1 Safety Element

S.1 Introduction & Goals

The residents of the Peninsula have historically dealt with the various natural and man-induced hazards affecting the area; including earthquakes, land movements, wildfires and tsunamis. The increased population on the Peninsula over the years means more people are exposed to these risks and has created a need to update disaster preparations, communication and infrastructure plans.

In order to promote sound public policy designed to protect citizens, critical facilities, infrastructure, private property, and the environment from natural hazards; the City of Rancho Palos Verdes and Rolling Hills Estates developed a Joint Hazards Mitigation Plan in 2004. The primary goal of this plan was to create a collaborated effort among the agencies, organizations and citizens to work toward mitigating risks from natural hazards. The mitigation plan provides a list of activities that may assist the Cities in reducing risk and preventing loss from future natural hazard events. The list of activities addresses multi-hazard issues, including earthquake, wildfire, earth movement (landslide & debris flow), and tsunami.

Similar to the Joint Mitigation Plan (2004), the Safety Element of the General Plan identifies hazards, assesses vulnerability, analyzes risk and contains goals, policies and objectives to reduce risk and prevent loss from future natural hazard events within the City of Rancho Palos Verdes. This element first discusses the various hazards that may impact the City, including wildfire hazards, flood hazards, geologic hazards, and other hazards. This discussion is followed by Emergency Services available to the City in addressing these hazards including risk assessment, leading to policies to help address these impacts.

To set the context for this element, the goals are as follows:

A. Provide for the protection of life and property from both natural and **man-**made hazards within the community.
(PLANNING COMMISSION RECOMMENDED CHANGE TO GENERAL PLAN UPDATE STEERING COMMITTEE'S RECOMMENDED POLICY)

B. Provide for the protection of the public through effective law enforcement and fire protection programs and volunteer programs such as Neighborhood Watch and the Community Emergency Response Team.

Comment [S1]: On 6/8/10, the Planning Commission had a comment/questions as to if there is actually a "Team" effort regarding CERT. Staff is checking with the Lomita's Sheriff's Station to see if the teams have been created and its activity level.

C. Develop and enforce health and sanitation requirements and develop emergency communications and disaster preparedness programs to ensure the overall health and safety of all residents.

D. Protect life and property and reduce adverse economic, environmental, and social impacts resulting from any geologic activity.

S.2 Wildfire Hazard

Wildfire hazard areas are commonly identified in regions of the wildland/urban interface, presenting a substantial hazard to life and property in communities built within or adjacent to hillsides and mountainous areas. Such fires can burn large areas and cause significant damage to structures, valuable watershed and increased risk of mud flows Ranges of the wildfire hazard are further determined by the fire ignition susceptibility resulting from natural or human conditions as well as the difficulty of fire suppression. The wildfire hazard is also magnified by several factors related to fire suppression and control such as the surrounding fuel load, weather, topography, and property characteristics.

While the hazards are not as great in the City of Rancho Palos Verdes as those in other cities, the area does have a propensity for major fires, especially during its long, hot summers. On the other hand, several assets tend to minimize the potential number and degree of damage of these fires. The low density of the built-up areas, the quality of fire control agencies and high standards of fire prevention contribute to creating a safer community.

The following subsections describe the various wildfire hazards and protection measures within the City:

- Wildland Fire
- Interface Fire
- Urban Fire
- Other Factors Leading to Fires
- Fire Hazard Zone

S.2.1 Wildland Fire

Wildland fires are uncontrolled, non-structure fires other than prescribed fires that occur in the wildland area. They are often considered beneficial to wildlands, as many plant species are dependent on the effects of fire for growth and reproduction. However, large wildfires often have detrimental atmospheric consequences.

The causes of wildland fires are numerous and include lightning, human carelessness, arson, and utility sparks either by transformer failure of wildlife shorting live lines. Nine out of ten wildfires are reportedly caused by some human interaction. Heat waves, droughts, and cyclical climate changes such as increased vegetation due to heavy rainy seasons such as with El Niño can also dramatically increase the risk and alter the behavior of wildfires.

The marine influence along with the local geology on the Palos Verdes Peninsula has played significant roles in shaping the terrestrial ecology and wildfire hazards potential. Two geographical factors important in this discussion include (1) the makeup of the local soils and (2) the topography of the Peninsula. The soils in the Peninsula have been derived from the parent metamorphic and sedimentary materials. Soils of this type are usually very clay-like and not particularly conducive to the establishment of well-developed plant communities.

Development in some localities has extended into canyon areas and in some cases has reduced the fire hazard by removing the vegetation. However, development has also introduced the human element into more outlying locations, sometimes upslope from the fuel, thus increasing the fire hazard.

Fire records maintained by the California Department of Forestry and Fire Protection between the years 1923 and 2003 identify the twenty largest California wildland fires that were 100 acres or larger in area. In the past 20 years, there were two fire incidents greater than 100 acres within the City of Rancho Palos Verdes. In 2005, the "San Clemente Fire" burned 179 acres and moved up toward the City of Rolling Hills and Portuguese Bend, advancing up Del Cerro Canyon near Del Cerro Park. In 2009, the "Palos Verdes Fire" burned approximately 209 acres, of which 181 acres was City owned land in the Portuguese Bend area designated as a Nature Preserve.

Fire records do not account for fires smaller than 100 acres in size, which can also cause much damage when they occur adjacent to structures.

Between 1989 and 2008, there were a total of 61 fire incidents ranging from a small structural fire within a residential condo up to 70 acres in size (brush fire) within the Peninsula. Approximately 24% of these fire incidents were structural while the remaining were brush fires. Natural fires on the Peninsula are very rare. Of the 62 fires recorded on the Peninsula in the last 40 years, only 1 was caused by natural events such as lighting. Most fires are caused by human influences and can vary, including children playing with matches, electrical malfunctions, transformer malfunctions, furnace malfunctions, arson, downed power lines, cigarette butts, and vehicle accidents.

S.2.2 Interface Fire

In many communities, increasing numbers of homes are being built on the urban/wildland interface, with a growing population expanding further into the hills and mountains. Rancho Palos Verdes is a hillside community containing a variety of land uses ranging from high density apartments and condominium developments to very low density hillside units. The increased "interface" between urban/suburban areas and the open spaces caused by expansion has produced significant increase in threats to life and property from fires, pushing existing fire protection systems beyond original or current design and capability.

The most common conditions that cause significant interface fires include: hot, dry and windy weather; the inability of fire protection forces to gain access, contain or suppress the fire; the occurrence of multiple fires that overwhelm committed resources; and large fuel loads (dense vegetation); homeowners not complying with brush clearance requirements. Additionally, human activities increase the incidence of fire ignition and potential damage. Ninety percent of the local fires in Palos Verdes have resulted from human activities near the interface of wildland areas and urban locations. Once a fire has ignited, fuel topography, weather, drought, and development may influence its behavior.

S.2.3 Urban Fire

Urban fires usually result from sources within the structures themselves. Smoking in bed, faulty wiring, children playing with matches, and appliance malfunctions are often causes for structural fire. Additionally, cinders from wood-burning fireplaces that remain alive and travel considerable distances have also been blamed for fire-starts near residential locations.

Buildings with open stairwells, substandard electrical wiring, improper storage or faulty heating systems are considered to be hazardous. Upon ignition, the fire spreads rapidly through the building. A common example of a fire hazardous building is older, multi-story structures. However, there are no major clusters of this type of building in Rancho Palos Verdes. Single-family detached houses form the major portion of the housing stock in the area.

Fires occur more frequently in private homes for a variety of causes, with human carelessness chief among them. More lives are lost in residential fires than in any other types of fire. One particularly dangerous hazard in residential fires is the use of untreated wood shingles for roof construction. Windy conditions could spread the fire to a large number of other houses where this type of roof is common. Another concern to fire fighters has been identified as the response time to certain residential areas within the City. This is particularly true in neighborhoods with long cul-de-sacs (in excess of 700 ft.) and in areas with limited ingress/egress points (Schneider).

Public assembly facilities are defined as those in which large numbers of people congregate in generally unfamiliar surroundings. They include schools, theaters, churches, temples and a variety of recreational facilities. There are a number of these buildings in the City, including several schools. Gathering of large numbers of people in these buildings create conditions conducive to mass panic in a crisis, which only worsens and increases the casualties. Administering medical aid is made more difficult in these situations as well.

Potentially hazardous industrial operations encountered in the Rancho Palos Verdes area include utility lines, such as gas lines and overhead electrical power lines. While the normal construction of utility lines provides a good degree of safety, breaks in gas lines and falling power lines may cause fires.

