



6. ENVIRONMENTAL RESOURCES & HAZARDS

As an oceanfront community, the Planning Area possesses a number of cultural and biological assets as well as environmental hazards associated with the Bay Area coast. This section documents the environmental context and provides an overview of various cultural and historic resources, biological resources, hydrology, geology and seismicity, climate change, and other hazards that may be present within the Planning Area.

6.1 Weather and Climate

OVERVIEW

Pacifica enjoys a moderate climate with an average temperature of 56 degrees, ranging between an annual high temperature of 63 degrees and low of 48 degree. The summer months are generally warmer and dryer, with an average high temperature of 70 degrees and averaging 0.2 inches of rain, while the winter and spring months are generally colder and wetter, with an average high temperature of 57 degrees and 5.0 inches of rain. Pacifica's coastal fog and average annual rainfall of 30 inches reflect a climate more similar to the Pacific Northwest than other coastal communities further south along the California coast. Lower temperatures, heavy fog, and wet winters could be a consideration for land use and architectural features, especially in the Planning Area, which experiences slightly lower temperatures than the City as well as year-round fog. Nevertheless, outdoor activities like the golf course, coastal access and trail system, fishing, and surfing opportunities found within Pacifica and the Planning Area are enjoyed frequently.

6.2 Cultural Resources

HISTORIC OVERVIEW

Before European settlement, Pacifica was home to the Ohlone people for thousands of years. Pacifica remained a mainly agricultural and undeveloped area until the construction of the Ocean Shore Railroad in 1905. The railroad stimulated development of small coastal communities including Edgemar, Vallemar, Sharp Park, Pedro Point, and Rockaway Beach. These communities, together with Pacific Manor, Westview, Fairway Park, and Linda Mar, were incorporated in 1957 as the City of Pacifica. After a period of rapid growth in the 60s and 70s, growth slowed in the following decades, owing to the scarcity of developable land and infrastructure constraints.

HISTORIC RESOURCES

The Planning Area features one site listed on the National Register of Historic Places: the Little Brown Church, located at 1850 Francisco Boulevard. According to the Pacifica Historical Society, the Little Brown Church was originally built in 1910 as a Presbyterian church and was one of the earliest buildings in what was once known as Salada Beach, now known as Sharp Park. In 2005, the Pacifica Historical Society restored and incorporated the Little Brown Church into the Pacifica Coastside Museum, which opened in 2015. The Church is leased from the City. The Historical Society also owns the last remaining car from the Ocean Shore Railroad, Car 1409 and has stated interest in moving the railcar next to the Church.

While the Little Brown Church is the only site eligible for the National Register of Historic Places, the City of Pacifica has nine local historical landmarks as designated in the City's Municipal Code, three of which are within the Planning Area and one adjacent, as shown in Figure 6-1. A local landmark that is not officially designated but is worth noting is the house known as Pacifica Castle, or more recently, Sam's Castle. The house, perched above the Sharp Park neighborhood and adjacent to the Planning Area, was built in 1908 in the style of a Scottish castle. Now owned by a foundation, the house is used for events and occasionally open to the public. Winters Tavern is another local landmark without an official designation, but is estimated to have been built in the 1950s. Approximately seven to eight

percent of the housing stock in the Planning Area was built before 1939 or earlier and could potentially meet criteria for historic landmark designation.

Following are images and description of the other four historic landmarks found in or adjacent to the Study Area, shown in Figure 6-1:



Anderson's Store (220 Paloma Avenue). Built in 1907, Anderson's Store was the first general store and telephone switchboard for the area, the control point for the eater supply for the neighborhood, and the first source of gasoline for automobiles using a hand-crank pump.



San Pedro Schoolhouse/Pacifica City Hall (170 Santa Maria Avenue). Built in 1914, this schoolhouse historically served children living on the coast. After a new school was built in Sharp Park and Pacifica was incorporated as a City in 1957, the building was donated by real estate agent Ray Higgins to serve as the new City Hall.

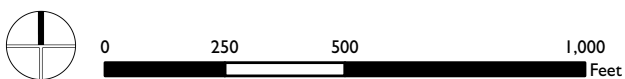


Private residence (185 Carmel Avenue). Designated as a Historic Landmark in 1985, this home appears to be built in coastal cottage style with a pitched gable roof, wooden shingles and wood lap siding.



Sharp Park Golf Course and Clubhouse (2600 Francisco Boulevard). Located to the south just outside of the Planning Area, the Golf Course dates to 1929 and was designed by famed golf course architect Alister MacKanzie in the classic "Links" style near the ocean and sand dunes. The Clubhouse, built in 1932, includes a bar, restaurant, and golf shop.

Figure 6-1: Sharp Park Cultural Resources



6.3 Biological Resources

VEGETATION AND HABITAT

Pacifica's varied topography creates a range of habitats in the city, including intertidal areas, beaches, ridges, coastal headlands, woodlands, grasslands, scrub, creeks, and wetlands. Figure 6-2 shows sensitive habitat and vegetation for the Planning Area. The beach at Pacifica Beach Park and the rest of the coastline is considered sensitive estuarine and marine wetland habitat.¹ Other than this area, most of the Planning Area is urbanized and there is little risk of disturbing existing natural habitat on land. However, pollution, contaminated runoff, and trash from urban uses may be inadvertently swept into the ocean, causing harm to the habitat. The Sharp Park Golf Course, while not directly in the Planning Area, is considered an environmentally sensitive habitat area, which means that any development along the southern border of the study area may be limited or require additional mitigation/impact studies.

