large fire, evaluate re-development within the impacted fire zone to conform to best practice wildfire mitigation.

6-P.58 Coordinate with telecommunication service entities and the San Diego County Communication Department to fire-harden communications.

6-P.59 Limit new development along steep slopes and amidst rugged terrain to limit rapid fire spread and increase accessibility for firefighting.

6-P.60 Develop and implement density management strategies that cluster residential developments and minimize low-density exurban development patterns to reduce amounts of flammable vegetation and collective exposure to wildfire risk. When feasible, require new residential development to be located outside of the Very High Fire Hazard Severity Zone (VHFHSZ). Should new residential development be located in VHFHSZ's, then require that it be built to the current California Building Code and Fire Code.

6-P.61 When feasible, site new critical facilities outside of the Very High Fire Hazard Severity Zone (VHFHSZ). Protect and harden critical facilities from natural hazards and minimize interruption of essential infrastructure, utilities, and services.

6-P.62 Site structures to maximize low-flammability landscape features to buffer against wildfire spread.

6-P.63 Require that new development and redevelopment have adequate fire protection, including proximity to adequate emergency services, adequate provisions for fire flow and emergency vehicle access and fire hardened communication, including high speed internet service.

6-P.64 Ensure that the Carlsbad Fire Department has complete access to all locations in the city, including gated residential communities and critical infrastructure.

6-P.65 Coordinate with San Diego Gas & Electric to implement an electrical undergrounding plan with a focus on critical evacuation roadways and areas with highest wildfire risk.

6-P.66 Provide fire hazard education and fire prevention programs to Carlsbad residents and businesses with targeted outreach to vulnerable populations and occupants of Moderate, High, and Very High Fire Hazard Severity Zones neighborhoods and/or single access neighborhoods.

6-P.67 Prioritize engagement with single access neighborhoods to encourage home retrofits to meet current standards on structure hardening and road standards, proactively enforce defensible space standards, and conduct emergency preparedness trainings.

6-P.68 Continue to maintain and update the city's Water Master Plan to identify and secure resources to meet future fire suppression needs and require future development to provide the water system improvements necessary to meet their demands.

6-P.69 Continue to maintain/contribute to updates to the Urban Area Security Strategy and the MJHMP to identify and prepare for future emergency service needs. For fire preparedness, continue to prepare a Standards of Coverage study to evaluate risks and prepare recommendations to mitigate those risks.

Emergency & Evacuation Preparedness

6-P.70 Implement and maintain the City of Carlsbad Emergency Operations Plan, the Multi-jurisdictional Hazard Mitigation Plan (MJHMP), and other relevant emergency plans, policies, and procedures.

6-P.71 Promote public awareness of potential natural and man-made hazards, measures that can be taken to protect lives and property.

6-P.72 Inform the public and contractors of the danger involved and the necessary precautions that must be taken when working on or near pipelines or utility transmission lines.

6-P.73 Ensure all new development complies with all applicable regulations regarding the provision of public utilities and facilities.

6-P.74 Maintain roadways that are likely to function as key evacuation routes.

6-P.75 Provide resources to City of Carlsbad staff regarding appropriate emergency preparedness and response activities as well as designed roles and responsibilities as Disaster Service Workers. Conduct routine trainings for all-hazards emergency preparedness and response.

6-P.76 Facilitate restriction of parking, construction permits, or right-of-way encroachment permits on high fire days in

neighborhoods in and near fire hazard zones and along critical evacuation routes.

6-P.77 Facilitate restriction of parking, construction permits or right-of-way encroachment on days with potential storm surges, atmospheric rivers, and king tide days in neighborhoods in and near flood hazard zones and along critical evacuation routes.

6-P.78 Develop and maintain emergency evacuation capabilities in conjunction with regional partners and regional plans such as the San Diego County Emergency Operations Plan.

6-P.79 Continue to communicate to the public on essential resources and procedures through a variety of communication tools and in multiple languages on topics including:

- Education on the California Standard Statewide Evacuation Terminology.
- Emergency evacuation checklists for residents.
- Creation and education of the public on evacuation maps.
- Available transportation services.
- Evacuation shelter and support service options.

Extreme Heat, Air Quality, and Drought

6-P.80 Protect vulnerable natural and recreational habitats and parks impacted by extreme heat through expansion of large continuous greenspaces wherever possible for greater cooling magnitude and extent. Include:

- A mix of drought tolerant and native habitat types for greatest cooling benefits.
- Mitigation of risk of dried out vegetation and wildfire risk through drought tolerant and wildfire resilient landscaping on private property.
- Facilitate mitigation projects through Carlsbad Habitat Management Division

6-P.81 Identify opportunities and expand the City's Landscape Manual to increase urban tree canopy and maintenance projects in coordination with existing efforts including the adopted Community Forest Management Plan.

6-P.82 Coordinate with San Diego County Public Health Services and local community organizations to establish extreme heat, drought, and air quality monitoring systems and develop accessible community education resources to prepare community members for increase extreme heat events and ambient air pollution.

6-P.83 Seek grant funding to pilot a project to install a cool roof on a city facility or cool pavement as part of a roadway project to showcase benefits to community members and local builders.

6-P.84 Encourage weatherization retrofits of private properties and retrofit all critical facilities with adequate cooling and air filtration in conjunction with the Carlsbad Climate Action Plan. Partner with the Home Energy Score Assessment program to facilitate retrofits.

See also policies in the Sustainability Element and Open Space, Conservation, and Recreation Element for policies related to Mitigating Drought, Urban Heat, and Green Infrastructure

Climate Change Governance Capacity

6-P.85 Broaden functions of cool zones to address a greater variety of needs as resilience hubs facilitating health, food, medical, and emergency services during climate hazards such as extreme heat events, flooding, wildfires, and poor air quality events.

6-P.86 Seek funding to plan and implement microgrids, cool roofs, resilience hubs, and other similar technology in areas with vulnerable populations.

6-P.87 Explore a climate equity analysis to prioritize programs that ensure the benefits of Environmental Sustainability programs are equitably distributed and prioritized to those most in need.

6-P.88 Distribute information on climate change impacts to the entire community with adapted communications for vulnerable populations, including but not limited to actions they can take to reduce exposure to unhealthy conditions associated with flood damaged properties, extreme heat, and bad air quality days. Increase the capacity/resilience of these populations by ensuring they have a role in decision-making surrounding climate change in their communities

6-P.89 Expand the resilience of new and existing critical buildings and infrastructure to function properly while subject to increased climate hazard frequency such as flooding, extreme heat, regional wildfires, and landslides.

6-P.90 Partner with utility companies and/or community choice energy entities to improve grid resilience and backup power for the community including but not limited to utility and/or community choice energy entity activities that seek to:

- Harden vulnerable overhead lines against winds and wildfires;
- Protect energy infrastructure and increase redundancy of energy storage and distribution systems in surrounding hazard zones for wildfire;

- Invest in sustainable power sources to provide redundancy and continued services for critical facilities during periods of high demand during extreme heat events; and
- Continue exploring the feasibility of installing microgrids, battery storage, or other local energy storage options.

6-P.91 Develop a checklist for adaptation-based design features and assessment of needed retrofits for critical facilities.

See also policies in the Sustainability Element related to Climate Change

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