Secondary Effects. A result of both wild fires and urban fires (adjacent to canyons) is the partial or total depletion of vegetation, which may result in potential erosion and/or mudflows hazards. Furthermore, in areas with chaparral, a chemical condition known as the hydrophobic effect causes soil to become relatively impermeable to water, and thereby reduces water absorption and increases runoff. However, if a slope is burned over by fire of intense heat, the near surface zone is purged of hydrophobic compounds. The vaporized compounds condense in a cooler zone just below the surface. Rainfall could then penetrate the surface layer and reduce its shear strength. Any excess water would travel down slope just

above the impervious layer, carrying away the weakened material as a debris flow. (California Geologic Survey Note 33, 2007).

S.2.4 Other Factors Leading to Fires

Human Proximity. Human proximity also tends to increase the activity of off-road vehicles, such as motorcycles in nearby open areas. This activity is becoming an ever-increasing source of brush-fires, as the trend accelerates toward such recreational pursuits.

Vegetation. The density and distribution of vegetation can define the overall hazard of fire and its intensity in a particular area. The vegetation of an area determines the fuel and spreading potential, while helping to identify the recurrence intervals one can anticipate between outbreaks of fire. In the Palos Verdes area, four major plant communities determine the various fuel potentials of the area: Coastal Sage Scrub, Riparian and types of Woodland-grass.

Fuel. Fuel feeds a fire and is a key factor in wildlife behavior. Diverse fuels in the landscape, such as natural vegetation, manmade structures, and combustible materials help understand the risk of fire. For example, a house surrounded by brushy growth rather than cleared space allows for greater continuity of fuel and increases the fire's ability to spread.

Fuel is classified by volume ("fuel loading", or the amount of available vegetative fuel) and by type. The type of fuel, along with moisture content, can greatly influence the dynamics of wildlife. Chaparral is a primary fuel of Southern California wildfires. Chaparral communities experience long dry summers and receive most of their annual precipitation from winter rains. Fire has been important in the life cycle of chaparral communities, which have evolved to a point it requires fire for spawn regeneration. In general, chaparral community plants have adapted to fire through fire induced flowering; bud production and sprouting subsequent to fire; in-soil seed storage and fire stimulated germination; and on plant seed storage and fire stimulated dispersal.

Weather. Weather patterns combined with certain geographic locations can create a favorable climate for wildfire activity. Areas where annual precipitation is less than 30" per year are extremely susceptible. High-risk areas in Southern California share a hot, dry season in late summer and early fall when high temperatures and low humidity favor fire activity. Although the Peninsula has a predominant westerly breeze flow, the bulk of the local fire outbreaks tend to accompany the "Santa Ana" winds,

which are heated by compression as they flow down to Southern California from Utah, creating a particularly high risk, as they can rapidly spread what might otherwise be a small fire. Therefore, those areas that lie to the west of potential ignition points or fire sources become even more hazardous. The Santa Ana wind system occurs in the drier fall season, and for residents of Southern California, the season of the Santa Ana winds is synonymous with fire danger.

Drought. Recent concerns about the effects of climate change, particularly drought are contributing to concerns about wildfire vulnerability. The term drought is applied to a period in which an unusual scarcity of rain causes a serious hydrological imbalance. Unusually dry winters, or significantly less rainfall than normal, can lead to relatively drier conditions and leave reservoirs and water tables lower. Drought leads to problems with irrigation and may contribute to additional fires, or additional difficulties in fighting fires.

Access. Access is a fire hazard factor that describes the relative difficulty of delivering both equipment and personnel to a fire. Containment being a key objective, those areas of limited accessibility have a greater potential for fire-spreading than the more accessible locations.
In the Palos Verdes area, the factor controlling access is slope. The degree of slope in a fire burn area can determine the type of heavy equipment and strategy method that can be used.

Topography. Topography influences the movement in the air, thereby directing a fire course. For example, if the percentage of uphill slope doubles, the rate of spread in wildfire will likely double. Gulches and canyons can funnel air and act as chimneys, intensifying fire behavior and causing the fire to spread faster. Solar heating of dry, south-facing slopes produces up slope drafts that can complicate fire behavior. Entire canyons have been engulfed in flames from the superheated conditions resulting from the combination of fire and wind drafts.

Fire Risk Zones. The fire risk zones shown on the Fire Hazards Map (CAL FIRE Fire Hazard Severity Zones) represent a compilation of data regarding the primary factors of human proximity, vegetation, wind direction, slope, and access. These factors are ranked in importance in roughly the same order as presented. However, fire risk analysis treats each factor as a mutually exclusive variable. Human proximity might be "more important" than slope on a general level, but conditions exist where the degree of slope could become the predominant factor in the risk determination process. Therefore, each factor can vary in relative importance, depending upon the

specific conditions and characteristics of the area. The following area profiles exemplify the types of conditions expected to be found in each zone.

High Risk	
Vegetation	Woodland grass
Proximity	Near developed area
Access	Limited
Slope	20-40%

Medium Risk	
Vegetation	Coast sage scrub
Proximity	Lying within the urbanized portions of the Palos Verdes Peninsula
Access	Available
Slope	0-20%

Low Risk	
Vegetation	Vacant lots and landscaping
Proximity	Urban areas
Access	Available
Slope	Negligible

The fire risk zones portrayed on the Fire Hazards Map represent a general assimilation of the data categories being considered. They are not meant to be precise or specific alignments, but instead tools that delineate fire propensities.

S.2.5 Fire Hazard Zone

Irrespective of the statewide Fire Hazards Map category for RPV's native vegetation of Coastal Sage Scrub, the entire Palos Verdes Peninsula is designated as a Very High Fire Hazard Severity Zone (VHFHSZ) by the California Department of Forestry and Fire Protection (CDF) website (Figure 6-1). In 2008, CDF reviewed and updated the VHFHSZ map with local Los Angeles County Fire stations' input (Figure 6-2, 6-3, 6-4). The updated maps indicate that the entire City of Rancho Palos Verdes, excluding the portion of the City located east of Western Avenue (approximately 98 acres) is classified as a VHFHSZ.

S.3 Flood Hazard

In general, there are three distinct types of flood inundation hazards are known to exist: flood inundation, dam inundation, and debris flows. Flood inundation hazards are those associated with major atmospheric events that result in the inundation of developed areas, due to overflows of nearby stream-courses or inadequacies in local storm drain facilities. Dam inundation hazards are those associated with the downstream inundation that would occur given a major structural failure in a nearby impoundment. Such failures would most likely be caused by geologic phenomena including slope instability or seismic failure. Another inundation hazard relative to Palos Verdes is debris flows that can occur during the rainy season and, in addition to impacting structures, can have an adverse effect on sensitive inter-tidal areas along the coastline

Flooding and debris flows can occur during storm events. These flows can occur in and below the areas denuded of vegetation and altered topsoil. The extent and amount of flows will depend in the rainfall intensity and duration of the storm event. These flows can be highly destructive and move large quantities of soil, rocks, brush and trees into neighborhoods, causing property damage, blocking streets and endangering property occupants. For areas with denuded vegetation as a result of a fire, it can take about four to five years for vegetation to significantly recover, about ten years to fully recover.

The location of the Palos Verdes Peninsula helps insulate the City from most aspects of flood hazard. The City is not located near any major streamway, and large scale inundations related to over-flow are not expected to occur. However, a definite flooding problem does exist in the form of temporary flash floods related to heavy winter rains. Most of this flash flood activity is isolated along the canyons, the floors of which provide the runoff channels for the hilly, steep terrain. The amount of runoff during a storm is increased by the high runoff characteristic of the local soils. Most flash flood conditions in Palos Verdes are short-lived in nature, due to the limited size of the available watershed, and the damage resulting from flash floods is more erosive than inundative in nature. However, substantial damage can occur if developments encroach into the canyon bottoms or where roadways are too close to canyons as with San Ramon Canyon.

S.3.1 Water Storage Facility Failure

Palos Verdes Reservoir is the largest water impoundment owned by the Metropolitan Water District in the Peninsula, located near Palos Verdes Drive East in the City of Rancho Palos Verdes. Palos Verdes Reservoir is an earth-fill type facility that has a surface area of 27 acres and a maximum storage capacity of 1,100 acre feet. This compacted-fill dam was constructed in 1939 to the engineering specifications of the period. The relative effects of earthquake shaking on the reservoir have not been determined.
There are twelve other water impoundments located throughout the Peninsula (City of Rancho Palos Verdes, Rolling Hills, and Rolling Hills Estates) which appear on the Hydraulic Analysis Map, prepared by the California Water Service Company Palos Verdes District (dated November 16, 2002). These facilities are either above- or below-ground water tanks of lesser capacity than Palos Verdes Reservoir. Although such facilities are smaller in capacity than Palos Verdes Reservoir, they could present locally hazardous inundation situations if they were to fail.