SPECIAL STATUS SPECIES

Several species known to occur in the project vicinity are accorded "special-status" due to their recognized rarity or vulnerability to various causes of habitat loss or population decline. Some of these receive specific protection, as defined in federal or State endangered species legislation. Other species have been designated as "sensitive" based on adopted policies and expertise of state resource agencies or organizations with acknowledged expertise, or policies adopted by local governmental agencies in order to meet local conservation objectives. A variety of special status species have the potential to be found in or near the Planning Area, including the San Francisco Garter Snake, the Bumblebee Scarab Beetle, the San Francisco Bay Spineflower, the Hoary Bat, and the Saltmarsh Common Yellowthroat. Figure 6-3 displays known records of the occurrence of special-status species in or near the Planning Area.

The San Francisco Garter Snake is a federally listed endangered species, and its habitat area covers most of Pacifica. The federally listed threatened California Red-legged Frog may be found just outside the Planning Area along Paloma Avenue. In these areas, project-level review and in-depth biological analysis would be required to study any potential impacts from development.

¹ U. S. Fish and Wildlife Service. National Wetlands Inventory website. U.S. Department of the Interior, Fish and Wildlife Service, Washington, D.C., <http://www.fws.gov/wetlands/>, 2019.

Figure 6-2: Sensitive Habitats

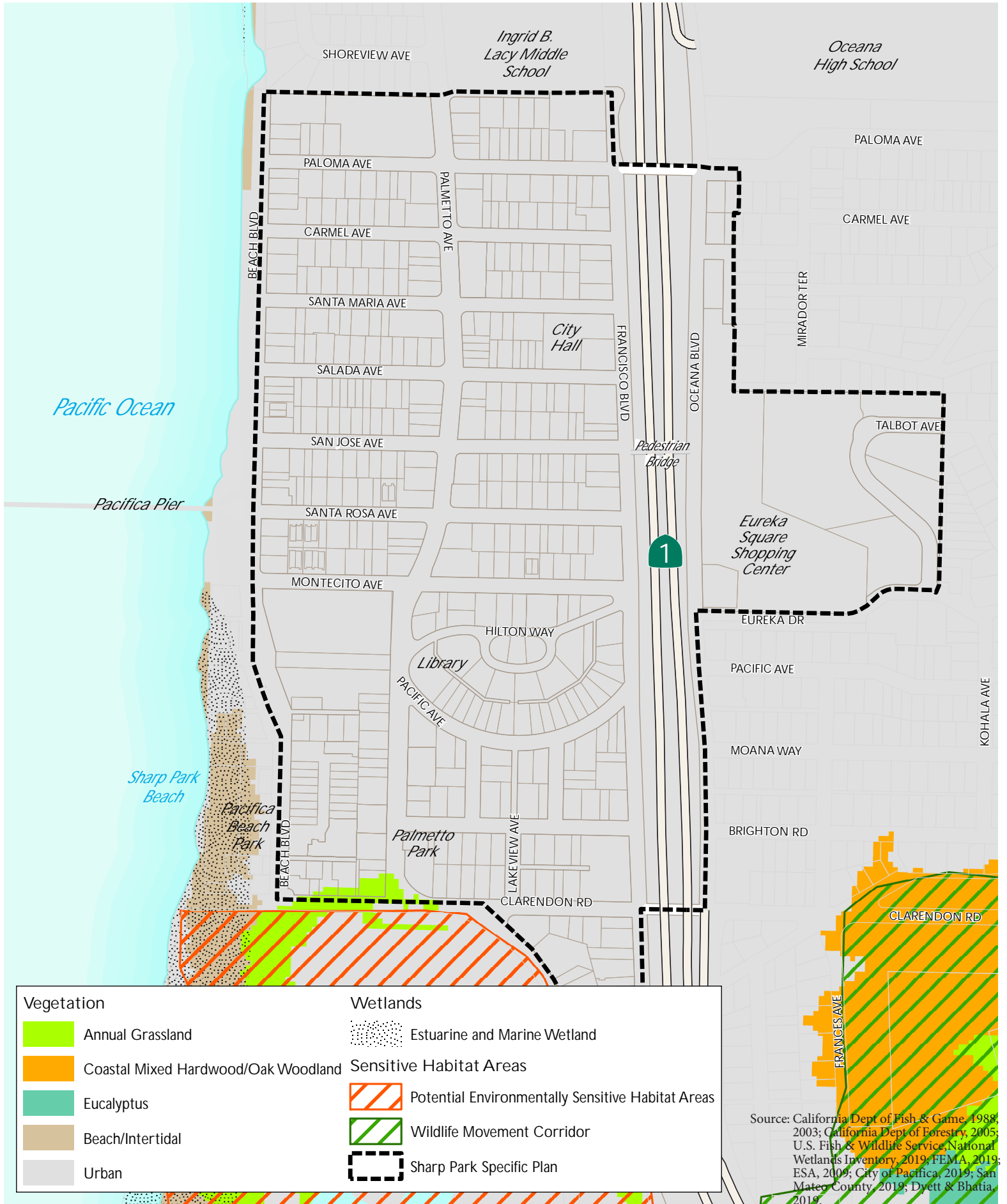
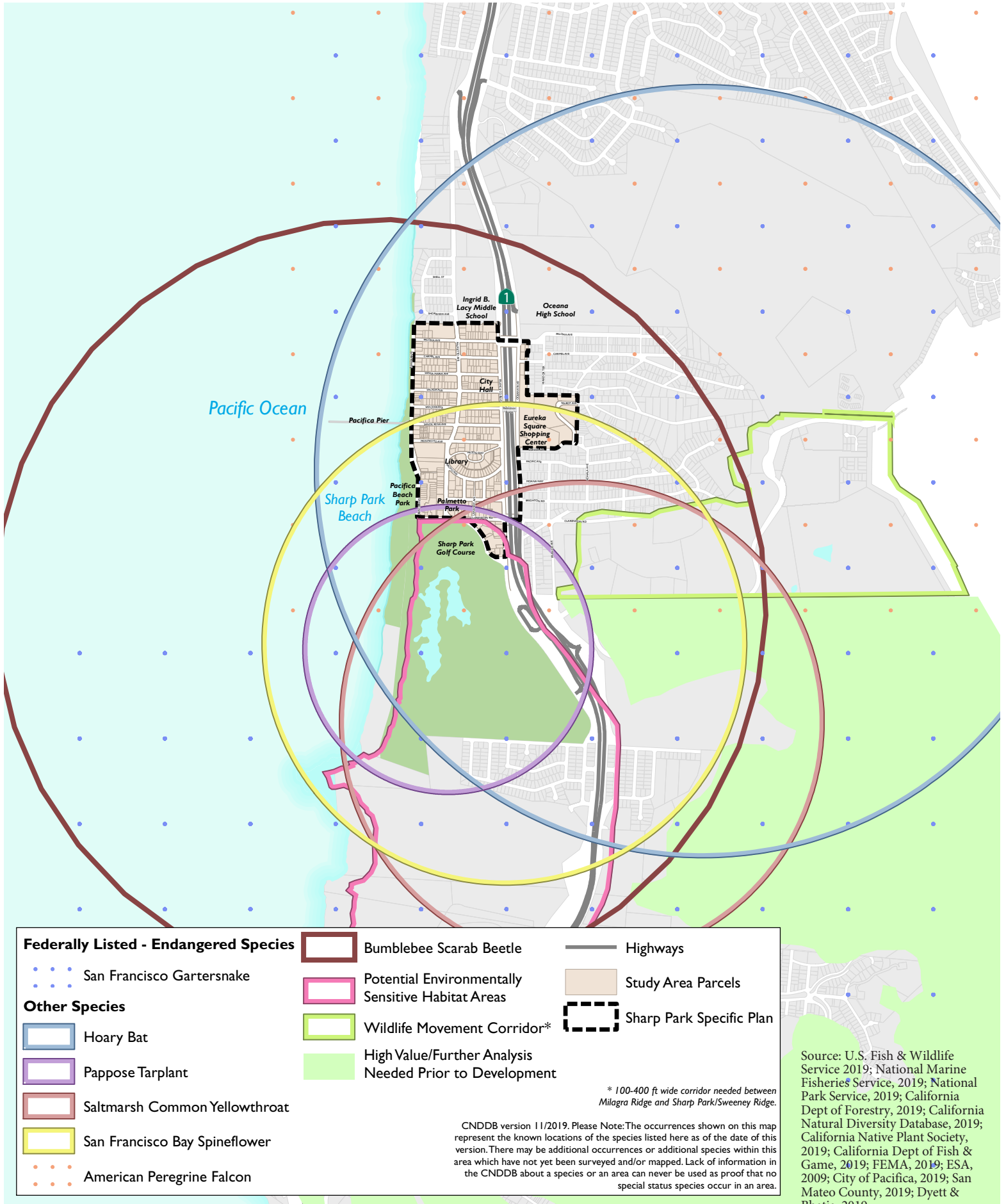


Figure 6-3: Sharp Park Sensitive Species



6.4 Environmental Hazards

REGIONAL GEOLOGY

The City of Pacifica lies within the Coast Ranges geomorphic province, which spans the Pacific Ocean and the Great Valley provinces (Sacramento and San Joaquin valleys) and stretches from the Oregon border to the Santa Ynez Mountains near Santa Barbara.² Modern seismic activity within the Coast Range continues to be associated with movement along the San Andreas system of faults.

