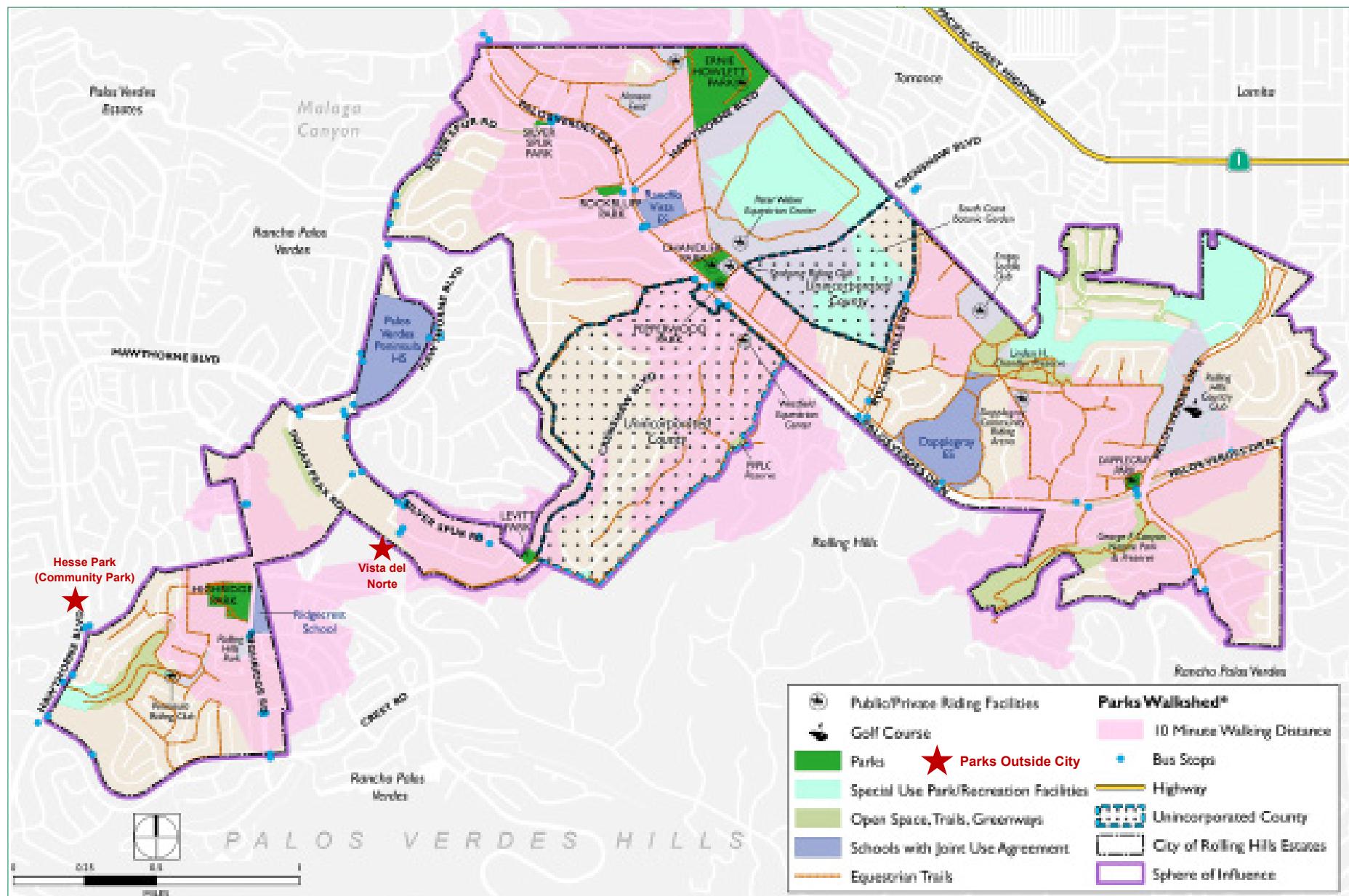


**Figure 6-4 Selected Parks Outside City**

Source: City of Rolling Hills Estates, 2017; Los Angeles County GIS Data, 2017

\*Note: Walksheds are recalculated for mini, neighborhood and community parks, George F. Canyon Nature Park & Preserve, Linden H. Chandler Preserve, and PVPLC Reserve. For special use parks and other recreational facilities, the service is citywide.





## **Proposed Facilities**



# Proposed Facilities

Generally, the City Planning Area is well served by parks and recreation facilities; however, there are several areas that are not currently served by City parks. To address this, the City has planned two new mini-parks for development, shown in