Each of the water storage facilities may be subject to severe ground shaking, given a major seismic event on the San Andreas, Newport-Inglewood or Palos Verdes faults. The ability of the water storage facilities to withstand the anticipated ground shaking is not correctly known. Other hazardous geologic phenomena, particularly landslides are most likely to be the cause of the structural failures of water impoundments. Fortunately none of the existing active reservoirs are located within the City-designated landslide areas.

In general, the direct threat to public safety resulting from inundation will not be great, with the possible exception of Palos Verdes Reservoir. However, other results indirectly related to inundation could be quite severe, including the shortage of water for both domestic and fire prevention uses. Shortages of that nature could be extremely critical in a real disaster situation. Acknowledging this potential, the California Water Service Company has an emergency contingency plan which includes damage assessment, water retention, transporting water, transporting generators, and mutual aid. Currently, the California Water Service Company uses an electronic telemetric method to monitor the capacity, pressure, and the distribution system of various reservoirs. Should there be any damage to the piping system; the water company staff can easily detect the source of the problem. Depending on the damage, the first priority of the water company is to isolate main leaks and retain water in the reservoirs to prevent any landsliding or flooding that may occur. In situations facing water shortage, the water company activates their

emergency contingency center and works with local emergency regional center, Los Angeles County Office of General Management and/or Southern California Region Emergency centers based on the significance of the situation for the delivery of bottled water. In cases of power outage in the two lift stations that pump water to the Peninsula, the water service company will transport large generators to restore power.

S.4 Geologic Hazards

The Palos Verdes Peninsula is composed of a sequence of sedimentary and metamorphic rock which has been folded and uplifted along the Palos Verdes fault on the north and an unnamed fault in the offshore area to the south. (See Natural Environment for geologic profile of Palos Verdes Peninsula.) The folding and up-lifting of the Peninsula has produced an anticlinal structure in which the sedimentary rocks are inclined generally to the north on the northerly flanks of the Palos Verdes Hills and inclined to the south on the southerly side. This particular structural relationship is one of the major factors responsible for the large-scale landslides present on the Peninsula.

The Palos Verdes Peninsula bedrock is composed of a metamorphic core blanketed by sequences of younger sedimentary rock. Five geologic formations are present on the Peninsula including the Catalina Schist, Monterey Formation, San Pedro Formation, intrusive volcanic rocks, and marine terrace deposits. The Palos Verdes Peninsula is tectonically uplifted and folded as a result of the Palos Verdes fault. The complex folding generally represents a northwest-southeast trending double-plunging anticline. The sedimentary rocks are inclined generally to the north on the northerly flanks of the Palos Verdes Hills and inclined to the south on the southerly side. The thirteen staircase marine terraces surrounding the Palos Verdes Peninsula are one of the most complete sequences of emergent marine terrace in Southern California.

Geologic hazards include seismic hazards, landslides, debris and mud flows, liquefaction, tsunamis, seiches, settlement and subsidence, expansive soils, corrosive soils, and coastal bluff retreat. These geologic hazards are detailed in the following sections below:

- Seismic Hazard
- Active, Capable, and Potentially Active Faults
- Landslides
- Liquefaction
- Seiches

- Settlement or Subsidence
- Expansive Soils
- Coastal Cliff Retreat

S.4.1 Seismic Hazard

The City of Rancho Palos Verdes is located in a seismically active area and near several of the many active and potentially active faults in Southern California (see Figure 27). This section analyzes the earthquakes that should be expected in the future and the effects that will be experienced with the area.

A fault is defined as a fracture in the crust of the earth along which rocks on one side have moved relative to those on the other side. Most faults are the result of repeated displacements over a long period of time. Active and potentially active faults within Southern California are those capable of producing seismic shaking that may cause damage to structures. An active fault is defined by the State of California as a well-defined fault that has exhibited surface displacement during the Holocene Epoch (to about 11,000 years ago) and a potentially active fault is defined as having a history of movement within the Pleistocene Epoch (between 11,000 to 1.6 million years ago).

Two faults are present on the Peninsula: the Palos Verdes and Cabrillo Faults (see General Geology Map Figure 26). The active Palos Verdes fault trends northwest-southeast and marks the eastern termination of the Palos Verdes Hills. The potentially active Cabrillo fault also trends northwest-southeast and extends from Cabrillo Beach to near the center of the Peninsula. The Palos Verdes fault is considered a source of significant earthquake hazard and the Cabrillo Fault is a potentially moderate earthquake hazard for reasons discussed in detail below.

The active Newport – Inglewood fault and the Puente Hills blind thrust are located east of the Palos Verdes Peninsula within the Central Plain of the Los Angeles Basin. The Newport – Inglewood marks the boundary between the Southwestern and Central Blocks and the Puente Hills/Whittier Fault marks the boundary between the Central and Northeastern Blocks. Earthquakes generated on these faults pose a significant earthquake hazard to the Palos Verdes Peninsula.

The active San Andreas Fault marks the boundary between the North American and Pacific Tectonic Plates. The San Andreas is the most active fault system in California and is considered a primary source for significant

earthquake hazards in Southern California. However, the effects on the Palos Verdes Peninsula are only considered moderate due to the distance from the San Andreas Fault. Additional secondary impacts to the Palos Verdes Peninsula will be felt due to the damage that may be suffered by other areas and damage to lifeline and infrastructure in Southern California.

For the purposes of defining the problem, the principal active and potentially active faults in the region and their earthquake generating capabilities are listed in Table 12. The latter is expressed as the magnitude of the largest earthquake that can reasonably be expected, and also as the level of shaking (ground acceleration) that could result within the City. In addition, the estimated slip rate, recurrence interval, and most recent rupture are included in the table.

Three items in the table are of particular interest. First, earthquakes generated by the Newport-Inglewood Fault will result in high ground accelerations due to the proximity of the fault to the city. Second, an earthquake on the San Andreas Fault is important because it has a high probability of occurrence (currently "overdue" for an occurrence). The 2008 magnitude 7.8 Shakeout Scenario indicates that shaking from this earthquake is expected to last between 45 and 60 seconds, but the ground accelerations in the area will not be unusually high (less than half that of the estimated acceleration anticipated for an earthquake on the Newport-Inglewood Fault). This is mainly because the nearest point on the fault is over 50 miles to the northeast. Third, the Palos Verdes Fault, although not zoned as active by the California Geological Survey, is now generally considered as having Holocene activity along the southern offshore section. It is the source for the largest ground accelerations shown on the table. However, maximum magnitude and recurrence interval is generally poorly understood.

Significant earthquakes can and probably will occur on other faults. However, available evidence indicates that their effects in the Palos Verdes Peninsula will be significantly less then the effects of the Newport-Inglewood, Palos Verdes or San Andres faults. Known active or potentially active faults that could be the site of ground rupture resulting from movement on the fault are limited to the Palos Verdes fault zone which traverses the extreme northeastern corner of the Palos Verdes Peninsula (General Geology Map). Evidence bearing on the activity of this fault is discussed in detail in a following section. No other potentially active faults are known within the Palos Verdes Peninsula. There are no significant trends of earthquake epicenters or groundwater conditions indicating a

buried active fault within the City. Figure 28 presents a plot of all recorded earthquake epicenters in the area from 1932 through 2008.

S.4.2 Active and Potentially Active Faults

As described above, below is a discussion of the following known faults and its impact in the Palos Verdes Peninsula: Palos Verdes Fault, Newport-Inglewood Fault, Puente Hills Blind Thrust, San Andreas Fault, and Cabrillo Fault.

Palos Verdes Fault. The Palos Verdes Fault is within a mile of the Palos Verdes Peninsula and poses the most significant earthquake hazard to the City due to its proximity. Although Holocene activity has been demonstrated in the southern offshore segment of the fault, the recurrence interval and magnitude of the most recent displacement is still not well characterized and as such the CGS considers it a "Potentially Active" fault. The fault strikes northwest-southeast, dips steeply to the southwest, and is a reverse fault with a minor right-lateral strike slip component. Compression translated along the fault produces the uplift and folding of Palos Verdes Hills and marks the boundary between the Palos Verdes Hills and the rest of the Southwestern Block of the Los Angeles Basin. This fault is considered an active "B" type fault with slip rates of approximately 1 to 5 mm/yr (Treiman, J.Jerome, and Lundberg, M.Matthew, USGS 1998) and a maximum credible earthquake magnitude of 7.3 (Peterson, 1996).

The effect a maximum credible earthquake on the Palos Verdes fault would have to Southern California is considerable. This potential scenario is estimated to cause losses of $30 billion in building damage, 80 to 1,050 deaths, and 2,400 to 19,000 injuries (OES, 2007).

