4.5 GEOLOGY AND SOILS

This section evaluates the potential for construction and operation of the proposed project to result in adverse impacts associated with geologic hazards, soil hazards, and seismic hazards. The analysis is based on review of available geologic and geotechnical maps and reports of the project area and vicinity, including reports and information published by USGS and the California Geological Survey (CGS), the Monterey County General Plan, and a project-specific geotechnical study prepared by Cleary Consultants, Inc. for the project (Cleary 2010).

Additional references are provided in Chapter 8 of the EIR, and the geotechnical study is included in Appendix D, Geology and Soils Background Information.

4.5.1 Existing Conditions

4.5.1.1 Geology

The project area is located within the coastal zone of Monterey County in the Coast Ranges Geomorphic Province. The Coast Ranges are generally northwest-trending mountain ranges that range in elevation from 2,000 to 6,000 feet above msl (CGS 2002). The ranges and valleys within this province are composed of thick Mesozoic and Cenozoic sedimentary strata. The Pacific coastline is uplifted (lifted by tectonic forces), wave cut, and characterized by raised terraces or platforms formed by wave erosion and shoreline retreat.

The project site is located in the Cypress Point area of Pebble Beach, approximately 600 feet (0.12 mile) east of Fanshell Beach and the Pacific Ocean. This area is characterized by shoreline bluffs and low cliffs, which are generally capped by recent (Holocene age) dune sand deposits, underlain by eroded granodiorite bedrock (Cleary 2010). The dune sand deposits are up to 82 feet thick, unconsolidated, and consist of well-drained medium to coarse-grained loose sand with poorly developed or absent underlying organic soil layers. Dune sands are subject to accelerated erosion in areas where vegetation is disturbed or removed (Cleary 2010). The underlying bedrock type in the Cypress Point area is porphyritic granodiorite, which forms resistant coastal bluffs and rocky outcrops. Granodiorite is typically light gray to moderately pink and medium grained. It is variably weathered, ranging from highly decomposed to fresh to slightly weathered crystalline rock.

The project site slopes downward from east to west, with the existing natural grade across the parcel ranging from approximately 105 to 50 feet above msl. The upper portion of the project site, where the existing residence is located and where the proposed residence would be located, is currently graded and terraced, with an overall change/fall of approximately 20 feet from east to west. The portion of the site that currently supports the existing two-story residence has been cut into the slope and the backyard has been terraced with a 50- to 75-foot-wide gently sloping to flat area at an elevation of approximately 80 to 85 feet above msl. In the western portion of the site, dune sand terrain extends toward 17-Mile Drive and the ocean at an overall gradient of approximately 25%. Several hard granodiorite bedrock outcrops are present on the project site, striking moderately to the northwest and dipping strongly southward (Cleary 2010).

During the geotechnical study conducted by Cleary Consultants, groundwater was detected at depths ranging from 9.5 to 16 feet below ground surface within the project site. Localized perched groundwater is expected to be present within the project site due to variable factors such as rainfall, temperature, runoff, irrigation, etc.

4.5.1.2 Seismic Conditions

Faults and Risk of Surface Fault Rupture and Ground Shaking

Monterey County is located in a region characterized by high seismic activity in the form of frequent small/moderate earthquakes and less frequent major earthquakes (County of Monterey 2010). Primary seismic hazards that can occur as a result of earthquakes include ground failure, liquefaction, seismic-induced water waves such as tsunamis and seiches, and dam failure. The greatest seismic threat in Monterey County is the segment of the San Andreas Fault, which runs through the southeastern portion of the county for approximately 30 miles. This segment of the San Andreas Fault is approximately 45 miles east of the project site.

There are several faults located near the project site (refer to Figure 4.5-1) including two unnamed faults located approximately 550 feet southwest of the project site and 750 feet east of the project site. Both unnamed faults were identified in *Geologic Resources and Constraints Monterey County, California, A Technical Report for the Monterey County 21st Century General Plan Update Program* (Rosenberg 2001). The unnamed faults were described as faults without recognized Quaternary displacement (within the last 1.6 million years) or showing evidence of no displacement during Quaternary time, not necessarily inactive. The Cypress Point Fault is a potentially active fault located approximately 1,250 feet southwest of the project site. The fault setback requirements, outlined in Monterey County Code Chapter 20.147.060, are not applicable.