Seismicity and Seismic Hazards

The San Andreas Fault is the closest active fault to the Planning Area, transecting the northeastern tip of Pacifica and crossing the cities of South San Francisco and San Bruno.³ Other nearby active faults are the San Gregorio and Hayward faults. These three faults pose the greatest threat of significant damage to the Planning Area and have experienced movement within the last 150 years.⁴

Ground Shaking

Ground movement during an earthquake can vary depending on the overall magnitude, distance to the fault, focus of earthquake energy, and type of geologic materials. The composition of underlying soils, even those relatively distant from faults, can intensify ground shaking. The strongest ground shaking anticipated to occur in Pacifica would come from the San Andreas Fault and could cause strong to very violent ground shaking.

Liquefaction

Liquefaction is the condition by which saturated soils lose cohesion during seismic events and settle, lose stability, or amplify the effects of groundshaking. Soil susceptible to liquefaction includes loose to medium dense sand and gravel, low plasticity silt, and some low-plasticity clay deposits. The potential for liquefaction in the Planning Area is mapped as very low to very high, depending on location, with highest risk areas in the southern portion near Lakeside Avenue and Clarendon Road, as shown in Figure 6-4.

² A geomorphic province is an area that possesses similar bedrock, structure, history, and age. California has 11 geomorphic provinces (CGS, 2002).

³ An “active” fault is defined by the State of California as a fault that has had surface displacement within Holocene time (approximately the last 11,000 years)

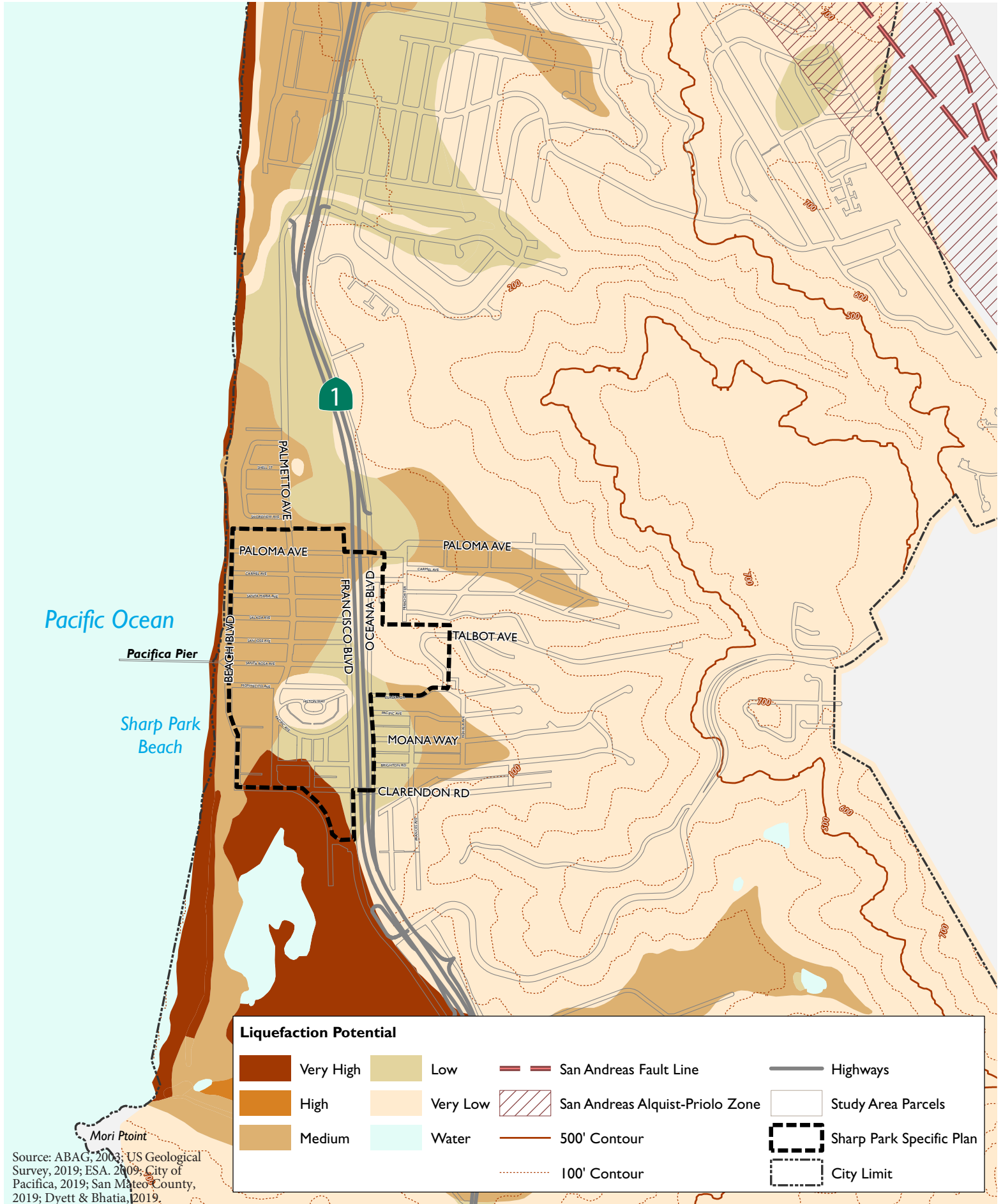
⁴ A strike-slip fault is a fault on which movement is parallel to the fault’s strike or lateral expression at the surface (Bates and Jackson, Glossary of Geologic Terms, second edition, 1984).