Newport – Inglewood Fault. The Newport – Inglewood Fault is 7 to 10 miles from the Palos Verdes Peninsula and poses a significant earthquake hazard to the City. The vertical fault strikes northwest-southeast and is a right-lateral strike slip fault with a minor reverse component. Compression translated along the fault produces the Newport – Inglewood uplift from Beverly Hills to the San Joaquin Hills. The fault separates the Southwestern Block from the Central Plain of the Los Angeles Basin. This fault is considered an active "A" type fault with slip rates of approximately 1.0 to 1.5 mm/yr and a maximum credible earthquake magnitude of 7.1 (Peterson, 2003).

The effect a maximum credible earthquake on the Newport – Inglewood fault would have to Southern California is great. This potential scenario is

estimated to cause losses of 49 billion in building damage, 150 to 1,900 deaths, and 5,200 to 33,000 injuries (OES, 2007).

The earthquakes that have had a significant effect on the Palos Verdes Peninsula, in historic times, have originated principally as the result of movement on segments of the nearby Newport-Inglewood fault zone. The most notable are the Long Beach earthquake (March 10, 1933, with a magnitude of 6.4), the Signal Hill earthquake (October 2, 1933, with a magnitude of 5.4), the Gardena earthquake (October 21, 1941, with a magnitude of 5.0), and the Torrance-Gardena earthquake (November 14, 1941, with a magnitude of 5.5). The epicenters of these earthquakes, as well as others along or in the vicinity of the Newport-Inglewood fault, are shown on Figure 28. Records of the smaller earthquakes (generally less than magnitude 3.9) are not available for years prior to 1963, so the number of smaller quakes shown is considerably less than that which would be expected had they been recorded for the full period from 1932 to 2006.

The relative intensity of ground shaking in the vicinity of the Palos Verdes Peninsula during each of the four notable earthquakes described above is estimated to have been between IV and VI on the Modified Mercalli Scale (Neamann, 1935 and 1943). The levels of intensities were deduced from the accounts of witnesses and by the severity of damage to different types of construction.

Puente Hills Blind Thrust. The Puente Hills Blind Thrust fault is greater than 15 miles from Palos Verdes Peninsula and poses a moderate earthquake hazard to the City. The fault strikes northwest-southeast and dips approximately 25 degrees to the southwest (Peterson, 2003). Compression translated along the fault produces the uplift and folding of Puente Hills and cuts the Central Plains of the Los Angeles Basin. This fault is considered an active "B" type fault with slip rates of approximately 0.7 mm/yr and a maximum accredited earthquake magnitude of 7.1 (Peterson, 2003).

The effect a maximum credible earthquake on the Puente Hills blind thrust would have to Southern California is considerable. This potential scenario estimated to cause losses of 69 billion in building damage, 40 to 700 deaths, and 1,700 to 11,000 injuries (OES, 2007).

San Andreas Fault. The San Andreas Fault is the greatest earthquake hazard in Southern California. The fault is located greater than 50 miles from the Palos Verdes Peninsula and poses a moderate earthquake hazard to the City. The vertical, right-lateral strike slip fault strikes northwest-

southeast. The San Andreas transform fault cuts through most of California and marks the boundary between the North American Plate to the northeast, and the Pacific Plate to the southwest. This fault is considered an active "A" type fault with slip rates of approximately 23 to 37 mm/yr and a maximum credible earthquake magnitude of 7.8 (Peterson, 2003).

The effect a maximum credible earthquake on the San Andreas fault would have to Southern California is great. This potential scenario would cause losses estimated at 150 billion in building damage, 60 to 900 deaths, and 2,200 to 15,000 injuries (OES, 2007). However, the affect on City residents and infrastructure would be less due to the distance from the Palos Verdes Peninsula. The affect on the City due to the damage that may be suffered by other areas and damage to lifeline and infrastructure in Southern California may be substantial.

The San Andreas Fault has generated two great earthquakes in recorded history; the 1856 Fort Tejon earthquake (magnitude 7.5-8.5), and the 1906 San Francisco earthquake (magnitude 8.3). Ground shaking intensities in the vicinity of this study were not recorded for the 1856 event, but reach a level of III-IV (Mercalli Scale) for the 1906 earthquake (Lawson, 1908).

These impacts are not considered a major hazard to the peninsula due to the distance from the fault. However, disruption to the movement of water, petroleum products, telecommunications, and general transportation may have a dramatic affect on peninsula in the short term.

Cabrillo Fault. The Cabrillo Fault, which bisects a portion of the Palos Verdes Hills, is considered potentially active and poses a potentially significant earthquake hazard to the City. The normal fault strikes northwest-southeast and dips northeast. Tension translated along the fault drops the northeast side relative to the southwest side. This fault is considered a potentially active type fault with undetermined slip rates and a maximum probable earthquake magnitude of 6.8 (SCEC, 2008). The effect a maximum accredited earthquake on the Cabrillo fault would have to Southern California has not been evaluated (OES, 2007).

S.4.3 Landslides

Comment [S2]: On 6/8/10, the Planning Commission requested some additional text be added. Specifically, Staff will add language in this section discussing pipelines in the Portuguese Bend Area and its impacts should a landslide occur. Also, Staff will update this section to address San Ramon/Tarapaca Landslide issues and affects upon the use of Palos Verdes Drive South.

Landslides represent only one step in the continuous, natural erosion process. They demonstrate in a dramatic way the tendency of natural processes to seek a condition of equilibrium, and various erosion processes act to gradually reduce them to a base level. Landsliding is an important

agent in this cycle. Several types of landslides commonly encountered (USGS, 2004) are described below.

Translational or Block Slides. These slides are the largest, most impressive type of landslide. They involve a single coherent mass that translationally moves down slope with little rotation or backward tilting. The basal failure plane (rupture surface) is controlled by planar zones of weakness, such as bedding, foliation, jointing or a formation contact, or fault. These failures typically occur in layered rocks of sedimentary or metamorphic origin where lateral support is removed by erosion or grading. The Portuguese Bend Landslide is a complex version of a translational landslide.

Rotational Slide. Rotational failures are common in massive, unstructured material with relatively little resistance to shearing. These materials include thick sections of clayey soils and poorly compacted artificial fills. The surface of rupture is curved concavely upward, and the movement of the mass is partly rotational. Small arcuate failures, called slumps, are a type of rotational slide common along steep-banked streams and canyons in Rancho Palos Verdes, where a stream has cut through an existing soil zone.

Rock falls. This phenomenon is an abrupt movement of rock and boulders that have detached from steep slopes or cliffs. Rock falls may be influenced by the height of the slope, size of rock, and slope geometry. Rock falls are prevalent where natural slope gradients exceed 50%, and where natural weathering produces angular fragments of material with little soil cover. An initial separation occurs along fractures, joints, or bedding and highly influenced by mechanical weathering and interstitial water. Interstitial water is defined as water occupying interstices or pore volumes in rocks. The debris typically free-falls, bounces and rolls down slope and may impact areas 10's to 100's of feet from the bottom of the slope. Rock falls are typical in the Forrestal Canyon area and along many of the sea bluffs of the city.

Topples. Similar to rock falls, they represent forward rotation of rock or boulders that are separated by gravity or the build up of water pore pressure in cracks from the surrounding rock materials.

Debris flows. Debris flows, also know as "mudflows," are potentially serious hazard to life and property in the hillside areas of the Palos Verdes Peninsula. Rainfall, steep slopes, and loose soil are the primary controlling conditions that generate debris flows. Debris flows are more likely to occur during rainy seasons after wildfires. Vegetation naturally binds the topsoil

and absorbs precipitation. The removal of vegetation by fire lowers the stability of exposed topsoil and lessens the water-holding capability of the watershed. Following a wildfire, sediment yields and peak discharges of watersheds can increase up to 35-fold, and potentially inundate drainage systems. Debris flows typically start within swales or small steep drainages or as small failures on the sides of steep slopes, usually greater than 15 degrees. The flows typically originate in loose soils that become saturated due to the introduction of water. The saturated soil liquefies into slurry of loose soil, rock, organic matter, air, and water. These flows may coalesce into larger canyons or stream channels intensifying the flow and increasing the volume of material. Debris flows can travel faster than about 10 mph or approximately 25 yards in about 5 seconds. Speeds in excess of 20 mph are not uncommon, and speeds in excess of 100 mph, although rare, do occur locally (California Geologic Survey Note 33, 2007). In general, hillsides become saturated and susceptible to debris flows after heavy seasonal rainfall (10 inches of seasonal), or during intense rainfall events (approximately 2-inches within a 6-hour period). Large mudflows have the energy to uproot trees, move large boulders, severely erode canyon walls, and deposit large volumes of material. Because of the speed with which they move, mudflows can be quite destructive and pose a threat to life and property, especially along the bottom and at the mouths of canyons. Silt and debris can also impact sensitive coastal inter-tidal zones.