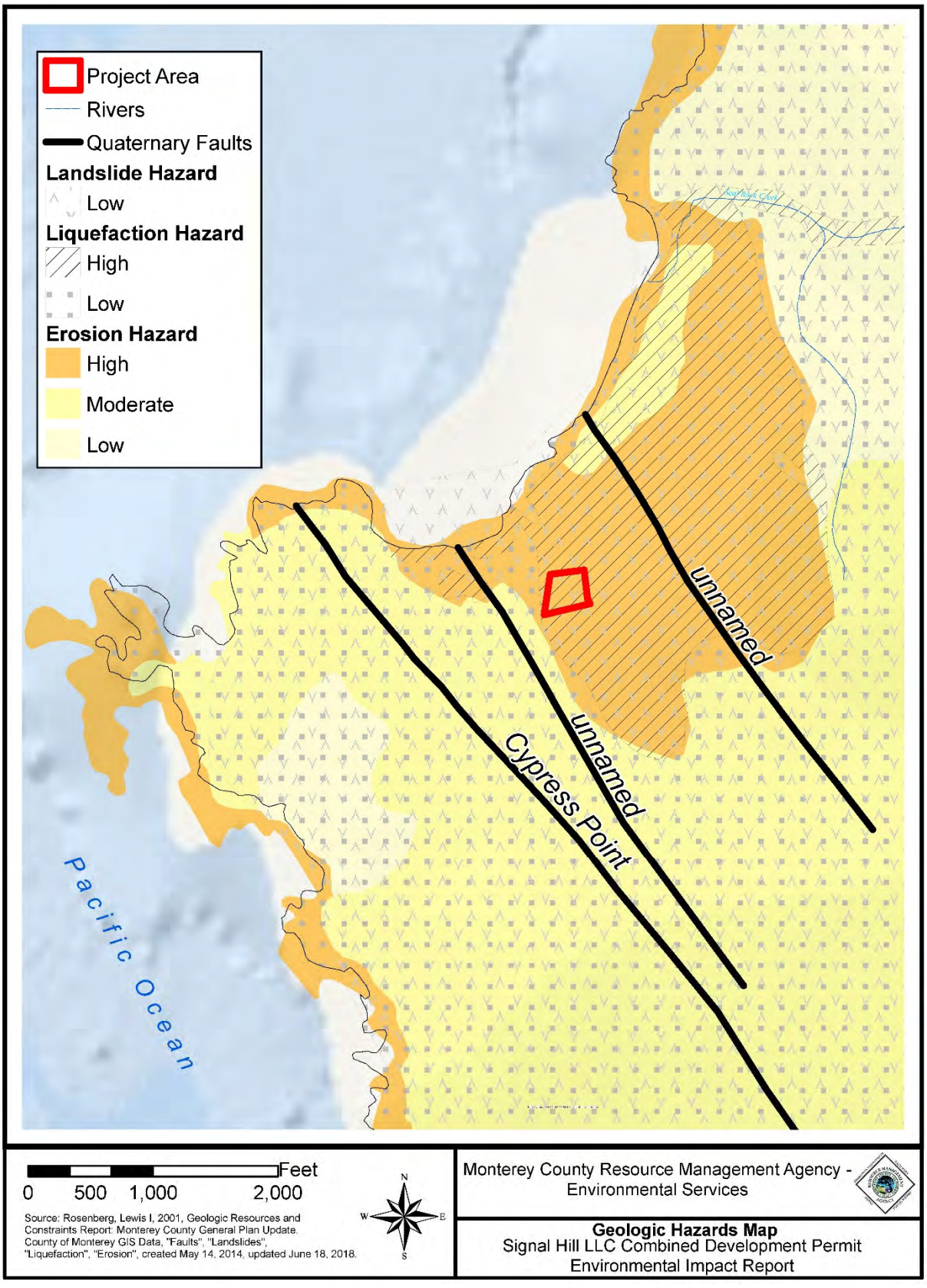
There are no known active or potentially active faults crossing the project site. Based on the Earthquake Shaking Potential for California Map prepared by CGS, the project site is located in a region identified as being relatively distant from known, active faults and expected to experience lower levels of shaking less frequently (CGS 2008). Additionally, the project site is not located within an Earthquake Fault Zone as defined by the State of California Alquist-Priolo Earthquake Fault Zoning Act; therefore, the hazard resulting from surface fault rupture or fault offset at the site is considered very low (California Department of Conservation 2015). During most earthquakes in this region, only weaker, masonry buildings would be damaged, although very infrequent earthquakes could still result in strong shaking in these areas (CGS 2008). Therefore, the project site is not expected to be at significant risk for surface fault rupture or ground shaking.

Liquefaction and Related Ground Failures

Liquefaction is a phenomenon where earthquake-induced ground motion causes relatively cohesionless (saturated or partially saturated) soils to lose strength and stiffness, causing it to act like a liquid. One of the primary factors controlling the potential for liquefaction is depth to groundwater. Soils that are generally most susceptible to liquefaction are clean, loose, saturated, uniformly graded, fine-grained sands and silts that lie within roughly 50 feet of the ground surface.

The project site is located within a high liquefaction risk area, as shown on Figure 4.5-1 (County of Monterey 2010). However, based on the results of the geotechnical study (Cleary 2010), the project site is underlain by predominantly non-saturated loose to medium dense clean sand and silty sand underlain by granodiorite bedrock. Based on these conditions, the likelihood of soil liquefaction during strong ground shaking at the site is considered low (Cleary 2010). Because the sandy soils overlying the granodiorite at the site are unsaturated, with the exception of local perched water, other ground failures such as soil lurching, lateral spreading, and ground cracking are also considered unlikely to occur (Cleary 2010).

Figure 4.5-1. Geologic Hazards



4.5.1.3 Slope Stability and Landslides

The project site slopes downward from east to west, with the existing residence located at the upper end of the parcel near Signal Hill Road. The existing natural grade underlying the area proposed for development ranges from 105 to 95 feet above msl, resulting in an average grade of 100 feet above msl. As shown in Figure 4.5-1, the existing (natural and manufactured) slopes within the project site are located in an area identified as having a low susceptibility for landslides by the Monterey County Floodplain Management Plan (County of Monterey 2003). Therefore, the project site is not expected to be at risk for landslides. On the western (downward) portion of the site, dune sloughing is expected to occur on steep dune slopes.

4.5.1.4 Soils

The project site is entirely composed of dune land (map unit Df) soils (NRCS 2015). This soil type is derived from quartz and feldspar eolian sands and is found on dunes. The typical profile for this soil consists of 0–60 inches of fine sand. Dune land is considered excessively drained with a very low susceptibility for runoff. Dune land is considered very limited for being capable of supporting dwellings, primarily due to slope (NRCS 2015).

The exploratory borings, performed by Cleary Consultants, Inc. for the geotechnical study, encountered approximately 8 to 14 feet of predominantly loose, medium to fine grained, slightly moist to dry cohesionless clean sand overlying 1–5 feet of loose to medium dense silty to clayey sand, in turn overlying very dense weathered granodiorite bedrock to a depth of 31 feet, the maximum depth explored (Cleary 2010). The upper clean sand is non-plastic and non-expansive while the underlying silty to clayey sand has a low to moderate expansion potential.

4.5.2 Regulatory Setting

4.5.2.1 State Regulations

Alquist-Priolo Earthquake Fault Zoning Act

The Alquist-Priolo Earthquake Fault Zoning Act of 1972 regulates development and construction of buildings intended for human occupancy to avoid the hazard of surface fault rupture. In accordance with this law, CGS maps active faults and designates Earthquake Fault Zones along mapped faults. This Act groups faults into categories of active, potentially active, and inactive. Historic and Holocene age faults are considered active, Late Quaternary and Quaternary age faults are considered potentially active, and pre-Quaternary age faults are considered inactive. These classifications are qualified by the conditions that a fault must be shown to be “sufficiently active” and “well defined” by detailed site-specific geologic explorations in order to determine whether building setbacks should be established.

Any project that involves the construction of buildings or structures for human occupancy, such as an operation and maintenance building, is subject to review under the Alquist-Priolo Earthquake Fault Zoning Act, and any structures for human occupancy must be located at least 50 feet from any active fault.