Landslides

Figure 6-5 identifies the relative likelihood of landslides in the Planning Area.⁵ Areas mapped as “Few Landslides” contain few, if any, large mapped landslides, but locally contain scattered small landslides and questionably identified larger landslides; defined in most of the region by excluding groups of mapped landslides. “Not Landslide Prone” refers to areas of gentle slope at low elevation that have little or no potential for the formation of slumps, translational slides, or earth flow except along stream banks and terrace margins; defined by the distribution of surficial deposits. Most of the West Sharp Park neighborhood is on relatively flat land and is not prone to landslides. However, across Highway 1, Eureka Square Shopping Plaza and apartments along Talbot Avenue have landslide potential. All of the coast in the Planning Area is subject to severe beach and cliff erosion, described in more detail in the next section of this chapter, “Coastal Hazards.”

⁵ USGS. Open File Report 97-745, San Francisco Bay Landslide Folio, <http://pubs.usgs.gov/of/1997/of97-745/>, 1997.

Figure 6-4: Sharp Park Liquefaction Zones and Fault Lines

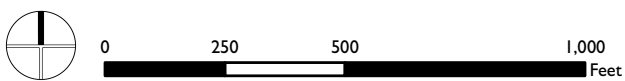


0 750 1,500 3,000 Feet

Figure 6-5: Sharp Park Slope Failure



Source: Pacific Institute, 2009; FEMA Revised DFIRM, 2017; US Geological Survey, 1997; ESA, 2009; City of Pacifica, 2019; San Mateo County, 2019; Dyett & Bhatia, 2019.



COASTAL HAZARDS

Sea Level Rise

As a coastal city, Pacifica is susceptible to significant impacts due to sea level rise caused by climate change. High tides and severe storms will challenge and change Pacifica’s existing shoreline and could affect existing coastal developments, coastal habitats, coastal access and recreation.

To date, there have been a variety of studies and analyses conducted on the threat of coastal flooding and erosion to the city and its residents, including the Sea Change San Mateo County (2017), Our Coast Our Future (2016), Pacific Institute Study (2009), and Coastal Regional Sediment Management Plan (Draft 2015).

More recently, a Sea Level Rise Vulnerability Assessment (2018) and a Sea-Level Rise Adaptation Plan (2018) were completed for the City of Pacifica. The Vulnerability Assessment used the best available science, or most recent peer-reviewed science reasonably validated by qualified experts in the scientific community, to determine the potential exposure of assets to flooding and erosion hazards under sea level rise scenarios selected for study, shown in Table 6-1 below.

Table 6-1: Sea Level Rise Projections for Pacifica

| <i>Year</i> | <i>Low (17% Chance)</i> | <i>Med-High (0.5% chance)</i> | <i>Extreme (n/a)</i> |
|-------------|-------------------------|-------------------------------|----------------------|
| 2050 | 1 ft. | 2 ft. | - |
| 2100 | 3 ft. | 6 ft. | 10 ft.* |

* SLR of 6 ft. at 2075 was considered in place of 10 ft. at 2100 to assess potential impacts under the Extreme scenario. This was recommended by the technical consultant, ESA, because of the lack of erosion and flooding data for 10 ft. of SLR.

Hazards identified as part of the Vulnerability Assessment for the Sharp Park, West Fairway Park and Mori Point subarea include wave overtopping and run-up, flooding due to sea level rise and flooding due to significant rainfall events or coastal storms, and coastal erosion. Impacts of these hazards are shown in Figure 6-6 and described in the following sections of this chapter.

Drawing upon Vulnerability Assessment findings, the 2018 Adaptation Plan was prepared to inform City decision making about a variety of sea level rise adaptation policy options to address these hazards, which were then evaluated and selected by Pacifica City Council. These decisions informed general and subarea-specific Coastal Resilience policies in the City’s Local Coastal Program.

Shoreline Protection and Wave Overtopping

North of the Planning Area, private homes are armored by rock revetments and gunite covering the bluff face. A seawall/revetment structure (which ranges from 25 to 31 feet tall north of the pier, and 22 to 24 feet tall south of the pier) protects the pedestrian walkway, road and residential properties along Beach Boulevard from its northern terminus at Paloma Avenue to Clarendon Road. The structure has required maintenance on several occasions to repair areas where beach erosion has undermined the structure. The backshore along the Sharp Park, West Fairway Park and Mori Point sub-area is low enough such that assets and property are subject to wave run-up and overtopping under

existing conditions. The City of Pacifica is in the process of evaluating options to fund, design, permit, and construct additional structural protections for portions of the subarea. Beyond the south end of the seawall, the City currently manages a sand berm to limit wave run-up and overtopping at the end of Clarendon Road. South of Clarendon, the backshore consists of an earthen berm levee managed by the City and County of San Francisco that spans south to the headlands of Mori Point, and which was constructed in 1980 to protect the Sharp Park Golf Course. These shoreline protections are shown in Figure 6-6.