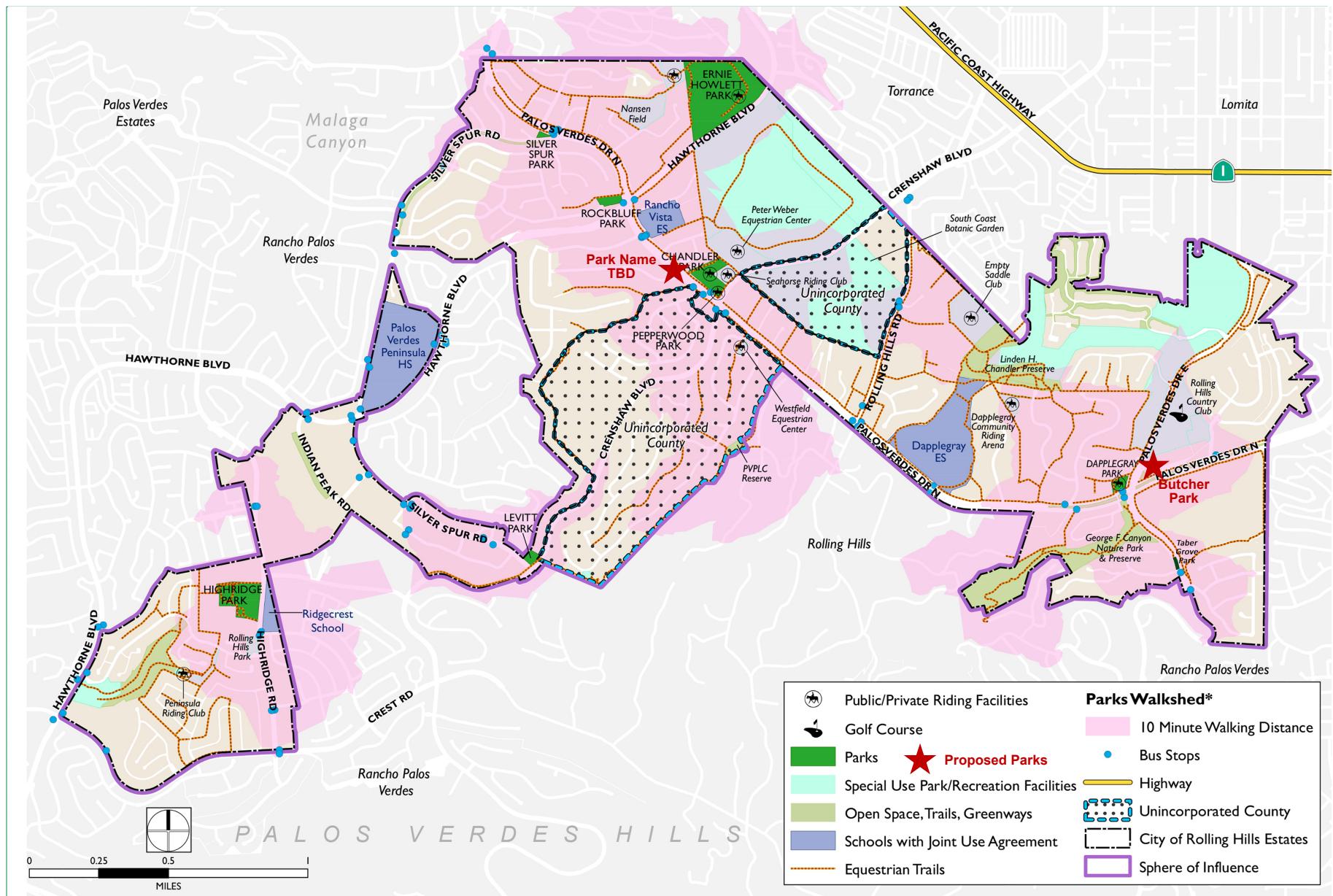
**Figure 6-5.** These facilities will help satisfy the need for new park facilities within a 10-minute walkshed. These two proposed quarter-acre pocket parks will be located at:

Name	Location	Amenities	Status
Butcher Park	Northeast corner of Palos Verdes Drive North and Palos Verdes Drive East	Passive park with benches, climbing features, and swings	To be constructed by the summer of 2023
Name - to be decided	Southside of Palos Verdes Drive North just east of Ranchview Road	Passive park with no structures	To be constructed by the end of 2023

Source: City of Rolling Hills Estates, 2021

In addition, the Commercial District Vision Plan, as described in the Land Use Element, envisions plaza spaces/gathering areas within a five-minute walking distance. The Brick Walk property along Deep Valley Drive is also envisioned to be developed with significant green space due to development limitations posed as a result of the geological configuration of this property.



**Figure 6-5 Proposed New Parks**

Source: City of Rolling Hills Estates, 2017; Los Angeles County GIS Data, 2017

Note: \*Walksheds are recalculated for mini, neighborhood and community parks, George F. Canyon Nature Park & Preserve, Linden H. Chandler Preserve, and PVPLC Reserve. For special use parks and other recreational facilities, the service is citywide.