Seismic Hazards Mapping Act of 1990

In accordance with PRC Chapter 7.8, Division 2, the California Department of Conservation, Division of Mines and Geology (now CGS) is directed to delineate Seismic Hazard Zones through the Seismic Hazards Zonation Program. The purpose of the act is to reduce the threat to public health and safety and to minimize the loss of life and property by identifying and

mitigating seismic hazards, such as those associated with strong ground shaking, liquefaction, landslides, other ground failures, or other hazards caused by earthquakes.

Cities, counties, and state agencies are directed to use seismic hazard zone maps developed by CGS in their land use planning and permitting processes. In accordance with the Seismic Hazards Mapping Act, site-specific geotechnical investigations must be performed prior to permitting most urban development projects within seismic hazard zones.

California Building Standards Code

The State of California provides minimum standards for building design through the California Building Code (CBC; California Building Standards Commission 2013). The CBC is based on the Uniform Building Code (UBC), which is used widely throughout the United States (generally adopted on a state-by-state or district-by-district basis), and has been modified for conditions within California. In 2013, a revised version of the CBC took effect. Chapter 16 of the CBC contains definitions of seismic sources and the procedure used to calculate seismic forces on structures.

4.5.2.2 Local Regulations

Monterey County Grading and Erosion Control Regulations

Monterey County Grading and Erosion Control Ordinances (Chapters 16.08 and 16.12 of the County Code) are enforced by the County Resource Management Agency, Environmental Services. The grading ordinance was adopted to safeguard the health, safety, and welfare of the public, and to minimize erosion, protect fish and wildlife, and otherwise protect the natural environment. The erosion control ordinance was adopted to eliminate and prevent conditions of accelerated erosion that have led to, or could lead to, degradation of water quality, loss of fish habitat, damage to property, loss of topsoil or vegetation cover, disruption of water supply, and increased danger from flooding. Grading permits, with supporting grading and erosion control plans, are required for all projects that move 100 cubic yards or more of soil. No grading permit can be issued if a determination is made that grading will result in hazards by reason of flood, geological hazard, seismic hazard or unstable soils, or is liable to endanger any other property or result in the deposition of debris on any public way or property or drainage course, or otherwise create a nuisance.

4.5.2.3 Applicable State, Regional, and Local Plans and Policies Relevant to Geologic, Soils, and Seismic Hazards

Table 4.5-1 lists applicable state, regional, and local land use policies and regulations pertaining to geology and soils that were adopted for the purpose of avoiding or mitigating an environmental effect and that are relevant to the proposed project. A general overview of these policy documents is presented above in Section 4.5.2, Regulatory Setting, and Chapter 3, Environmental Setting. Also included in Table 4.5-1 is an analysis of project consistency with identified policies and regulations. Where the analysis concludes the proposed project would potentially conflict with the applicable policy or regulation, the reader is referred to Section 4.5.5, Impact Assessment and Mitigation Measures, for additional discussion.

Table 4.5-1. Applicable Local Plans and Policies Relevant to Geology and Soils

Goals, Policies, Plans, Programs and Standards	Intent of the Policy in Relation to Avoiding or Mitigating Significant Environmental Impacts	Preliminary Consistency Determination*
County of Monterey Del Monte Forest Area Land Use Plan		
Del Monte Forest Land Use Plan Key Policies		
Hazards: Land uses and development in areas of geologic, flood, fire, and other coastal hazards shall be carefully regulated through the best available planning practices and sited and designed in order to minimize risks to life and property, and damage to the natural environment.	The intent of this policy is to regulate development in areas of designated hazard risk to minimize risks to life, property, and the natural environment.	Potentially Consistent. The project site is not located in an area identified as being at risk for flooding. The site is located in an area designated as having a high potential for erosion and the project includes the implementation of an erosion control plan and a drainage plan to mitigate associated impacts. Mitigation has been identified requiring implementation of all of the recommendations of the site-specific geotechnical study (Cleary 2010) to reduce the potential for property damage and/or hazards as a result of soil conditions and seismic events. The project site is located in an area identified as a high fire severity zone by CAL FIRE (CAL FIRE 2007). However, the project would involve replacing an existing single-family residence with a new single-family residence. Therefore, the project would not result in a change in land use or increase in susceptibility to fire risk. With implementation of identified mitigation, the project would be consistent with this policy.
Resource Management Element		
HAZARDS		
Policy 38. New development shall be sited and designed to minimize risk from geologic, flood, or fire hazards; to assure stability and structural integrity; and to not threaten the stability of a site, contribute	The intent of this policy is to minimize risk associated with geologic, flood, and fire hazards; to assure stability and	Potentially Consistent. The project site is not located in an area identified as being at risk for flooding. The site is located in

Table 4.5-1. Applicable Local Plans and Policies Relevant to Geology and Soils

Goals, Policies, Plans, Programs and Standards	Intent of the Policy in Relation to Avoiding or Mitigating Significant Environmental Impacts	Preliminary Consistency Determination*
significantly to erosion, geologic instability, or destruction of the site or surrounding areas. Areas that are subject to the highest category of fire hazard in CAL FIRE Fire Hazard Rating System shall be considered unsuitable for development, unless it can be clearly demonstrated that design measures can adequately mitigate the fire hazard. Mitigation of hazards shall be demonstrated by detailed technical reports specific to the hazard type in question (e.g., soils, geologic, geotechnical, erosion control, fire hazard, etc.) that are prepared by persons who are appropriately qualified in the hazard field in question (e.g., civil engineers and engineering geologists familiar with coastal processes, geotechnical engineers, etc.) and that are submitted as part of any permit application. All technical reports shall be prepared consistent with County criteria for such reports (e.g., criteria for detail on seismic hazards are contained in the General Plan Safety Element; criteria for detail on fire hazards are based on the fire hazard rating system of CAL FIRE; criteria for detail on shoreline hazards are based on Coastal Commission guidelines). All technical reports and analyses shall accompany development applications and/or be part of any required environmental documentation (e.g., that associated with CEQA).	structural integrity; and to not threaten the stability of a site, contribute significantly to erosion, geologic instability, or destruction of the site or surrounding areas.	an area designated as having a high potential for erosion and the project includes the implementation of an erosion control plan and a drainage plan to mitigate associated impacts. The project site is located in an area identified as a high fire severity zone by CAL FIRE, but not the highest category of fire hazard (i.e., very high) (CAL FIRE 2007).The project would involve replacing an existing single-family residence with a new single-family residence. Therefore, the project would not result in a change in land use or increase in susceptibility to fire risk. A site-specific geotechnical study has also been prepared for the project (Cleary 2010), consistent with this section. Mitigation has been identified requiring implementation of all of the recommendations of the geotechnical study to reduce the potential for property damage and/or hazards as a result of soil instability and seismic events. With implementation of identified mitigation, the project would be consistent with this policy.
Policy 40. Development shall be sited and designed to conform to site topography and to minimize grading and other site preparation activities. Natural features, such as tree cover, should be preserved. Applications shall be reviewed for potential onsite and offsite impacts arising from grading, as well as related geologic and seismic hazards, and mitigation measures may be required to offset such impacts. All areas disturbed by grading shall be revegetated with non-invasive native plant species appropriate to the site in order to recreate as much as possible native plant and animal habitat.	The intent of this policy is to minimize impacts resulting from grading and other site preparation activities.	Potentially Consistent. The majority of the proposed grading and residential development would be located on previously disturbed and graded areas, consistent with this policy. The project includes implementation of an erosion control plan and a drainage plan to mitigate the effects of grading and demolition activities. Additionally the project includes restoration of