Hydrology and Flooding

While there are no existing creeks or bodies of water within the Planning Area, it can experience flooding, typically caused by some combination of high tides, large wind-driven waves, or storm surge. Areas mapped in Figure 6-7 as prone to coastal flooding include the low-lying areas of Sharp Park Beach, the coastline along Beach Boulevard, and the edge of Beach Boulevard.

The only section of coastline protected by levees is the Sharp Park Golf Course area and Laguna Salada, which drains a 1,200-acre watershed. Waves overtopping the levee along the golf course resulted in significant flooding in 1983 and 1986.⁶ Since that time, the levee has been reinforced, reducing overtopping risk in the area.

A pump station is used to manage the water level in Laguna Salada, but pumping is restricted to maintain minimum water levels in order to protect habitat in Laguna Salada, and drainage from Sanchez Creek and Laguna Salada to the ocean can be insufficient to prevent lowland flooding during high tide/high flow events. The City also has a portable pump station deployed along Clarendon Road to pump stormwater from swales out to Clarendon Road and over the beach berm to the ocean. If the sea level rises enough during a rainstorm, inundation and flooding due to the backup of stormwater channels and outfalls will have a significant impact on the lower part of the Planning Area.

Tsunami

A tsunami is a wave generated by abrupt movement of the seabed, which can occur as an earthquake or after a significant landslide. Coastal flooding, potentially severe structural and environmental damage, and threats to human health and safety can occur as a result of a tsunami. Tsunami hazards occur for the low-lying portions of Pacifica, which include a significant portion of the Planning Area, and generally coincident with the coastal flooding zones discussed above. Figure 6-7 shows the tsunami evacuation areas for the Planning Area.⁷

The most significant recorded tsunami wave that reached Pacifica was caused by the 1964 earthquake in Prince William Sound, Alaska. This event was a 9.2 magnitude earthquake that resulted in a 4.5 foot (1.37 m) run-up at Pacifica. The study resulted in an estimate of tsunami run-up heights and frequencies ranging from 0.16 feet (0.05 m) for the 5-year (20 percent annual chance) event to 4.2 feet (1.27 m) for the 500-year (0.2 percent annual chance) event.⁸

⁶ PWA, 1992.

⁷ California Department of Conservation. San Mateo County Tsunami Inundation Maps. <https://www.conservation.ca.gov/cgs/tsunami/maps/san-mateo>. Accessed 9/2019.

⁸ Ibid.

The City of Pacifica has identified tsunami hazards in their local annex to the Local Hazard Mitigation Plan for San Mateo County.⁹ As part of an earlier program to prepare for a tsunami event, the City of Pacifica installed a tsunami warning system, consisting of three solar powered alarm towers. Two are in the Sharp Park neighborhood and one is located at Rockaway Beach. This system links into a San Mateo County alert system that can also reach email and cell phones.

Coastal Erosion

Erosion is the wearing away of soil and rock by processes such as mechanical or chemical weathering; mass wasting; and the action of waves, wind, and underground water. Excessive soil erosion can eventually lead to damage of building foundations and roadways. According to a study done by the U.S. Geological Survey following the heavy winter storms of 1982–1983, the entire coastline of San Mateo County contains areas susceptible to severe erosion and slope failure.¹⁰ This study lists specific impacts to Pacifica’s coast, which include wave surging over the seawall, cliff erosion, and severe beach erosion.¹¹ In 2009-2010, erosion caused by winter storms resulted in evacuation and eventual City-mandated demolition of apartment buildings on the 300 block of Esplanade Avenue, 1.4 miles north of the Planning Area.

Figure 6-8, the Coastal Vulnerability Zone Map, shows the extent of projected erosion in the Planning Area, evaluating using Pacific Institute coastal erosion maps (2009) and Draft San Francisco Coastal Regional Sediment Management Plan (CRSMP, 2015.)¹² While the erosion scenario does not account for existing shoreline protection structures, the map highlights the importance of the existing structures and the vital need for them to be maintained to protect those vulnerable areas. These maps are not a substitute for site-specific erosion analyses but do show important information necessary to make general planning-level decisions about the vulnerability of portions of the Planning Area. To confirm vulnerability potential, further studies should be performed for sites in the Planning Area.

⁹ City of Pacifica, Local Hazard Mitigation Plan Annex: City of Pacifica, Association of Bay Area Governments Local Hazard Mitigation Plan, 2005.

¹⁰ USGS, Lajoie, Kenneth and Mathieson, Scott, 1982-1983 Coastal Erosion: San Mateo County, California,

¹¹ USGS. 1982-83 El Niño Coastal Erosion Map: 3 of 26 Sharp Park. Accessed 9/2019.






https://archive.usgs.gov/archive/sites/walrus.wr.usgs.gov/el_nino/SMCO-coast-erosion/03sharp_e.html

¹² PWA 2009; Pacific Institute 2009

Figure 6-6: Sharp Park Coastal Protection Structures



Coastal Structures

-  Coastal Armor
-  Levee
-  Sharp Park Specific Plan
-  Highways
-  Study Area Parcels

Source: ESA, 2009; City of Pacifica, 2019; San Mateo County, 2019; Dyett & Bhatia, 2019.