Human activity can impact the occurrence of debris flows as a result of improper drainage and maintenance. Introduction of excess water into soils from a broken water pipe or improper functioning drainage can create a saturated soil condition. Altered and excavated slope areas such as road cuts are more prone to debris flows than natural slopes if not properly maintained. To mitigate potential debris flows, care should be taken that all runoff is properly channeled to engineered drainage systems.

Landsliding is basically controlled by four factors: the rock type, the fabric or structure of the rock, the amount of available water and the topographic conditions. The geologic formation or rock type is a reasonably good indicator of the strength of the rock and its resistance to failure. The geologic structure or the orientation of potential failure planes is important in determining the size and type of failure. The amount of available water greatly influences the strength of a potential failure surface. It can add to the weight of the unstable mass, lower the co-efficient of friction and increase pore pressure all of which contributes to land movement. Topographic slope gradient is also a contributing factor in controlling the force that causes failure. The relative importance of these four factors varies from place to place, but rock type, geologic structure, and available water

are probably the most important. Some degree of slope is necessary to initiate failure, but if the other factors are present, failure can occur on slopes with a gradient of less than 5%.

Landsliding in the City can be grouped into two major landslide systems that represent complex groups of smaller coalescing landslides: the Portuguese Bend and the South Shores. Smaller, isolated landslides are scattered over the City, outside the two major systems (see CGS Landslide Inventory Map of the Palos Verdes Peninsula, 2007).

The Portuguese Bend system is the most studied and publicized landslide in the area, and perhaps in the Los Angeles Basin. The Portuguese landslide has been mapped as a large ancient complex that extends from close to the top of the ridge of the city to the ocean. The most recent movement began in 1956, apparently as the result of grading operations, and involved movement in about 1/3 of the system. The recently active portion is shown on the Landslide Map. This area includes the Abalone Cove and the Portuguese Bend Landslide.

The upper limit of the landslide has been under debate for many years. The recently published Landslide Inventory Map places the ancient landslide scarp at the Valley View Graben adjacent to Crest Road. The Valley View Graben is a narrow valley interpreted as the remnant of the original pull-away at the top of the slide mass. Previous maps by Dibblee (1999) and others place the top of the landslide much further down slope from the Valley View Graben.

No historic movement has been recorded within the main mass of the South Shores landslide system. The last movement of the main landslide has been determined to be approximately ±16,200 years ago. This system is apparently at equilibrium for the present, but renewed activity may occur if existing conditions are modified. Along the eastern flank of the landslide, erosion and subsequent down cutting within San Ramon Canyon has triggered a new un-named landslide that drops into the canyon from the east. This down cutting now threatens many of the over steepened slopes in the canyon as well as road stability along the switchbacks of Palos Verdes Drive East.

The Silver Spur Graben, located northwest of the Valley View Graben and partially within Rolling Hills Estates and partially within Rancho Palos Verdes, was postulated by Envicom (1975) as being part of a much larger landslide complex they called the Silver Spur System. Ehlert (2000) reviewed the evidence to date and postulated that the graben might be

associated with a tectonic (fault) origin rather than a landslide origin. He suggested that the area, although a graben, would need further work to determine its origin. He states that the age of the graben formation is on the order of a maximum of one million years old and may be several hundred thousand years old. The CGS Landslide Inventory Map of the Palos Verdes Peninsula, 2007, does not include the Silver Spur Graben as a known landslide or landslide complex.

S.4.4 Liquefaction

Liquefaction occurs when earthquake waves cause water pressure to increase in the sediment and the sand grains to lose contact with each other, leading the sediment to lose strength and behave like a liquid. The soil can lose its ability to support structures, flow down even very gentle slopes, and erupt to the ground surface to form sand boils. Many of these phenomena are accompanied by settlement of the ground surface — usually in uneven patterns that damage buildings, roads and pipelines. For liquefaction to occur, three factors must be present: loose granular sediments, saturation of the sediment by ground water, and strong ground shaking. If the liquefying layer is near the surface, the effects are like that of quicksand for any structure located on it. If the liquefying occurs below a competent layer, translation, rotation, or liquefaction may occur.

The potential for liquefaction in Ranch Palos Verdes is very low, since the local soil deposits are relatively thin and cohesive and groundwater is usually at depth. Liquefaction is not considered to be a significant hazard in the City. The mapped potential liquefaction zones on the Palos Verdes Peninsula are located in the drainage area east of the Palos Verdes Reservoir, along the shores of Royal Palm Beach Park and along the shoreline adjacent to some of the beach areas as indicated in the State of California Seismic Hazard Zone Maps for the Torrance, Redondo Beach and San Pedro Quadrangle (CDMG, 1999).

Nearby affects of liquefaction were noted in the San Pedro area following the 1933 Long Beach earthquake (CDMG, 1998). During the 1994 Northridge earthquake significant damage was reported in the Los Angeles – Long Beach Harbor areas including; lateral spreading, settlement, and sand boils that suggested liquefaction occurred (CDMG, 1998).

S.4.5 Tsunamis

Tsunamis are sea waves generated by earthquake, landsliding, or volcanic eruption. It has also been postulated that large meteor impacts hitting the

ocean have caused very large sea waves. The destructive power of tsunamis is due to the fact that they travel at velocities approaching 500 miles per hour. While they are generally imperceptible on the open sea, as they approach land and as the ocean shallows, these waves slow down, making them grow in height (amplitude) and thus impact inland areas greater than normal wave action. Tsunamis have been recorded that crested to heights of more than 100 feet before slamming into shore. These great heights are rare and depend on several factors, such as offshore topography, tide phase, and coastline orientation, and configuration. Hazardous tsunamis may occur along the coastline of Rancho Palos Verdes as the result of submarine faulting or landsliding.

Faulting at great distance is the most common source of tsunamis along the California coast. Typical source areas are the great submarine trenches off Chile and Alaska. The latter was the source area for the tsunami that struck Crescent City in 1964 with 13 foot waves, claiming 11 lives and causing over 11 million dollars damage. The Seismic Sea-Wave Warning System administered by the U.S. Coast and Geodetic Survey detects incoming tsunamis and supplies the endangered localities with the expected arrival times of the waves. The warning times vary with distance from the source, but for most tsunamis approaching the coast, several hours are available to evacuate the citizens and to make emergency preparations. The largest recorded tsunami heights in California were in Venice and Santa Monica in 1930 and were about 6.1 meters, or 20 feet in height (California Geologic Survey web site).

Recent studies have indicated the potential for large scale landsliding and slumping off the Palos Verdes Peninsula coast capable of producing tsunamis. Modeling indicates that tsunamis on the order 3 to 6 meters high with velocities of up 10 meters per second could occur. Due to the height of the bluffs in the Rancho Palos Verdes city boundaries, the impact from these potential tsunamis would be limited (April 2005, Volume 75 Number 4 Civil Engineering Magazine).

S.4.6 Seiches

Seiches are long period water-level oscillations within closed or open bodies of water, such as a lake or harbor basins that can be created by seismic waves or landsliding. Seiches are not considered a significant hazard in Rancho Palos Verdes.

S.4.7 Settlement or Subsidence

Settlement may occur in unconsolidated and unsaturated soils as the result of a more efficient rearrangement of the individual soil particles. This arrangement is typically due to additional overburden pressures from foundation loads or grading, or due to earthquake shaking. Settlements of sufficient magnitude to cause structural damage are normally associated with rapidly deposited alluvial materials, secondary settlement within subsurface peat deposits, improperly founded or poorly compacted fills, or highly fractured landslide deposits. Regional or local groundwater withdrawal from the Los Angeles Basin could cause subsidence within adjacent cities; however, does not pose a hazard to Ranch Palos Verdes.

S.4.8 Expansive Soils

Expansive soils contain sensitive clay minerals that are capable of absorbing water and increasing in volume. The more water they absorb the more their volume increases. Sensitive clay minerals will also shrink when they dry out and remove support from structures and buildings and result in subsidence and/or desiccation cracks at the ground surface. The shrink and swell cycle of highly sensitive clay minerals in expansive soils can exert enough force on footings or foundations to cause damage to structures and buildings.

Expansive soils tend to have a greater effect near the surface since expansion pressures are counteracted by soil overburden pressures at depth. Cracked foundations, floors and basement walls are typical types of damage done by expansive soils. Expansive soils can cause post construction damage to building foundations or interior slabs, or exterior hardscape such as patio slabs, garden walls, driveways, and sidewalks as well as structure framing and plaster walls.