## **Goals, Policies, & Implementation Measures**



# Goals, Policies, & Implementation Measures

This section establishes the goals, policies, and implementation measures for the Open Space and Recreation Element of the General Plan for Rolling Hills Estates. Goals, policies, and implementation measures are defined as:

- **Goals:** Topical statements of broad direction and philosophy
- **Policies:** Reinforcing statements of the overarching goals of the General Plan
- **Implementation Measures (IM):** Action-oriented statements to help Rolling Hills Estates actualize their goals and policies



## Community Recreational Needs



<b>Goal 6.1</b>	<b>The City will provide for the recreational needs of residents of the community.</b>
<b>Policy 6.1.1</b>	<b>Explore opportunities to develop additional parks and recreational amenities to meet community needs.</b>
IM 6.1.1.1	Identify new sites for the development of mini-parks and neighborhood parks, especially in the underserved areas of the community.
IM 6.1.1.2	Develop a parks and recreation master plan for the community to identify land, programming, funding, and maintenance of existing and future facilities.
IM 6.1.1.3	Prioritize the development of a playground, skate park, dog park, and community gardens by incorporating these in existing park facilities or future parks.
<b>Policy 6.1.2</b>	<b>Provide open space and recreational facilities that cater to a variety of ages and abilities as well as increasing accessibility into the park system.</b>
IM 6.1.2.1	Develop recreation facilities that have multi-use capabilities when possible.
IM 6.1.2.2	Review and update the Municipal Code to incorporate universal design guidelines in the development of trails, parks, and public open spaces.

<b>Policy 6.1.3</b>	<b>Explore opportunities in commercial areas to create public open spaces that foster placemaking.</b>
IM 6.1.3.1	Review proposed subdivisions or larger development projects and streetscape projects to incorporate plazas, pocket parks, and parklets.
IM 6.1.3.2	Co-locate park and recreation facilities with other community-oriented spaces to the extent possible (such as the public library and other publicly accessible commercial areas) so that they may function as the “heart” of a community.
<b>Policy 6.1.4</b>	<b>Seek federal, state, or regional grants, and work with agencies, organizations, or individuals to acquire additionally identified parkland.</b>
IM 6.1.4.1	Identify a staff person or consultant who can evaluate the feasibility of obtaining grants and funding from public and private sources to develop new parks and recreational facilities.
IM 6.1.4.2	Develop a program to encourage property owners to work with the Pepper Tree Foundation and other similar organizations to donate or sell land to preserve or develop parks and recreational amenities.
IM 6.1.4.3	Develop plans for financing the acquisition of open space areas should they be placed on the market by current property owners.

## Existing Facilities



### Goal 6.2

**The City will maintain existing natural open spaces, parks, and recreational facilities.**



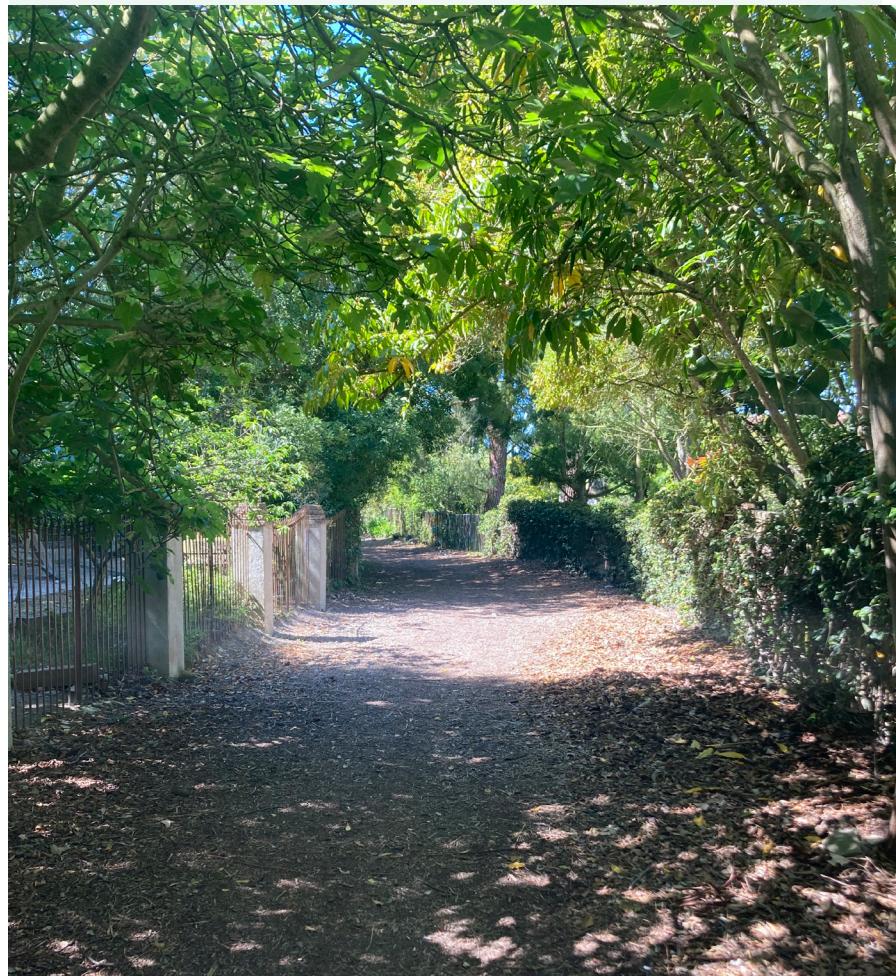
<b>Policy 6.2.1</b>	<b>Preserve natural open space areas to protect the local natural environment for present and future generations.</b>
IM 6.2.1.1	Implement the General Plan Land Use plan that depicts areas for preservation.
IM 6.2.1.2	Develop design guidelines for recreational facilities to respect and preserve the local natural environment as part of the park's master plan.
IM 6.2.1.3	Prioritize City parkland and City fields to use reclaimed/recycled water if and when it becomes available.
IM 6.2.1.4	Identify all recorded easements and examine the status of the easements.
<b>Policy 6.2.2</b>	<b>Strive to maintain or increase the current ratio of 6.7 acres of parkland for every 1,000 residents.</b>
IM 6.2.2.1	Ensure that any land set aside or dedicated for open space (public or private) has deed restrictions to certify that land is reserved for open space.
IM 6.2.2.2	Preserve and maintain the Peter Weber Equestrian Center at the current location.