Table 4.5-1. Applicable Local Plans and Policies Relevant to Geology and Soils

Goals, Policies, Plans, Programs and Standards	Intent of the Policy in Relation to Avoiding or Mitigating Significant Environmental Impacts	Preliminary Consistency Determination*
		approximately 1.67 acres of native dune habitat pursuant to the Dune Restoration Plan. Tree removal is proposed to accommodate development of the larger residential structure; however, mitigation has been identified that requires replacement (at a 2:1 ratio) and maintenance of removed trees to restore on-site vegetation. With implementation of identified mitigation, the project would be consistent with this policy.
Policy 41. Structures to be occupied shall be set back a minimum of 50 feet from an active or potentially active fault as determined by geologic investigation.	The intent of this policy is to establish a set-back distance from potentially active faults for development of new structures to prevent damage resulting from surface ruptures.	Potentially Consistent. Per the geotechnical study prepared for the project (Cleary 2010), the project site is not located within 50 feet of a potentially active fault.
Policy 46. Geologic and geotechnical reports shall be required for unstable areas and for all proposed blufftop development.	The intent of this goal is to require technical reports for unstable areas and all blufftop development	Potentially Consistent. A geotechnical study was prepared for the proposed project to ensure project design is appropriate for the project location and on-site conditions (Cleary 2010).
Monterey County Coastal Implementation Plan		
Part 5 Regulations for Development in the Del Monte Forest Plan Area (Chapter 20.147)		
20.147.060 Hazards A. Report Requirements Mitigation of hazards shall be demonstrated by detailed technical reports specific to the hazard type in question (e.g., soils, geologic, geotechnical, erosion control, fire hazard, etc.) that are prepared by persons who are appropriately qualified in the hazard field in question (e.g., civil engineers and engineering geologists familiar with coastal processes, geotechnical engineers, etc.) and that are submitted as part of any permit application. All technical reports and analyses shall accompany development applications and/or be part	The intent of this section is to carefully regulate land uses and development in areas of geologic, flood, fire, and other coastal hazard through the best available planning practices, including appropriate siting and design for long-term stability, in order to minimize risks to life and property and damage to the natural environment.	Potentially Consistent. The project site is located in an area designated as having a high potential for erosion and the project includes the implementation of an erosion control plan and a drainage plan to mitigate associated impacts. Mitigation has been included to ensure the design and construction recommendations provided in the geotechnical study prepared by Cleary Consultants, Inc. are implemented prior to and during

Table 4.5-1. Applicable Local Plans and Policies Relevant to Geology and Soils

Goals, Policies, Plans, Programs and Standards	Intent of the Policy in Relation to Avoiding or Mitigating Significant Environmental Impacts	Preliminary Consistency Determination*
of any required environmental documentation. As technical reports supporting development proposals are completed and received by the County, the information contained therein shall become part of the public record. Where appropriate, the results of such technical reports shall augment and may supersede, if appropriate, more general information found in other County sources. Development that includes preparation of any technical report shall require recording a notice that development on the parcel must be in accordance with said report, and consistent with the terms and conditions of this coastal development permit. Said notice shall be recorded prior to issuance of building or grading permits. 1. Geologic Report Requirements (a) Regardless of a parcel's seismic hazard zone, a geologic report shall be required for, but not limited to, the following types of projects: (1) standard subdivisions; (2) schools, civic buildings, and other public facilities; (3) emergency communication facilities; (4) flood control projects; and, (5) diking dredging, filling, and construction of new structures within shoreline, estuarine and wetland areas. (b) Regardless of a parcel's seismic hazard zone, a geologic report shall be required for any development project located in the following areas: (1) landslide areas, or areas showing evidence of ground movement within recorded history; (2) within 50 feet of the face of a cliff or bluff or within the area of a 20 degree angle above horizontal from the face of a cliff, whichever is greater; (3) within 1/8 mile of an active or potentially active fault; (4) on slopes of greater than 30%; (5) within sand dune habitats; and,		construction to mitigate potential impacts. The project site is located in an area identified as a high fire severity zone by the California Department of Forestry and Fire Protection (CAL FIRE 2007). However, the project would not result in a substantial change in land use or increase in susceptibility to fire risk. CAL FIRE would continue to provide fire prevention and response services to the project site. With implementation of identified mitigation, the project would be consistent with this policy.

Table 4.5-1. Applicable Local Plans and Policies Relevant to Geology and Soils

Goals, Policies, Plans, Programs and Standards	Intent of the Policy in Relation to Avoiding or Mitigating Significant Environmental Impacts	Preliminary Consistency Determination*
(6) in any area of known or suspected geologic hazards. (c) If a parcel is located in Seismic Hazard Zone IV, V, or VI, or in Recent Alluvium or Unstable Uplands areas (as shown on County Seismic Hazard Maps), a geologic report shall be required for, but not limited to, the following projects: (1) churches; (2) theaters; (3) hotels, motels; (4) utility centers; (5) large commercial or industrial buildings or centers; (6) minor subdivisions; and, (7) apartment buildings. (d) If a parcel is located in Seismic Hazard Zone VI, an Unstable Uplands or Recent Alluvium area, or in an area of a known hazard, a geologic report shall be required for, but not limited to, the following projects: (1) single family dwellings; (2) small commercial or industrial buildings; and, (3) grading, when a coastal development permit is required. (e) Projects which do not require a geologic report, unless a hazard is otherwise known, include but are not limited to: (1) uninhabited structures; (2) pole barns; (3) storage sheds; (4) greenhouses; (5) uses in existing structures; (6) structural additions; (7) additions to water systems		