Soils of the Rancho Palos Verdes area are typically various combinations of Diablo and Altamont soils (U.S.D.A., 1969) which produce dark grey, neutral clay. All of these combinations have a high shrink-swell potential. While these soils are highly expansive, they should not be a factor in precluding development. Modern soil engineering procedures coupled with present-day foundation designs can effectively and inexpensively mitigate the effects of most expansive soils.

S.4.9 Coastal Cliff Retreat

The Palos Verdes Peninsula coastal cliffs are exposed to wave energy and subject to erosion and cliff retreat. Cliff retreat is the landward migration of

the cliff face as a result of erosion processes including ocean, wind, and gravity. This chronic coastal evolution plagues the city's infrastructure and threatens the communities that are situated above and adjacent to these cliffs. Cliff retreat rates from the Point Vicente area north are approximately 0 to 0.77 meters per year, and has locally retreated more than 50 meters within a 65 year period (Hapke and Reid, 2007). Cliff retreat rates in the Point Fermin area are estimated at between 0 to 0.95 meters per year, and has locally retreated more than 60 meters in 65 years (Hapke and Reid, 2007). Along the Portuguese Landslide Complex shoreline erosion removes stabilizing support.

S.5 Other Hazards

S.5.1 Air Pollution (to be further updated by Consultant)

As a safety hazard, air pollution is less likely to be as catastrophic as a major earthquake or be as completely devastating as fire or flood, but a definite health hazard still exists.

Rancho Palos Verdes is fortunate in that the air quality is relatively good, due to the environmental characteristics of the Palos Verdes Peninsula (see Natural Environment). However, during periods of certain climatic conditions (e.g., Santa Ana Winds), the Peninsula is severely impacted by smog. These times of poor air quality often exceed the limits set by the South Coast Air Quality Management District (SCAQMD). It should be noted that certain types of air pollution (primarily, sulfur dioxide) not only cause damage to man, but to plants, animals, and some materials, as well.

S.5.2 Hazard Peculiar to RPV and Environs

The coastal bluffs which rise from the ocean are indeed an impressive and beautiful geologic phenomenon. The bluffs and associated seascape draw people from all over Southern California. This attraction causes visitors and residents alike to wander too close to the point of danger and fall, causing injury and, in some cases, death. Weathering and other factors often leave the geologic structure weak and subject to breakage by the person who comes too close. Also, people have been known to fall due to stumbling while walking parallel to the bluff. In addition to the closeness factor, people are often hurt while trying to descend or ascend the cliffs. This usually occurs when the person is "blazing" a trail of his own instead of using an established access point. To prevent injuries or deaths, the City recommends that visitors use designated trails, avoid bluffs during dark

hours and wear appropriate shoes. The City will post signage to warn visitors of the dangers near a cliff edge.

S.5.3 Wild and Domestic Animals

The historic development of the Peninsula has slowly eliminated several species of wildlife, such as the deer and eagle. However, many of the more adaptable species have remained. At the present time, wildlife populations consist of skunks, rabbits, small rodents, a variety of birds, reptiles, coyotes and fox (See Natural Environment Element – Biotic Resources). Peninsula wildlife does not pose a major health or safety problem to area residents, however, mixing wild animals, domestic animals and humans create potential incidents of snake bites, rabies, etc.

Along with the usual dogs and cats, the nature of development on the Peninsula has and will continue to allow for the keeping of certain large domestic animals, such as horses, in some areas. While no major safety or health problems currently exist, occasionally isolated cases are reported. These cases most generally require preventative measures rather than specific health or medical measures.

S.6 Emergency Services

This section deals with various programs and services designed to avoid hazards, help during hazardous conditions, and/or provide assistance after a hazardous condition has occurred.

S.6.1 Emergency Medical Aid and Rescue

The City of Rancho Palos Verdes subcontracts ambulance service with a private company regulated by the Los Angeles County Fire Department. The subcontractor for ambulance service on the Palos Verdes Peninsula is McCormick. The McCormick ambulance vehicles are based in three separate Fire Stations (Station Nos. 53, 83 & 106) and a McCormick Ambulance Station (Red Cross Station No. 7) within the City of Rancho Palos Verdes.

Aside from the subcontracted ambulance service, a paramedic rescue squad (Los Angeles County Fire Department) serves the contracted areas on the Palos Verdes Peninsula. The City of Rancho Palos Verdes is served by one Paramedic Rescue Squad at Fire Station 106 on Indian Peak Road. The Paramedic Rescue program provides 24 hour service ranging from aiding heart attack victims, to assisting victims who may have fallen from one of the coastal bluffs, to aiding persons stuck in an elevator.

S.6.2 Healthcare

The Palos Verdes Peninsula has the following acute care ("short term") hospitals in Torrance and San Pedro, located approximately 15 minutes away.

Hospital	Location
Del Amo Hospital	Torrance
Harbor - UCLA Medical Center	Torrance
Providence Little Company of Mary Medical Center	Torrance
Providence Little Company of Mary Medical Center	San Pedro
Torrance Memorial Medical Center	Torrance

The Los Angeles County Department of Health Services (LAC DHS) created a map in 2004, illustrating designated medically underserved areas and populations. The existing nearby hospitals are adequately meeting the needs of the City since the LAC DHS 2004 map excludes the City of Rancho Palos Verdes from areas that are designated medically underserved.

Basic health services, such as communicable disease control, public health administration and enforcement of refuse collection ordinances, nursing, clinical services, and related activities are provided at no cost to the City by the Los Angeles County Department of Health Services.

An additional form of rescue operation is provided for water-oriented activities. The Los Angeles County Lifeguards are responsible for lifesaving operations at County beaches. Furthermore, rescue operations for boats in distress off the Rancho Palos Verdes coast are currently provided by Los Angeles County, Los Angeles City, and the U.S. Coast Guard. Although each has its own jurisdiction, in an emergency, jurisdiction is rarely considered, but rather who can get there first.

S.6.3 Flood Control

The City of Rancho Palos Verdes is within the Los Angeles Flood Control District. The Flood Control District encompasses more than 3,000 square miles, 85 cities and approximately 2.1 million land parcels. It includes the vast majority of drainage infrastructure within incorporated and unincorporated areas in every watershed.

The Flood Control District was established to provide flood protection, water conservation, recreation and aesthetic enhancement within its boundaries and is the responsibility of the County of Los Angeles

Department of Public Works. The Watershed Management Division is the planning and policy arm of the Flood Control District. The Public Works Flood Maintenance and Water Resources Divisions, respectively, oversee its maintenance and operational efforts.

The County Public Works Flood Maintenance and Water Resources Divisions are responsible for the operation and maintenance of County-owned storm drains and catch basins within the City of Rancho Palos Verdes. The County Public Works monitor and prepare flooding and mudflow forecast prior to and during significant storms for impacts to the County-owned storm drains. The storm drains are generally inspected in a 5 year cycle while catch basins are maintained more frequently.

While the County-owned storm drains are maintained by the County Public Works Flood Maintenance and Water Resources Divisions, the City-owned storm drains are the responsibility of the City of Rancho Palos Verdes (RPV) Public Works Department. The City of RPV Public Works Department is responsible for the operation and maintenance, including the cleaning of all City-owned storm drain catch basins at least twice per year and on a complaint basis.

Comment [S3]: On 6/8/10, the Planning Commission had a comment/question regarding the jurisdictional responsibility of the storm drains along Western Avenue. The City Attorney has been working on this issue. The pipes belong to RPV, but who maintains them is undecided. Additional text to clarify this issue may be added in the future.

In order to fund the operation and maintenance of City-owned storm drain systems, the City Council determined that a dedicated funding source was needed. Accordingly, in 2005, property owners approved the Storm Drain User Fee, which provides funding for the City's storm drain improvement and maintenance program. The Storm Drain User Fee is dedicated for the repair, reconstruction, and maintenance of City-owned storm drain systems throughout the City and for the installation of filtration devices to reduce polluted runoff and protect coastal water quality. Property owners pay the Storm Drain User Fee for parcels that use the City's storm drain system.

On November 6, 2007, the voters approved Measure C, an amendment to the User Fee ordinance to include a voter enacted Oversight Committee and a 10-year sunset of the storm drain user fee. When the User Fee rate was established by the property owners in 2005, the total User Fees to be collected over 30 years was estimated to be about $50 million to pay for known construction projects, storm drain lining, maintenance, staffing and engineering.

S.6.4 Police Protection

The City is part of a joint-contract with Los Angeles County for police protection. The Lomita Station opened in 1975 and provides police

protection to the Peninsula Region, which is identified as the City of Rancho Palos Verdes, Rolling Hills Estates and Rolling Hills. On an average, the following number of patrol cars protects the City of Rancho Palos Verdes during specific times of the day:

Time	Number of Patrol Cars
Early Morning Shift	2
Day Shift	4
Night Shift	4

The Sheriff's Office has three response categories: Emergency, Priority, and Routine for each City within the Peninsula Region. The table below provides annual response time for the City of Rancho Palos Verdes, Rolling Hills Estates, Rolling Hills, compared to the entire Peninsula Region [Source: Los Angeles County Sherriff's Department (Peninsula Region Quarterly Activity Summary - January to March 2009)].