## Promote Trails



### Goal 6.3

**The City will promote the use of trails for pedestrian, bicycle, and equestrian mobility.**



<b>Policy 6.3.1</b>	<b>Strive to create contiguous open space and multi-trail networks.</b>
IM 6.3.1.1	Review proposed subdivision developments, new construction, and additions to identify potential connections to the trail system.
<b>Policy 6.3.2</b>	<b>Preserve and promote the use of and access to equestrian trails in the City of Rolling Hills Estates.</b>
IM 6.3.2.1	Incorporate, to the extent feasible, equestrian access to places of interest such as parks, recreational areas, schools, and commercial areas as a part of a street project or future mobility plan.
IM 6.3.2.2	Include hitching posts for horses in new parks and explore opportunities to include hitching posts in existing parks that are connected with existing and proposed equestrian trails.
<b>Policy 6.3.3</b>	<b>Strive to keep the existing multi-use and equestrian trails well maintained for community use.</b>
IM 6.3.3.1	Work with property owners and community organizations to identify and rectify roadblocks in trail maintenance.
IM 6.3.3.2	Develop an education and resource packet for property owners and community organizations to enable them to maintain trails.

## Coordination with Neighbors



### Goal 6.4

**The City will work closely with neighboring jurisdictions and organizations to provide for the recreational needs of the community.**

#### Policy 6.4.1

Promote a cooperative, neighborly, and cultural community by encouraging recreational programs that stimulate, educate, and enrich the lives of residents.

##### IM 6.4.1.1

Continue to work with arts organizations to establish and promote arts and cultural activities in the City.

#### Policy 6.4.2

**Cooperate in sharing a Peninsula-wide system of parks and recreational facilities.**

##### IM 6.4.2.1

Work with neighboring jurisdictions to share the Peninsula-wide system of parks and recreation facilities.

##### IM 6.4.2.2

Work with neighboring jurisdictions to identify programs where joint use and cooperative agreements are possible.

#### Policy 6.4.3

**Encourage local citizen groups to participate in the planning, development, and maintenance of recreational facilities.**

##### IM 6.4.3.1

Establish an "Adopt-a-Park" program as a means for residents to provide equipment for existing and future facilities.



# SAFETY ELEMENT

7



ROLLING HILLS ESTATES - GENERAL PLAN 2040

WELCOME TO  
ROLLING HILLS  
ESTATES



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# Introduction



# Introduction

The Safety Element focuses on the safety and security of Rolling Hills Estates residents and businesses. The City strives to provide a safe and enjoyable environment for citizens; properly addressing and reducing risks associated with natural and human-induced hazards will further this goal. This information serves as a guide for hazard mitigation, emergency planning, and preparedness throughout the City's jurisdiction.

## Purpose

The purpose of the Safety Element is to identify potential hazards to the City of Rolling Hills Estates' jurisdiction, including the community's citizens, structures, public facilities, and infrastructure. By identifying local and regional hazards (including both natural hazards and man-made hazards), goals and policies can address public safety concerns unique to the City.

This Safety Element satisfies the requirements of State planning law and is a mandated component of the General Plan. Government Code Section 65302(g) establishes the required components of the Safety Element, which include the following topical areas:

- Wildland and urban fires
- Seismic hazards: ground shaking, surface rupture, ground failure, tsunami, seiche, and dam failure
- Slope instability: mudslides, landslides, subsidence, liquefaction
- Flooding
- Climate resiliency

State law allows communities to select additional safety issues for consideration in the Safety Element. Thus, the City has elected to address the following non-mandatory safety issues:

- Hazardous materials location and movement
- Utility-related events: power failure/stoppages, drought/water shortages, natural gas pipes
- Crime and terrorism

## Relationship to Other General Plan Elements

Policies in the Safety Element address various public safety hazards and emergency preparedness. The Land Use Element is closely related to the Safety Element and contains policies that ensure both natural and human-made hazards are considered while making land use decisions, particularly given State-mandated requirements to provide additional housing. The distribution of residential and other sensitive land uses in the Land Use Map is designed to avoid areas where hazardous conditions have been identified. Safety Element policies are designed to protect existing and planned land uses identified in the Land Use Element, as well as associated persons and properties.

The Safety Element is also linked to both the Open Space and Recreation Element and Conservation Element. Many designated open space or conservation areas are also documented as earthquake fault zones, unstable soils or slope zones, floodplains, or watersheds. Open space can also be used as a buffer zone between uses that may create or have public safety hazards,

such as hazardous materials use or production. Development within designated open space and conservation areas would be inconsistent with the goals and policies in the Safety Element.