Table 4.5-1. Applicable Local Plans and Policies Relevant to Geology and Soils

Goals, Policies, Plans, Programs and Standards	Intent of the Policy in Relation to Avoiding or Mitigating Significant Environmental Impacts	Preliminary Consistency Determination*
(f) Geologic reports shall be prepared, at the applicant's expense, by a registered geologist or registered engineering geologist, as deemed appropriate by the County given the project type and probable hazards. (g) Geologic reports shall be required, submitted, and deemed adequate by the County prior to the application being considered complete. The manner (electronic versus hard copy, number of copies, etc.) said Plan is to be submitted shall be determined by the Planning Department. (h) Where there is a dispute over the adequacy of the geologic report, a third party review by a registered geologist or registered engineering geologist shall be required. The review shall be at the applicant's expense. Third party review and any necessary report revisions shall be completed prior to receiving approval pursuant to Section 20.70.130. (i) Geologic reports shall be consistent with "Guidelines for Geologic/Seismic Reports" of the California Division of Mines and Geology and shall include, at a minimum, the following elements, as applicable to the site: (1) Regional geologic setting; (2) Historic, current and foreseeable erosion, including investigation of recorded land surveys and tax assessment records in addition to the use of historic maps and photographs where available, and possible changes in shore configuration and transport, including in relation to generally accepted estimates of accelerated future sea level rise over the development's lifetime; (3) Bluff geometry and site topography, extending the surveying work beyond the site as needed to depict unusual geomorphic conditions that might affect the site and the proposed development. The extent of the bluff top considered should at a minimum include the area between the face of		

Table 4.5-1. Applicable Local Plans and Policies Relevant to Geology and Soils

Goals, Policies, Plans, Programs and Standards	Intent of the Policy in Relation to Avoiding or Mitigating Significant Environmental Impacts	Preliminary Consistency Determination*
the bluff and a line described on the bluff top by the intersection of a plane inclined at a 20 degree angle from the horizontal passing through the toe of the bluff or cliff, or 50 feet inland from the edge of the cliff or bluff, whichever is greater; (4) Geologic conditions, including soil, sediment, and rock types and characteristics in addition to structural features such as bedding, joints and faults; (5) Evidence of past or potential landslide conditions, the implications of such conditions for the proposed development, and the potential effects of the development on landslide activity both on-site and off-site; (6) Wave and tidal action, including effects of erosion on bluffs, and identification of extreme scour platform elevation seaward of the site as well as expected maximum wave up rush elevation for the site, all in relation to generally accepted estimates of accelerated future sea level rise over the development's lifetime; (7) Ground and surface water conditions and variations, including hydrologic changes caused by the development (e.g., introduction of sewage effluent and irrigation water to the groundwater system, and alterations in surface drainage); (8) Potential effects of seismic forces resulting from a maximum credible earthquake; (9) Effect of the proposed development including siting and design of structures, septic system, landscaping, drainage, and grading, and impacts of construction activity on the stability of the site and the adjacent area; (10) A quantitative slope stability analysis, including identification of factors of safety for the		

Table 4.5-1. Applicable Local Plans and Policies Relevant to Geology and Soils

Goals, Policies, Plans, Programs and Standards	Intent of the Policy in Relation to Avoiding or Mitigating Significant Environmental Impacts	Preliminary Consistency Determination*
site and structures and any other factors that may affect slope stability; (11) Potential erodibility of site and mitigating measures to be used to ensure minimized erosion problems during and after construction without reliance on shoreline armoring and/or other such shoreline altering development (i.e., landscaping and drainage design), including analysis of the ability of the development to withstand storms comparable to the winter storms of 1982-83 on the California Coastline; (12) Any other recommended mitigation measures; and, (13) When development of shoreline protection structures is proposed, in addition to the above items, the following topics shall also be addressed: i. Design wave height; ii. Maximum expected wave height; iii. Frequency of overtopping; iv. Normal and maximum tidal ranges; v. Erosion rate with/without protection device; vi. Effect of structure on adjoining property; vii. Potential/effect of scouring at base; viii. Sand supply impacts (beach encroachment, passive erosion, and retention of beach material); ix. Design life of structure/maintenance provisions; x. Alternatives to the chosen design method including "no project"; and, xi. Maintenance provisions including methods and materials.		

Table 4.5-1. Applicable Local Plans and Policies Relevant to Geology and Soils

Goals, Policies, Plans, Programs and Standards	Intent of the Policy in Relation to Avoiding or Mitigating Significant Environmental Impacts	Preliminary Consistency Determination*
20.147.060 Hazards B. Development Standards 1. Development shall be sited and designed to conform to site topography and to minimize grading and other site preparation activities. Natural features, such as tree cover, should be preserved. Applications shall be reviewed for potential onsite and offsite impacts arising from grading, as well as related geologic and seismic hazards, and mitigation measures may be required to offset such impacts. All areas disturbed by grading shall be revegetated with non-invasive native plant species appropriate to the site in order to recreate as much as possible native plant and animal habitat. 2. Subdivisions may be approved only where it can be clearly demonstrated that development of each proposed parcel and construction of any necessary access roads will not significantly contribute to erosion, geologic instability, flooding, or fire hazard, all of which shall be demonstrated in the required technical reports (e.g., soils, geologic, geotechnical, erosion control, flood, and fire reports). 3. Areas that are subject to the highest category of fire hazard as indicated by the California Department of Forestry and Fire Protection Fire Hazard Rating System shall be considered unsuitable for development, unless it can be conclusively demonstrated that design measures adequately mitigate the fire hazard. This shall be demonstrated by a suitably detailed fire hazard report prepared by a qualified person to accompany the permit application. Determination of the fire hazard ratings for specific parcels shall be made using the current fire hazard rating system of the California Department of Forestry and Fire Protection. 4. The fire hazard policies contained in the Safety Element of the Monterey County General Plan and the clearance requirements of the State Forest and Fire Law (Section 4291 of the Public Resources Code) shall be regularly and consistently applied provided they are consistent with all other policies of this LCP. For example, exceptions to the State Forest and Fire Law may be necessary where ESHA is	The intent of this policy is to minimize impacts resulting from grading and other site preparation activities.	Potentially Consistent. The project includes demolition and grading activities for the removal of the existing residence and development of the new single-family residence on an existing developed and disturbed lot. The project includes implementation of an erosion control plan and a drainage plan to mitigate the effects of grading and demolition activities. Additionally the project includes restoration of approximately 1.67 acres of native dune habitat pursuant to proposed Dune Restoration Plan. All removed materials would be hauled offsite for recycling or disposal at the Monterey Regional Waste Management District facility. The project would not include dumping spoils into riparian areas. The majority of the project components would be located on previously disturbed and graded areas. The project site is not located in an area subject to flooding, wave runup, tsunami, landslide, ground-shaking, rupture, or other seismic events (refer to Figure 4.4-1). Additionally, the project site is not located on or near an active fault or within an Alquist-Priolo Fault Zone. The project site is located in an area identified as a high fire severity zone by the CAL FIRE (CAL FIRE 2007). However, the project would involve be developed in accordance with the CBC