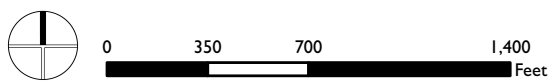


Figure 6-7: Sharp Park Hydrology and Floodzones

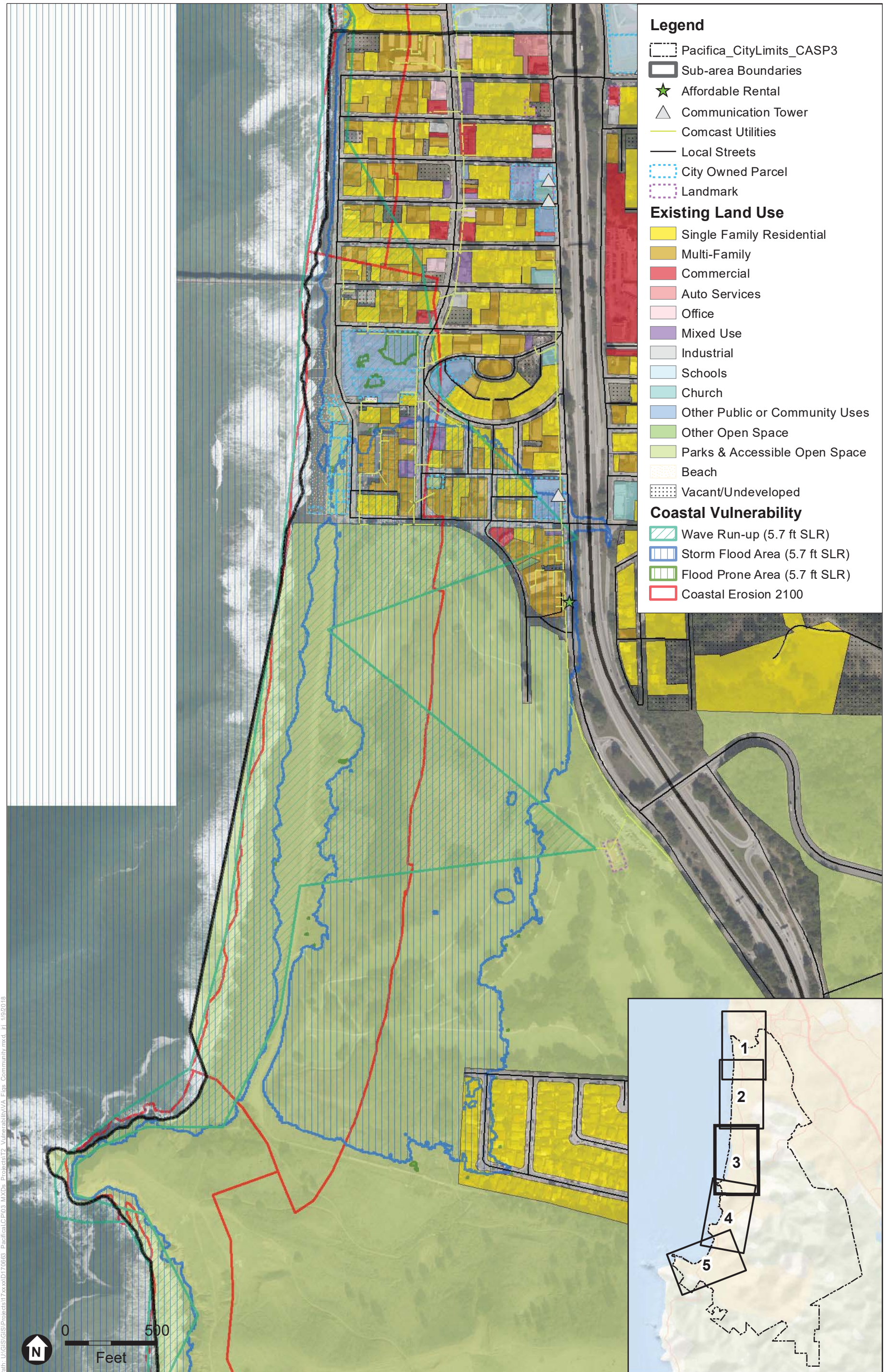


| Flood Zones | | Watershed | | Other Features | |
|-------------|-------------------------------------|-----------|---------------|----------------|--------------------------|
| | 0.2% Annual Chance Flood Zone | | Sanchez Creek | | Highways |
| | 1% Annual Chance Flood Zone | | Unnamed | | Study Area Parcels |
| | 1% Annual Chance Coastal Flood Zone | | Creek | | Sharp Park Specific Plan |
| | Tsunami Evacuation Area | | | | |

Source: Pacific Institute, 2009; FEMA, 2017; ABAG, 2009; US Geological Survey, 2009; ESA, 2009; City of Pacifica, 2019; San Mateo County, 2019; Dyett & Bhatia, 2019.