To a lesser extent, the Safety Element relates to the Noise, Circulation and Sustainability Element. Excessive noise can create nuisances that negatively affect public health. Additionally, public safety agencies may become involved in enforcing certain noise codes and regulations. The Circulation Element provides a policy framework for a safe and efficient circulation system, which is critical during the response to an emergency or in the event that an evacuation is necessary. The Sustainability Element addresses climate resiliency issues and is interrelated with Safety Element's climate resiliency policies.

## Relationship to Hazard Mitigation Plan

The Multi-jurisdictional Hazard Mitigation Plan (MJHMP) for Rolling Hills Estates was developed in conjunction with the City of Rancho Palos Verdes. The MJHMP was crafted in accordance with the Disaster Mitigation Act of 2000 (DMA 2000) and followed the Federal Emergency Management Agency's (FEMA) 2011 Local Hazard Mitigation Plan guidance. 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, involves planning, policy changes, programs, projects, and other activities. The MJHMP is fully integrated into the Safety Element and may be found at this location: [rhe.city/emergencyprep](http://rhe.city/emergencyprep).

## Chapter Organization

This Safety Element chapter comprises three sections:

**Introduction** summarizes the general intent of Safety Element as well as its relationship to other General Plan Elements and the Multi-jurisdictional Hazard Mitigation Plan (MJHMP).

**Existing Conditions** summarizes the natural and human-made hazards to the City as well as critical facilities and evacuation routes.

**Goals, Policies and Implementation Measures** identifies goals and policies to address public safety hazards and emergency preparedness and response issues.



## Existing Conditions

# Existing Conditions

## Wildfires

Wildfire hazard areas exist within the Planning Area and possess a substantial hazard to life and property, especially on properties built on or adjacent to steep terrains such as canyons and hillsides. Such fires can burn large areas, cause significant damage to structures and valuable watersheds, and result in an increased risk of mudflows.

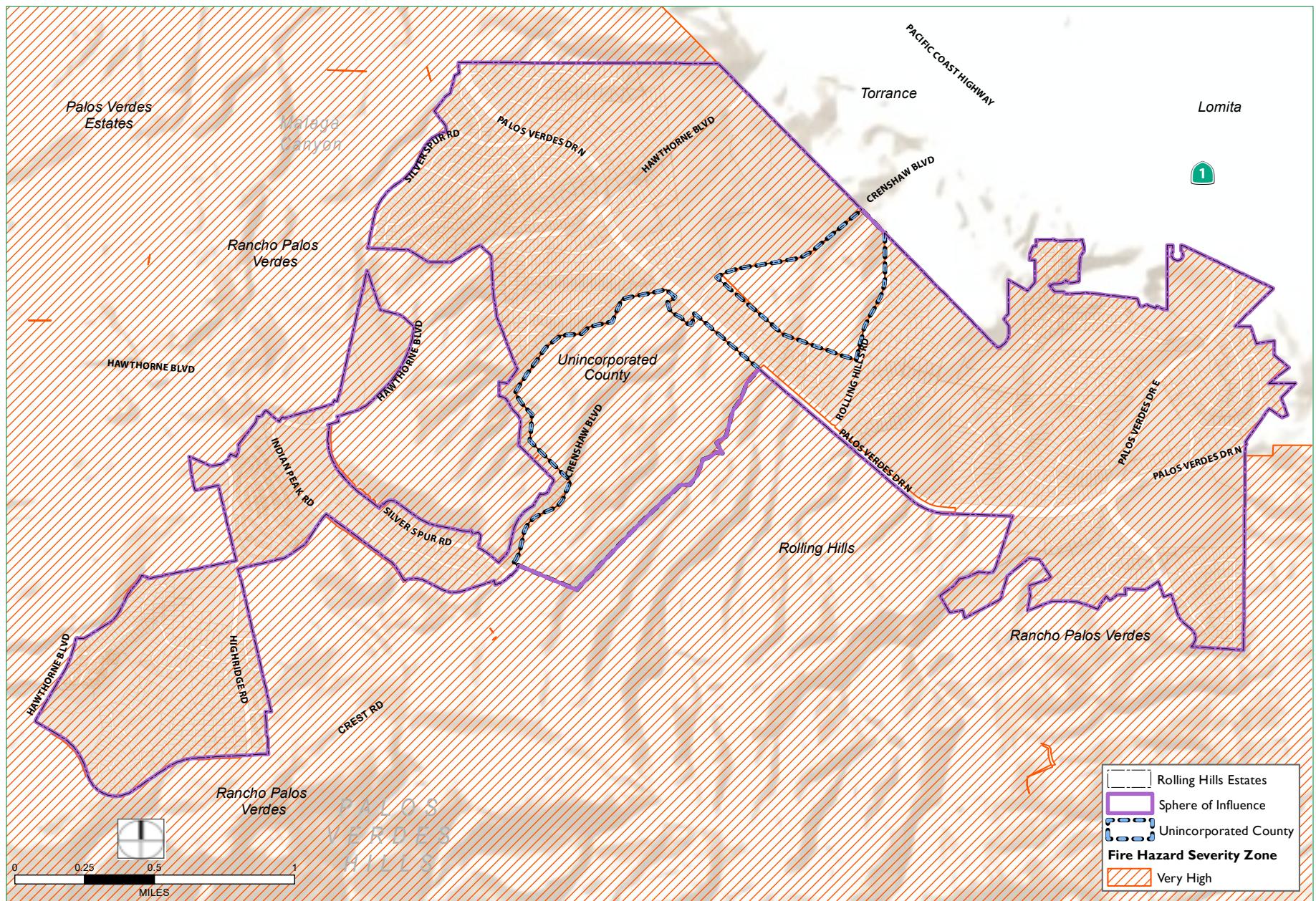
A classic wildland/urban interface exists where well-defined urban and suburban development presses up against open expanses of wildland areas. Similarly, wildfires can also occur where pockets of rural or isolated development abut wildland areas or pockets of wildland areas abut developed areas. Certain conditions must be present for significant interface fires to occur. The most common conditions include hot, dry, and windy weather; the inability of fire protection forces to contain or suppress the fire; the occurrence of multiple wildfires that overwhelm committed resources; and a large fuel load (dense vegetation). Once a fire starts, several conditions influence its behavior, including fuel, topography, weather, drought, and development.