Table 4.5-1. Applicable Local Plans and Policies Relevant to Geology and Soils

Goals, Policies, Plans, Programs and Standards	Intent of the Policy in Relation to Avoiding or Mitigating Significant Environmental Impacts	Preliminary Consistency Determination*
present and/or where prior restrictions (including in Forest Management Plans) dictate otherwise. The County's fire hazard map should be updated regularly, including in accordance with the most current California Department of Forestry and Fire Protection hazard rating criteria, as new and more specific information becomes available.		and would not result in a substantial change in land use or increase in susceptibility to fire risk. CAL FIRE would continue to provide fire prevention and response services to the project site.
5. Structures to be occupied shall be set back a minimum of 50 feet from an active or potentially active fault.		This project includes development on slopes exceeding 30 percent and ridgeline development and a Coastal Development Permit is required. The only portion of the proposed project that would be developed on slopes exceeding 30% would be the driveway There is no feasible alternative to the proposed project that would allow development of the proposed driveway to occur on slopes less than 30% on the property while maintaining a simple, direct alignment to the residence from Signal Hill Road. Therefore, strategic planning, adequate erosion control and construction techniques, including the implementation of the erosion control plan and drainage plan, would ensure compliance with this policy.
6. No habitable structures shall be permitted along the shoreline in areas subject to storm wave run-up. New development shall be sited and designed in such a manner as to avoid the need for shoreline armoring and/or other such shoreline altering development over the development's lifetime, and shall include enforceable provisions for addressing any future bluff retreat/erosion danger to the development without shoreline armoring (e.g., moving the development, removing the development, etc.). In addition, bluff and cliff top development shall be permitted only if design and setback provisions are adequate to assure stability and structural integrity for the development's lifetime and if the development (including associated storm runoff, foot traffic, grading, and irrigation) will neither create nor contribute significantly to erosion problems or geologic instability of the site or surrounding area. Development on bluff faces shall be prohibited except for public access pathways, including stairways.		
7. Revetments, seawalls, retaining walls, groins, and other such construction that alters natural shoreline processes shall be permitted when required to serve coastal-dependent uses or to protect existing structures or public beaches in danger from erosion, and when designed to eliminate or mitigate adverse impacts on local shoreline sand supply. For the purposes of application of this policy, existing structures shall mean existing substantial structures (such as a primary residence, a major road, or a significant facility or accessway used by the public). Shoreline armoring and/or other such shoreline altering development shall be allowed to protect existing structures if they are in danger from erosion, and if:		

Table 4.5-1. Applicable Local Plans and Policies Relevant to Geology and Soils

Goals, Policies, Plans, Programs and Standards	Intent of the Policy in Relation to Avoiding or Mitigating Significant Environmental Impacts	Preliminary Consistency Determination*
(a) less-environmentally damaging alternatives to such armoring/development are not feasible (including relocation of endangered structures); and (b) the armoring/development has been sited, designed, and accompanied by measures to proportionately mitigate any unavoidable negative coastal resource impacts (on views, sand supply, public access, etc.). New development, including land divisions, that would require shoreline armoring and/or other such shoreline alteration over the lifetime of the development shall be prohibited. 8. The submittal of a site stability evaluation report is required for all bluff and cliff top development. This report is to be prepared by a qualified soils engineer or a state certified engineering geologist, as appropriate, acting within their areas of expertise. (a) Development on slopes of 30% or more is prohibited unless such siting better addresses LUP objectives as a whole when compared to other possible siting alternatives on slopes of less than 30% associated with projects and/or sites. 9. Criteria for wet-season grading shall include extra erosion control measures as necessary to protect against erosion and sedimentation (including such options as installation of jute netting, construction of sediment catch basins and cessation of operations when soils are saturated). 10. Grading and site preparation activities for new development shall incorporate design features to prevent soil erosion, repair existing erosion damage within the development area, and prevent siltation and pollution of coastal waters. 11. Natural soil cover shall be retained in place and only the amount of disturbance necessary for construction and consistent with the provisions of this LCP shall be allowed. 12. Erosion control measures for construction which are satisfactory to the Director of Building Services (e.g., native vegetation cover, temporary vegetation, seeding, mulching, or		

Table 4.5-1. Applicable Local Plans and Policies Relevant to Geology and Soils

Goals, Policies, Plans, Programs and Standards	Intent of the Policy in Relation to Avoiding or Mitigating Significant Environmental Impacts	Preliminary Consistency Determination*
other suitable stabilization methods) shall be used to protect soils that have been disturbed during grading or development 13. All development shall employ adequate erosion/sediment control and water quality construction best management practices (BMPs) during construction, and all such BMPs shall be in place prior to the commencement of construction and shall be maintained in good operating condition through the construction period. 14. Manufactured slopes shall be stabilized during construction and after completion of soil disturbance with native annual grasses and shrubs, appropriate native compatible plants, and with approved landscaping. 15. Provisions shall be made to collect and conduct runoff to drainage areas/devices capable of polluted runoff filtration/treatment (e.g., vegetated filtration strips, detention/retention basins, storm drains, etc.) to ensure maximum on-site filtration/treatment. Permanent onsite drainage areas/devices shall be designed to accommodate increased runoff resulting from site modification. Where necessitated by good drainage design considerations, on-site retention of storm water may be considered to reduce the size requirements for drainage structures, consistent with resource protection policies. 16. Dumping of spoils (e.g., dirt, garbage, refuse, etc.) into riparian habitat and drainage courses shall be prohibited 17. Development shall be sited and designed to conform to site topography and to minimize grading and other site preparation activities. Natural features, such as tree cover, should be preserved. Applications shall be reviewed for potential onsite and offsite impacts arising from grading, as well as related geologic and seismic hazards, and mitigation measures may be required to offset such impacts. All areas disturbed by grading shall be revegetated with non-invasive native plant species appropriate to the site in order to recreate as much as possible native plant and animal habitat.		