Figure 6-8: Coastal Vulnerability Area Map



Path: U:\GIS\Projects\T2\000\0170603_Pacific\CP03_MXD\Projects\T2_Vulnerability\VA_Figs_Community.mxd, #1, 1/9/2018

SOURCE: San Mateo County 2017 Imagery; City of Pacific and SMC Assets (2017); Pacific Institute Erosion (2009); OCOF Coastal Flooding (2014)

Disclaimer: This map is not detailed to the parcel-scale and should not be used for navigation, permitting, regulatory, or other legal uses. The erosion scenario does not account for shoreline protection. Coastal Vulnerability projections were sourced from publicly available data and existing models not created by the City of Pacifica.

Coastal Vulnerability Area Map
Sharp Park, West Fairway Park, and Mori Point

6.5 Other Hazards

FIRE HAZARDS

Fire hazards in Pacifica include both urban and wildland fires. Urban fires involve the uncontrolled burning of built structures due to human-made causes; wildland fires affect grassland, forest, and brush (and the structures on them), and can result from either human or natural causes. The city of Pacifica has a substantial risk of wildland fires, with many areas of high and very high threat within the Planning Area. The entirety of the Planning Area faces moderate risk of wildfire. The City's main challenges regarding fire hazards are:

- ***Actively Managing the Urban-Wildland Interface.*** Pacifica's residents enjoy close contact with open ridges and woodlands. This brings with it the risk of proximity to wildland fires. Preparedness is essential, and the North County Fire Authority's fire prevention activities, especially its Vegetation Management Program, are important.
- ***Maintaining and Enhancing Evacuation Routes.*** It is critical that road capacity exists for local residents, workers, and visitors to evacuate in case of an environmental disaster, including fire.

Urban Fires

Urban fires are fires that begin in a building in urban centers. They are typically localized but have the potential to spread to adjoining buildings. The risk of urban fires is highest where single-family homes, multifamily residences and business facilities are clustered close together, increasing the possibility of rapid spread to an adjoining building. The risk to life and property can be reduced by adopting and funding adequate levels of fire protection and ensuring new buildings are built to include fire resistive features which conform to modern fire and building codes.

Wildland Fires

Wildland fires are fires that start in a wooded or undeveloped areas. Their potential for damage is dependent on the extent and type of vegetation, known as surface fuels, as well as weather and wind conditions. Wildland fires occur infrequently but typically cause more damage than urban fires.

The California Department of Forestry (CDF, or "Calfire") also designates land as either a State or Local Responsibility Area (SRA and LRA), based on population density, land use, and land ownership. The Planning Area is a designated LRA.

HAZARDOUS MATERIALS

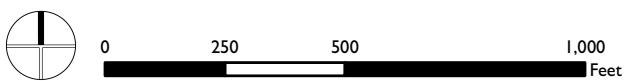
Within the Planning Area, the only site currently undergoing remediation for hazardous materials is an auto body shop at 1518 Francisco Boulevard.¹³ It is listed as an open-verification monitoring Leaking Underground Storage Tank (LUST) cleanup site by the State Water Resources Board for potential gasoline contaminants.¹⁴ Contamination does not render these sites unusable but may require time and funding for cleanup. A few sites in Planning Area have been contaminated in the past but are now remediated.

Disturbance of a previously contaminated area through grading or excavation operations could expose the public to health hazards from physical contact with contaminated materials or hazardous vapors. Areas where historic or ongoing activities have resulted in the known or suspected release of hazardous materials to soil and groundwater, and where current clean-up activities monitored by the State Water Quality Control Board or the California Department of Toxic Substances are ongoing, are listed in Figure 6-9.

¹³ CalEPA Cortese List Data Resources. <https://calepa.ca.gov/sitecleanup/corteselist/> accessed 9/2019.

¹⁴ State Water Resources Control Board Geo Tracker. <https://geotracker.waterboards.ca.gov/> accessed 9/2019.

Figure 6-9: Sharp Park Hazardous Material Sites



6.6 Planning Issues and Implications

- The Planning Area is home to many treasured cultural and historic resources. Opportunity exists to maintain, enhance, and promote these historic resources as community amenities and draws for tourism.
- Because a variety of special status species may exist throughout the Planning Area, careful review and environmental analysis will need to be conducted during the site-specific planning process. The legal protections given to these species to ensure their survival will need to be taken into consideration when planning new development.
- Like most of the Bay Area, the Planning Area is vulnerable to earthquakes and seismic hazards. The southern portion of the Planning Area could be highly susceptible to liquefaction, and Eureka Square Shopping Center and apartments along Talbot Avenue could be prone to landslides. Site-specific geotechnical investigations can confirm the presence of liquefiable materials and can provide various foundation design or slope stabilization criteria to mitigate the potentially damaging effects.
- The Planning Area faces significant coastal hazards, including flooding due to sea level rise, coastal erosion, and tsunamis. Flooding at the Sharp Park Golf Course (SPGC) affects residences directly north of the course. The Specific Plan should implement Coastal Resiliency strategies and policies that are consistent with the Pacifica General Plan and the Local Coastal Program, particularly the policies for the Sharp Park, West Fairway Park and Mori Point subarea. Development in the Sharp Park area will face the challenge of balancing coastal protection and future effects due to climate change with preservation of Pacifica's cultural and economic assets.

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