The Planning Area has not had a major wildfire incident since 1973, when a fire destroyed 12 homes and burned 925 acres. However, the Palos Verdes Peninsula as a whole has a history of fires. The most recent major brush fire in the South Bay began on August 27, 2009, at the upper ends of Narcissa and Peppertree Drives, in the gated Portuguese Bend community near the Portuguese Bend Nature Preserve (now part of the Palos Verdes Nature Preserve). Due to the City's location as a wildland/urban interface with canyon topography, the prevalence of a hot, dry climate, and the general impacts of climate change, the chances of wildfires appear

more likely during the next 25 years. There has however been an increase in spot fires over the last several years on the Palos Verdes Peninsula. Typically, there are about two to three spot fires a year ranging in about one to three acres of burn area.

The entirety of the Rolling Hills Estates community falls into a Very High Fire Hazard Severity Zone as denoted by the California Department of Forestry and Fire Protection (CalFire; refer to **Figure 7-1**). The area is a Local Responsibility Area (LRA), meaning the responsibility for fire protection rests with the Los Angeles County Fire Department (LACoFD). The LACoFD maintains a contract for fire protection with the City of Rolling Hills Estates along with the neighboring cities of Rancho Palos Verdes, Palos Verdes Estates, and Rolling Hills. LACoFD Station No. 106 at 27413 Indian Peak Road is within Rolling Hills Estates' City limits.

Pursuant to the State Government Code, properties located within a Very High Fire Hazard Severity Zone must maintain certain defensible space through specific fuel modification (brush clearing) requirements. These fuel modification requirements are enforced wholly by the LACoFD. Furthermore, property owners located within a Very High Fire Hazard Severity Zone must disclose that their property is situated in such a zone at the time of sale. These requirements have been in place since the original State Government Code dealing with Very High Fire Hazard Severity Zones was adopted in 1995.

**Figure 7-1 Wildfire Hazard Areas**

## Faults and Seismic Activity

Reasonably well-established historical records of earthquakes in California have been compiled for approximately the past 200 years. More accurate instrumental measurements have been available since 1933. As demonstrated by historical seismicity, earthquakes generated by displacement along nearby regional faults within an approximately 62-mile radius are considered capable of generating ground shaking of engineering significance at a particular site.

Surface fault rupture is the result of fault movement that breaks to the surface of the earth either suddenly during earthquakes, or slowly due to a process known as fault creep, and is the result of tectonic movement that originates deep in the Earth. Surface fault rupture is different from other types of earthquake-related ground deformation, such as that caused by soil liquefaction or earthquake-triggered landslides. The energy released during an earthquake is a direct result of fault rupture at depth, and when that rupture extends to the ground surface it manifests as displacements expressed as fractures, fissures and related tectonic deformation. The release of energy during an earthquake will also cause shaking which can trigger liquefaction and landslides.

The State of California classifies surface fault ruptures into two categories- Holocene-active fault and pre-Holocene faults. Holocene-active fault are the faults that have had surface displacement within the Holocene epoch (i.e., within the last 11,000 years). The San Andreas Fault, where the western Pacific plate meets with the eastern North American plate, is the State's largest Holocene-active fault. Seismologists have determined that the

San Andreas Fault is moving at a rate of approximately two inches per year. Holocene-active faults are also regulated by the Alquist-Priolo Earthquake Fault Zoning Act (A-P Act) that went into effect in March, 1973.

The pre-Holocene fault is defined as showing evidence of surface displacement during the Quaternary Period (i.e., during the last 2.6 million years). These terms are used by the State primarily for use in evaluating the potential for surface rupture along faults and are not intended to describe possible seismic activity associated with displacement along a fault. Additionally, these definitions are not applicable to blind thrust faults that have only limited, if any, surface exposures.