Table 4.5-1. Applicable Local Plans and Policies Relevant to Geology and Soils

Goals, Policies, Plans, Programs and Standards	Intent of the Policy in Relation to Avoiding or Mitigating Significant Environmental Impacts	Preliminary Consistency Determination*
County of Monterey General Plan (1982)		
Goals, Objectives, and Policies for Natural Resources		
GEOLOGY, MINERALS, AND SOILS		
Goal 3: To promote the conservation of soils as a valuable natural resource	The intent of this goal is to promote soil conservation.	Potentially Consistent. Development of the new single-family residence would primarily occur within the developed footprint of the existing residence. The project includes implementation of an erosion control plan and drainage plan to reduce the potential for loss of topsoil resulting from erosion and stormwater runoff.
Policy 3.1.1 Erosion control procedures shall be established and enforced for all private and public construction and grading projects.	The intent of this policy is to establish procedures for the prevention of soil erosion.	Potentially Consistent. The project site is located in an area identified as having a high potential for erosion; however, implementation of the proposed erosion control plan described in the project description would ensure impacts associated with erosion are mitigated to an acceptable level.
Policy 3.2.2 Lands having a prevailing slope above 30% shall require adequate special erosion control and construction techniques.	The intent of this policy is to consider the prevailing slope of the land as an additional criterion in evaluating erosion control requirements.	Potentially Consistent. The project requires a coastal development permit for development on slopes exceeding 30%. Strategic planning and adequate erosion control and construction techniques, including the implementation of the proposed erosion control plan and drainage plan, would ensure consistency with this policy.

Table 4.5-1. Applicable Local Plans and Policies Relevant to Geology and Soils

Goals, Policies, Plans, Programs and Standards	Intent of the Policy in Relation to Avoiding or Mitigating Significant Environmental Impacts	Preliminary Consistency Determination*
Goals, Objectives, and Policies for Seismic and Other Geologic Hazards		
Goal 15. To minimize loss of life, injury, damage to property, and economic and social dislocation resulting from seismic and other geologic hazards	The intent of this policy is to reduce the risks to life and property associated with seismic and other geologic hazards.	Potentially Consistent. The project site is not located in an area subject to above-average seismic hazards; however, the project site is located in an area considered to have a high risk of erosion and liquefaction (refer to Figure 4.5-1). The proposed project would be constructed in compliance with the CBC and includes the implementation of an erosion control plan and a drainage plan to minimize the potential for erosion associated with construction activities. Although the project site is located in an area identified as having a high risk of liquefaction, based on the results of the geotechnical study submitted by the applicant, the project site is underlain by predominantly non-saturated loose to medium dense clean sand and silty sand underlain by granodiorite bedrock. Based on these conditions, the likelihood of soil liquefaction during strong ground shaking at the site is considered low (Cleary 2010). Mitigation has been identified requiring implementation of all of the recommendations of the geotechnical study to reduce the potential for property damage and/or hazards as a result of soil instability and seismic events. With implementation of identified mitigation, the project would be consistent with this policy.
Policy 15.1.4 All new development and land divisions in designated high hazard zones shall provide a preliminary seismic and geologic hazard report which addresses the potential for surface ruptures,	The intent of this policy is to reduce the risks resulting from seismic and geologic hazards within designated high hazard	Potentially Consistent. The project site is located in an area identified as being at high risk of erosion and liquefaction.

Table 4.5-1. Applicable Local Plans and Policies Relevant to Geology and Soils

Goals, Policies, Plans, Programs and Standards	Intent of the Policy in Relation to Avoiding or Mitigating Significant Environmental Impacts	Preliminary Consistency Determination*
ground shaking, liquefaction, and landsliding before the application is considered complete. This report shall be completed by a registered geologist and conform to the standards of a preliminary report adopted by the County.	zones.	A geotechnical study was prepared for the proposed project, which evaluated geologic and seismic hazard conditions at the project site and provided recommendations for the proposed project to reduce the potential for impacts associated with seismic and geologic hazards (Cleary 2010), consistent with this policy.
Policy 15.1.6 Prior to the issuance of a building or grading permit, the County shall require liquefaction investigations for proposed critical use structures and multi-family dwellings over four units when located in areas of moderate or high hazard for liquefaction or subject to the following conditions: ▪ Location in primary floodways; and ▪ Groundwater levels less than 20 feet, as measured in spring and fall.	The intent of this policy is to reduce the potential for risks to proposed dwellings and structures associated with liquefaction.	Potentially Consistent. The project site is located within a high liquefaction risk area; however, based on the results of the geotechnical study submitted by the applicant, the likelihood of soil liquefaction during strong ground shaking at the site is considered low (Cleary 2010). Because the sandy soils overlying the granodiorite at the site are unsaturated, with the exception of local perched water, other ground failures such as soil lurching, lateral spreading, and ground cracking are also considered unlikely to occur (Cleary 2010). The project does not propose a critical use structure or multi-family development.
Policy 15.1.8 The County should require a soils report on all building permits and grading permits within areas of known slope instability or where significant potential hazard has been identified.	The intent of this policy is to reduce the risks resulting from development in areas subject to slope instability.	Potentially Consistent. The project site is located in an area identified as having a high risk of erosion. As discussed previously, the proposed project includes the implementation of an erosion control plan and a drainage plan which would minimize the potential for erosion associated with construction activities. Additionally, the proposed project would be subject to the requirements of a coastal development permit for