Areas / Response Time	Rancho Palos Verdes	Rolling Hills Estates	Rolling Hills	Peninsula Region
Emergency (min.)	5.5	5.3	4.8	5.4
Priority (min.)	8.3	7.3	9.9	8.1
Routine (min.)	21.7	18	16.2	20.7

During emergency situations, back-up assistance can be provided by utilizing additional Sheriff units normally assigned to nearby contract cities (Rolling Hills Estates, Rolling Hills, Lomita) and unincorporated areas of the County.

The Sheriff's Department provides assistance and information to Rancho Palos Verdes Neighborhood Watch which provides additional crime prevention and emergency preparedness resources for local homeowners participating in the program.

S.6.5 Fire Protection

Currently, the County of Los Angeles provides fire protection to the City of Rancho Palos Verdes through the operation of the following fire stations.

Fire Station No. 53	
Address	6124 Palos Verdes Drive South, Rancho Palos Verdes
Equipment	1 Fire Engine, 3 Personnel

Fire Station No. 56	
Address	12 Crest Road West, Rolling Hills
Equipment	1 Fire Engine, 1 Patrol Unit, 4 Personnel
Fire Station No. 83	
Address	83 Miraleste Plaza, Rancho Palos Verdes
Equipment	2 Fire Engines (active & reserve), 1 Patrol, 4 Personnel
Fire Station No. 106	
Address	413 Indian Peak Road, Rolling Hills Estates
Equipment	1 Fire Engine, 1 Truck, 1 Paramedic Rescue Squad, 1 Battalion Chief, 1 Patrol, 1 Reserve Wagon, 1 Utility Vehicle, 12 Personnel

The helicopter has also proven to be a very effective tool in fighting brush fires. The occasional brush fire in Rancho Palos Verdes frequently requires helicopter assistance, which has the capability of responding to a call within 20 minutes. Based in Pacoima, the Air Operations Section has a fleet of aircraft consisting of eight helicopters, with the newest models equipped with a 1,000 gallon water tank that uses a "constant flow" delivery system. Los Angeles County has designated the helicopter pads at the Nike Site (53 Alpha) and the Palos Verdes Coastguard Station (53 Charlie) to be used for water re-fueling.

Fire hazards can be minimized in two basic ways. The first method involves the reduction of fire starts. Preventative fire control emphasizes safety in the design, maintenance, and use of structures. Proper safety measures can effectively prevent the possibility of fire. The City's Building & Safety Division enforces the proper safety measures under the regulations and codes of the California Building Code.

The second method of hazards reduction emphasizes the effective response aspect of fire control. Effective response can be assisted by providing necessary access and adequate amounts and pressures of water. The 2006 International Fire Code provides guidelines and standards for fire protection in urban settings and is enforced by the Local Fire Departments to reduce fire deaths, injury and property loss.

S.6.6 Disaster Preparedness and Response

The City of Rancho Palos Verdes has been a member of the South Bay Office of Disaster Management's Area G since 1974. Area G covers all fourteen cities in the South Bay and provides services to the City for disaster planning and training, as well as representation and liaison

Comment [S4]: At the 6/8/10 meeting, the Planning Commission expressed a comment/question as to who is responsible for evacuation of residents/visitors on private/public properties that have high occupation levels, such as the Terranea Resort and schools, especially when roads may be blocked. Additionally, how are schools used as an emergency shelter. Staff will be proposing text to address these comments for future review by the Commission.

services to the Los Angeles County Operational Area, the Governor's Office of Emergency Services, and the Federal Emergency Management Agency. The City has a joint powers agreement with the South Bay Office of Disaster Management for services. The Area G Coordinator is the on-call local expert who provides information and assistance to the City during an emergency or disaster.

The City of Rancho Palos Verdes has an Emergency Operations Plan (EOP). The EOP is based on Incident Command System (ICS) principles and concepts within the Standardized Emergency Management System (SEMS). The SEMS and the NIMS (National Incident Management System) are compatible approaches, and the City of Rancho Palos Verdes recognizes these policies and utilizes the SEMS/NIMS as a basis for the ICS structure. The SEMS/NIMS create a standard incident management system that is scalable and modular, and can be used in incidents of any size/complexity. These functional areas include command, operations, planning, logistics and finance/administration. The SEMS/NIMS incorporate such principles as Unified Command (UC) and Area Command (AC), ensuring further coordination for incidents involving multiple jurisdictions or agencies at any level of government.

Preparedness activities are necessary to the extent that mitigation measures have not, or cannot completely, prevent disaster. In the preparedness phase, governments, organizations, and individuals develop plans to save lives and minimize disaster damage. These activities serve to develop the response capabilities needed in the event of an emergency. The EOP identifies many of the preparedness efforts that the City of Rancho Palos Verdes has undertaken or plans to undertake, such as preparedness plans, emergency exercises/training, emergency communication systems, evacuation plans/training, resource inventories, emergency personnel/contact lists, mutual aid agreements and public education/information.

The EOP also details response activities the City of Rancho Palos Verdes will follow pending the occurrence of an actual disaster or emergency. These activities help to reduce casualties and damage, and speed recovery. Response activities could include public warning, notification of public authorities, evacuation, rescue, assistance, activation of the Emergency Operations Center (EOC), declarations of disaster, search and rescue, and other similar operations addressed in the updated EOP.

S.6.7 *Emergency Communications*

In times of emergency, a dependable and flexible communications system is essential. The telephone is the fastest and most reliable form of communication available. The "911 Telephone System" provides a single emergency telephone number (911) which, when called, will be routed to the correct agency (e.g. fire, police, etc.). In 2007, an Emergency Communications Center (ECC) was constructed at the City Hall complex to backup the City's normal emergency communication systems. When activated due to the loss of the normal communication methods, the ECC provides emergency communications by utilizing Amateur Radio Operators.

The Amateur Radio operators that would staff the ECC during times of emergency are part of the Los Angeles Disaster Communications Service (DCS). DCS is administered by the Sheriff's Department Emergency Operations Bureau. DCS is an element of the Federal Government's Radio Amateur Civil Emergency Service (RACES), which was established under the Federal Communications Commission Rules and Regulations as part of the amateur radio service. RACES support emergency management entities throughout the United States. During major incidents DCS Amateur Radio operators coordinate, transmit and receive command and liaison traffic for the County, City, Sheriff's Department and Fire Department, as well as other disaster relief agencies.
In 2005, the City established the Peninsula Volunteer Alert Network (PVAN) with the goal of providing emergency communications at the neighborhood level. PVAN operators communicate to and from the City through the ECC. When completely staffed, there will be a PVAN operator in each neighborhood supporting members of the Community Emergency Response Team (CERT) and Neighborhood Watch Block Captains.

S.7 Other Safety Services

S.7.1 *Animal Control*

Currently, the Los Angeles County Department of Animal Care & Control is contracted to enforce the provisions of the City's Animal Control Ordinance (Chapter 6.04), as well as to provide other animal related functions. The animal control program consists of the following major operations:

- Enforcement:
  - Respond to allegations of code violations, such as leash law violations, the feeding of prohibited wildlife, etc.
  - Canvass for expired animal licenses, as needed or requested.
  - Investigate allegations of animal cruelty.
  - License and inspect animal related businesses, as needed or requested.
- Field Services and Outreach:
  - Renew animal licenses.
  - Provide low-cost vaccination clinics, as needed or requested.
  - Respond to service calls, such as stray and dead animal pickup.
  - Return identifiable animals to owners in field, when possible.
  - Provide educational materials and programs upon request, when available.
- Shelter Services:
  - Provide impounded animals with appropriate care, including food, shelter and medical treatment.
  - Impound animals for at least the state mandated holding period.
  - Vaccinate impounded animals, when necessary.
  - Provide adoption and fostering opportunities, when possible.
  - Post the photographs of impounded animals on the County's website to help owners find their lost pets.
  - Provide low-cost spay/neutering and free micro chipping of all adopted animals.

In cases of natural disasters, such as fire and earthquakes, the Lomita Sherriff's Department implements an emergency evacuation plan to relocate animals to safety. The Lomita Sheriff's Department sponsors the Palos Verdes Peninsula Equine Rescue Team, which is a group of volunteers that is trained to conduct emergency rescue, evacuation and sheltering services for horse and other large domestic animals during local emergencies, such as brush fires and inclement weather. According to the Los Angeles County Department of Animal Care and Control, the Carson shelter is designated as an emergency shelter for animals evacuated during disastrous events on the Peninsula. Additionally, the City of Rancho Palos Verdes has a Memorandum of Understanding with the Area G Veterinary

Disaster Team (VDT), a California nonprofit corporation that assists in providing temporary housing for animals and emergency veterinary medical care by setting up a temporary triage animal center. The VDT also assists in supplying lost and found animal information services to the public.