The Planning Area is traversed by two known pre-Holocene faults, the Palos Verdes Fault and the Cabrillo Fault, with the potential to cause high ground accelerations in the City. **Figure 7-1** identifies the Planning Area in proximity to the Palos Verdes Fault and Cabrillo Fault. Several other faults in the region, such as the San Andreas, San Jacinto, Whittier-Elsinore, and Newport-Inglewood Faults, also have the potential to cause high ground accelerations in the City.

Earthquakes that could affect the project area would most likely originate from the Southern San Andreas (M7.8), Newport-Inglewood (M7.2), or Palos Verdes (M7.3) Faults. These faults are close enough in proximity or expected to generate strong enough shaking that could significantly impact the project area. These are discussed in the next section and documented in **Table 7-1.**<sup>[1]</sup>

<sup>1</sup> City of Rancho Palos Verdes and City of Rolling Hills Estates. 2020. Multijurisdictional Hazard Mitigation Plan.

**Table 7-1 Relative Likelihood and Impact of Selected Major Fault Ruptures on the City of Rolling Hills Estates**

Fault Name	Magnitude*	Peak Ground Shaking**	Approximate Distance from City
Palos Verdes	7.4	Severe (34 to 65% g)	Within Northeast City Limits
San Andreas	7.8	Moderate (3.9 to 9.2% g)	35 miles
Newport-Inglewood	7.2	Very Strong (18 to 34% g)	9 miles

Source: City of Rancho Palos Verdes and City of Rolling Hills Estates. 2020. Multijurisdictional Hazard Mitigation Plan. Use of Hazards United States – Multi Hazard (HAZUS-MH) software program.

#### Notes:

\* Maximum magnitude that each fault is predicted capable of generating.

\*\*Peak Ground Acceleration. When the ground is shaking during an earthquake, it also experiences acceleration (g)- change in speed. The peak acceleration is the largest increase in velocity recorded by a particular station during an earthquake.

**San Andreas Fault Zone:** The San Andreas Fault Zone is located approximately 80 miles east of the project area. This fault zone extends from the Gulf of California northward to the Cape Mendocino area where it continues northward along the ocean floor. The total length of the San Andreas Fault Zone is approximately 750 miles. The activity of the fault has been recorded during historic events, including the 1906 (M8.0) event in San Francisco and the 1857 (M7.9) event between Cholame and San Bernardino, where at least 250 miles of surface rupture occurred. These seismic events are among the most significant earthquakes in California history. Geologic evidence suggests that the San Andreas Fault has a 50 percent chance of producing a magnitude 7.5 to 8.5 quake (comparable to the great San Francisco earthquake of 1906) within the next 30 years.

**Newport-Inglewood Fault Zone:** The Newport-Inglewood Fault Zone's closest point to the project area is approximately 10 miles from it, and its surface trace is a discontinuous 75 km in the Los Angeles Basin, but the fault zone can easily be noted there by the existence of a chain of low hills extending from Culver City to Signal Hill. South of Signal Hill, it roughly parallels the coastline until just south of Newport Bay, where it heads offshore, and

becomes the Newport-Inglewood – Rose Canyon fault zone. The most recent rupture was on March 10, 1993 (M6.4) but was not a surface rupture.

**Palos Verdes Fault Zone:** The Palos Verdes Fault Zone has two main branches, the Cabrillo Fault and the Redondo Canyon Fault. The Cabrillo Fault runs 20 km, and the Redondo Canyon Fault 11 km. The Palos Verdes Fault Zone is roughly 80 km. These faults are all in the immediate vicinity of the project area.

## Seismic Design Standards

The Planning Area is located within Seismic Zone 4, as specified in the California Building Code. Seismic design provisions for conventional residential and commercial development, specify that a building does not collapse under seismic loading; however, structural and nonstructural damage cannot be precluded. It is seismically and economically infeasible to design earthquake-resistant structures for conventional development. The key is to enforce seismic design provisions with adequate review and inspection to ensure maximum quality construction and optimum design.

## Seismic Hazards

**Ground Shaking and Surface Fault Rupture:** The primary seismic effects associated with earthquakes are ground shaking and surface fault rupture. The Alquist-Priolo Earthquake Fault Zones are areas determined by the State of California Geologist as affected by potentially and recently active traces of earthquake faults. No portion of the Planning Area is located within a currently designated Alquist-Priolo Earthquake Fault Zone, as no Special Studies Zones have been designated within the City's boundary.<sup>[2]</sup>

Ground shaking and surface fault rupture would typically be considered to have the greatest potential for damage associated with earthquakes. Ground shaking is characterized by the physical movement of the land surface during and subsequent to an earthquake. Surface fault rupture occurs when fault displacement breaks the ground surface along the historical trace of a fault. These seismic events have the potential to cause destruction and damage to buildings and property, including damaged or destroyed gas or electrical utility lines; disruption of surface drainage; blockage of surface seepage and groundwater flow; changes in groundwater flow; dislocation of street alignments; and displacement of drainage channels and drains. These events and subsequent destruction can also result in the loss of life. In addition, ground shaking and surface fault rupture can induce several types of secondary ground failures, including liquefaction and landslides.

The intensity of ground shaking during an earthquake depends largely on geologic foundation conditions of the materials comprising the upper several hundred feet of the earth's surface.

<sup>2</sup> Index to official Maps of Earthquake Fault zones in California, Southern Region, [https://www.lib.berkeley.edu/EART/UCONLY/CDMG/south/socal\\_index.pdf](https://www.lib.berkeley.edu/EART/UCONLY/CDMG/south/socal_index.pdf)

Peak ground motion parameters that might be generated within the Planning Area by a maximum credible earthquake have been estimated for active faults in regional proximity to it. Using deterministic analysis, the “maximum” earthquake resulting in the highest peak horizontal accelerations within the City would be a magnitude 7.0 event (total size of the earthquake) on the Palos Verdes Fault based on its proximity to the Planning Area (**Table 7-1**). While other faults might show a higher magnitude, their distance from the City will likely have minimal effect on the City. According to the MJHMP, the Palos Verdes Fault poses the most significant earthquake hazard to the City, as this potentially active fault traverses the northeastern border of the City.<sup>[3]</sup> The Cabrillo Fault is also a potentially active fault, mapped within the city limits near the intersection of Silver Spur Road and Crenshaw Boulevard along the south-central portion of the City.

Ground fissuring has been documented on hillside areas in the City in recent earthquakes, and surface rupture of the onshore Palos Verdes or Cabrillo Fault segments is credible.

Secondary earthquake hazards such as liquefaction, lateral spreading, slope creep, dynamic settlement, and landslides are generally associated with relatively high intensities of ground shaking. Liquefaction, lateral spreading, and dynamic settlement are associated with shallow groundwater conditions and loose, sandy soils or alluvium.

**Liquefaction:** Soil liquefaction is a phenomenon that occurs during strong ground shaking, most commonly in generally low-to medium-density, saturated, low-cohesion soils, where the soils experience a temporary loss of strength and behave essentially as

<sup>3</sup> City of Rancho Palos Verdes and City of Rolling Hills Estates. 2020. Multijurisdictional Hazard Mitigation Plan.

a fluid. In extreme cases, the soil particles can become suspended in groundwater, resulting in the soil becoming mobile and fluid-like. Most of the City is underlain by consolidated bedrock and is not susceptible to liquefaction.<sup>[4]</sup> A review of the Seismic Hazard Mapping by the State of California Department of Conservation, Division of Mines and Geology shows that the Planning Area is not located within potential liquefaction zones (see **Figure 7-2**). The areas of artificial fill throughout the City are susceptible to settlement during strong ground shaking. If perched (shallow and confined) groundwater exists within fill areas, liquefaction can occur.<sup>[5]</sup>

**Lateral Spreading:** Lateral spreading is the horizontal movement of soil masses caused by seismic waves; this movement is usually toward an open face slope or a steep slope that has been weakened by saturation. It occurs as a result of liquefaction of the subsurface soils. Throughout the Planning Area, areas of steep slopes and artificial fill have the potential for lateral spreading as a result of seismic activity.

**Slope Creep:** Slope creep can be characterized by a long-term settlement that can manifest itself in the form of both horizontal and vertical movements. These movements typically are produced as a result of weathering, erosion, prolonged wetting and drying periods, gravity forces, and other natural phenomena. Slope creep/lateral movement has been attributed to steep slopes located throughout the Planning Area.

**Subsidence:** Subsidence refers to broad-scale changes in the elevation, i.e., downward settling, of the land. Common causes of land subsidence are pumping water, oil, and gas from underground

reservoirs; dissolution of limestone aquifers (sinkholes); the collapse of underground mines; drainage of organic soils; and initial wetting of dry soils (hydrocompaction). Subsidence is also caused by heavy loads generated by large earthmoving equipment.

Areas within the City associated with groundwater or petroleum withdrawal, peat oxidation, or hydrocompaction may be susceptible to subsidence.

**Landslides and Slope Instability:** As indicated in **Figure 7-3**, the majority of the City is underlain by shale and siltstone units of the Monterey Formation (Altamira Shale; the Valmonte Diatomite and Malaga Mudstone are confined to the north of Palos Verdes Drive). These units are conducive to land sliding and slope instability characteristic of the Palos Verdes Peninsula.

The downslope movement of loose rock or soil is a potential effect of strong ground shaking. Earthquake-induced landslides are common in areas where steep slopes expose out-of-slope bedding or where the bedrock is intensely jointed or fractured. Slope instability can also occur when slope faces become unstable because of the saturation of slope materials from rainfall or seepage or undercutting of cliffs and banks by natural or human activities. The San Pedro Formation, an unconsolidated marine sedimentary deposit along the northern flank of the City, is particularly susceptible to storm-induced landslides and erosion along slopes.<sup>[6]</sup>

The natural orientation of major slopes in the Planning Area is along northeast-southwest trending canyons. Out-of-slope road cuts may pose a rockfall or landslide threat as a result of strong

<sup>4</sup> City of Rancho Palos Verdes and City of Rolling Hills Estates. 2020. Multijurisdictional Hazard Mitigation Plan.

<sup>5</sup> City of Rolling Hills Estates. 1992. General Plan.

<sup>6</sup> City of Rolling Hills Estates. 1992. General Plan.