S.7.2 Air Pollution Control

South Coast Air Quality Management District (AQMD) is the air pollution control agency for all of Orange County and the urban portions of Los Angeles, Riverside and San Bernardino counties, the smoggiest region of the United States. Rancho Palos Verdes is part of the Western Region of AQMD's four-county jurisdiction. AQMD is responsible for controlling emissions primarily from stationary sources of air pollution, including anything from large power plants and refineries to the corner gas station.

AQMD develops and adopts an Air Quality Management Plan, which serves as the blueprint to bring areas into compliance with federal and state clean air standards. Permits are issued to many businesses and industries to ensure compliance with air quality rules. AQMD staff conducts periodic inspections and continuously monitor air quality from different locations throughout the four-county area. This allows AQMD to notify public whenever air quality is unhealthy.

S.7.3 Codes and Ordinances

There are numerous codes and ordinances which set safety standards, specifications, and regulations. Although the City has developed certain safety regulations, contracts and service agreements with the County currently set most safety standards. The Building Code, Zoning Ordinance and Subdivision Ordinance are enforced by the City's Planning Department while the Fire Code is enforced by the Los Angeles County Fire Departments.

While the various codes and ordinances cannot be expected to be perfect for all situations, they should: "(1) reflect the concept of risk and uncertainty; (2) be dynamic in allowing for amendment resulting from new knowledge and improved understanding; (3) be rationally interrelated and tied to a plan which considers probable forms of natural disasters among its elements; (4) be based on a logic which the legislator, administrator, and citizen can fully comprehend; thus, allowing for effective participation in the decision-making process" (Petak, et al, Pg 145).

One of the most significant and important documents in respect to safety are the building codes. The City's Building and Safety Division uses the most up to date code versions to implement and enforce construction standards and codes. In addition to these Codes, the Building and Safety Division coordinates with the City's geotechnical consultants on the review of geology and soils reports for various construction projects, primarily due to the area's physical characteristics, such as slope, soils, and geologic structure. Specifically, the primary purpose of the California Building, Plumbing, Mechanical and Electrical Codes are to protect the public health, safety, and welfare by setting minimum construction and building standards which minimize hazard impacts.

The City adopted its original Development Code, Zoning and Subdivision Ordinances, in December 1975. As with most other codes and ordinances, the zoning ordinance is principally designed to protect the public health, safety, and general welfare. Within the numerous zoning districts (based on land use), regulations generally specify: the use or function of a structure; the density of population; the lot coverage (e.g., structure and open space); soil stability investigation and the minimum dimensions of the structure. Over time, new and amended Code sections have been added for a more effective implementation of the City's goals and objectives.

S.8 Hazard Potential and Risk

Analysis of the hazards inventory indicate that, while all hazards are of concern, geologic hazards (earthquakes and landslides, primarily), fire, and flood are potentially the most destructive in terms of life and property. Of these three, earthquakes and associated secondary effects are capable of the most widespread damage. Fire and floods are generally confined to isolated areas. This is due to the diverse topography and the ability of man to prevent and/or deal with flooding and fires. This section discusses earthquake and associated hazards in terms of potential destruction and risks.

The census indicates that fewer than 220 residential structures were constructed on the Peninsula prior to 1933. A majority of these older structures appear to be within the Palos Verdes Estates and Miraleste areas. In a larger earthquake, it is assumed that the major structural damage might result in buildings constructed before 1933, when building code requirements for seismic resistance were adopted. Furthermore, due to vintage and construction techniques, it is expected that the most vital public buildings (administrative, fire, police) will withstand major quakes

and recover quickly enough to function as emergency operation assistance centers.

Estimates of infrastructure damage due to a major earthquake will vary from negligible to widespread. It is suggested that major supply lines (water, gas) might be subject to major damage. Within Rancho Palos Verdes, the major concern lies with vital services located on landslide areas. An earthquake could trigger landslides, which could eventually result in severe damage to the roadway, water, communications, and power networks. Furthermore, there seems to be some question as to the condition of some of the water storage facilities and pipelines in the City and their ability to withstand a major earthquake.

The level of risk associated with each event caused by a fault is indicated by the recurrence interval in much the same manner as the risk from other natural hazards, such as flooding, is defined by a recurrence interval. For example, it is common practice to design flood-prevention works to accommodate the flows from a 100-year storm. Where a higher level of protection is desired, as, for example, along the Santa Ana River in Orange County, the design levels are increased to accommodate the flows from storms occurring at roughly 300-500 year intervals.

The risk of earthquake should be considered in a similar manner. Design for the 100-year event is considered minimum; where a higher level of protection is desired, such as for hospitals, design levels should be increased to protect against earthquakes with longer recurrence intervals. The levels of the following table are recommended for earthquakes expected from the Newport-Inglewood fault zone.

Comment [S5]: On 6/8/10 the Planning Commission had a comment/question on how this concept of recurrence interval actually gets applied in RPV. Staff will add language clarifying whether this table is general information applicable to most areas, or specifically related to RPV and how it may or may not get applied.

Use	Recurrence Interval	Expected Magnitude
Limited occupancy (warehouses, automated manufacturing facilities, etc.)	100 years	5.2
Normal occupancy (residences, stores, etc.)	150 years	5.6
Critical facilities (hospitals, fire and police stations, schools, critical utilities, etc.)	300 years	6.5

The risk of an earthquake from the San Andreas fault is a special case. As discussed in the previous section, a major or "great" earthquake is considered imminent.

S.9 Impacts

The intent of the Safety section is to identify potential hazards and hazard areas, and to provide policies and recommendations by which to increase safety and reduce hazards. Although the principal impact of this section is, for the most part, expected to be beneficial to both man and natural systems, some adverse economic conditions may arise.

The financial impact will probably be the City's greatest concern. The development of future safety programs and the possible expansion of existing programs may or may not require some public financing. If required, the initial costs of such programs, however, are expected to be largely offset by Federal, State, and county assistance programs, and through the ultimate reduction of damage caused by hazards.

Costs to individuals may also increase in the form of construction costs, due to future building standards, and in the form of hazard prevention costs due to landscaping and services; however, these too are expected to be offset in the long term by reduction of damage and/or loss of possessions and individuals.

S.10 Safety Policies

It is the policy of the City to:

1 Promote education and safety awareness pertaining to all hazards which affect Rancho Palos Verdes residents and adjacent communities.

2 Adopt and enforce building codes, ordinances, and regulations using best practices which contain design and construction standards based upon appropriate levels of risk and hazard.

3 Encourage cooperation among adjacent communities to ensure law enforcement and fire protection mutual aid in emergency situations.

4 Cooperate with the fire protection agency and water company to ensure adequate water flow capabilities with adequate back-up throughout all areas of the City.

5 Continue to cooperate with fire protection agencies in utilizing public facilities for water and refueling location.

6 ~~Using best practices d~~**Develop** and implement stringent site design and maintenance criteria for areas of high fire hazard potential in coordination with fire protection agencies.

(PLANNING COMMISSION RECOMMENDED CHANGE TO GENERAL PLAN UPDATE STEERING COMMITTEE'S RECOMMENDED POLICY)

7 Implement reasonable and consistent house numbering and street naming systems.

8 Coordinate with the Fire Department to provide adequate emergency access to **all streets, including** the end points of cul-de-sacs**, and along the sides of structures.**

(PLANNING COMMISSION RECOMMENDED CHANGE TO GENERAL PLAN UPDATE STEERING COMMITTEE'S RECOMMENDED POLICY)

9 Ensure that services are available to adequately address health and sanitation issues.

10 Work with other jurisdictions to ensure that local, County, State, and Federal health, safety, and sanitation laws are enforced.

11 Develop and maintain relationships with various levels of health, safety, and sanitation agencies.

12 Ensure the availability of paramedic rescue and fire suppression services to all areas of the City.

13 Maintain and implement a current Standard Emergency Management Systems (SEMS) Plan to cope with major disasters.

14 Regulate the activities, types, kinds, and number of animals and balance the interest of animal owners and persons whose welfare is affected.

15 Ensure the protection of compatible levels of wild animal populations, which do not adversely impact humans and their domestic animals.

16 Work with adjacent jurisdictions with respect to animal regulation activities.

17 Consider alternative animal control and enforcement methods and facilitate shelter, medical treatment, and training classes where needed.