Table 4.5-1. Applicable Local Plans and Policies Relevant to Geology and Soils

Goals, Policies, Plans, Programs and Standards	Intent of the Policy in Relation to Avoiding or Mitigating Significant Environmental Impacts	Preliminary Consistency Determination*
		construction on slopes exceeding 30% and would be constructed in compliance with the CBC. A geotechnical study was prepared for the project which identified potential hazards such as slope and stability issues, as well as appropriate design techniques and mitigation measures for the proposed project (Cleary 2010). Therefore, the proposed project would be consistent with this policy.
Policy 15.1.10 All structures and private utility lines shall be designed and constructed to conform to the standards of the latest adopted Uniform Building Code.	The intent of this policy is to reduce the risks to structures and utilities associated with geologic and seismic hazards.	Potentially Consistent. The proposed project would be constructed in compliance with the CBC and would tie-in to existing utilities. The project would not require the construction or expansion of utility infrastructure. Therefore, the proposed project would be consistent with this policy.
Policy 15.1.12 The County shall require grading permits to have an approved site plan which minimizes grading and conforms to the recommendations of a detailed soils or geology investigation where required.	The intent of this policy is to minimize grading and impacts to soils.	Potentially Consistent. The project plans include a site plan and preliminary grading plan, which minimizes the extent of grading necessary to construct the building pad and residence, consistent with the recommendations identified in the project geotechnical report (Cleary 2010), consistent with this policy.
Greater Monterey Peninsula Area Plan (1984)		
Supplemental Policies		
NATURAL RESOURCES		
Geology, Minerals and Soils		
Policy 3.1.1.1. Erosion control procedures shall be established and enforced for all private and public land clearing projects.	The intent of this policy is to reduce the impacts associated with erosion.	Potentially Consistent. The project site is located in an area identified as having a

Table 4.5-1. Applicable Local Plans and Policies Relevant to Geology and Soils

Goals, Policies, Plans, Programs and Standards	Intent of the Policy in Relation to Avoiding or Mitigating Significant Environmental Impacts	Preliminary Consistency Determination*
		high risk of erosion. The proposed project includes the implementation of an erosion control plan and a drainage plan which would minimize the potential for erosion associated with construction activities, consistent with this policy.
ENVIRONMENTAL CONSTRAINTS		
Seismic and Other Geologic Hazards		
Policy 15.1.11.1. For high hazard areas, the County shall require, as a condition of development approval, a detailed geological investigation and soils report and shall further require, as a condition of approval, that the recommendations of that report be followed.	The intent of this policy is to reduce risk associated with seismic and geologic hazards through geological investigation.	Potentially Consistent. The project site is located in an area identified as being at high risk of erosion. A geotechnical study was prepared for the project, which evaluated geologic and seismic hazard conditions at the project site and provided recommendations for the proposed project to reduce the potential for impacts associated with seismic and geologic hazards (Cleary 2010). Implementation of identified mitigation would ensure all recommendations of the geotechnical study would be implemented and that the proposed project would be consistent with this policy. Therefore, with implementation of identified mitigation, the project would be consistent with this policy.

* Although a preliminary determination regarding project consistency is made, it is the responsibility of the County Planning Commission or Board of Supervisors, the lead CEQA decision makers, to make the final determination regarding consistency issues.

4.5.3 Thresholds of Significance

The significance of potential impacts associated with soil stability and seismic hazards are based on thresholds identified within Appendix G of the State CEQA Guidelines, which provide the following thresholds for determining impact significance with respect to geology and soils. Impacts would be considered significant if the proposed project would:

a) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:

    i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.

    ii) Strong seismic ground shaking?

    iii) Seismic-related ground failure, including liquefaction?

    iv) Landslides?

b) Result in substantial soil erosion or the loss of topsoil?

c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?

d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property?

e) Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?

4.5.4 Impact Assessment Methodology

Geologic and seismic information for the project area was derived from various sources and compiled in this chapter to develop a comprehensive understanding of the potential constraints and hazards associated with project construction and operation. Sources of pertinent information include regional geologic maps prepared by the CGS and USGS, the probabilistic seismic hazard assessment of California (California Department of Conservation 1996), and *Geologic Resources and Constraints Monterey County, California, A Technical Report for the Monterey County 21st Century General Plan Update Program* (Rosenberg 2001), all of which reflect the most up-to-date understanding of the regional geology and seismicity.

In addition, geologic and seismic analysis relied on a project-specific geotechnical study prepared by Cleary Consultants, Inc. (2010). The analysis also considers the various existing state and local regulations that apply to geotechnical design and construction, which include the CBC and the Monterey County ordinances for building and grading. Through compliance with the existing ordinances, the applicant would be required to demonstrate that the proposed site uses are compatible with the subsurface geology and local seismic conditions prior to issuance of building permits.

4.5.5 Impact Assessment and Mitigation Measures

4.5.5.1 Expose People or Structures to Seismic Hazards

All of Monterey County is located within a seismically active area; however, there are no known active faults within the immediate proximity of the project site and the site is not located in an area identified as being at high risk of fault rupture, seismic ground shaking, or seismic-related ground failure such as landslides (refer to Figure 4.5-1). The project site is not located in an Alquist-Priolo Earthquake Fault Zone. Although there are several faults in the vicinity of the project site, they are not considered active because they do not exhibit surface displacement that is younger than 11,000 years old and are not considered sufficiently active or well-defined.

Although the project site is located in an area identified as having a high risk of liquefaction, the site-specific geotechnical study determined that the project site is underlain by predominantly non-saturated loose to medium dense clean sand and silty sand underlain by granodiorite bedrock. Based on these conditions, the likelihood of soil liquefaction during strong ground shaking at the site is considered low (Cleary 2010). Design of the structure in accordance with the CBC and recommendations made in the site-specific geotechnical study would ensure the proposed structure could withstand the expected level of ground shaking associated with active faults in the region. Therefore, impacts would be *less than significant with mitigation*.

GEO Impact 1	
Implementation of the proposed project could expose people or structures to substantial adverse effects involving seismic hazards, resulting in a potentially significant impact.	
Mitigation Measures (mm) and Mitigation Monitoring Actions (mma)	
GEO/mm-1.1	*The project shall be designed to meet or exceed all applicable requirements of the California Building Standards Code. The Applicant shall ensure that all design and construction recommendations provided by Cleary Consultants, Inc. (2010) in the geotechnical study are included on construction specifications and implemented during construction of the proposed project. Prior to issuance of the Combined Development Permit, the Applicant shall submit to the County of Monterey Resource Management Agency – Planning Department, for review and approval, grading and engineering plans that are consistent with this measure.*
GEO/mma-1.1.1	*The Applicant shall submit grading and engineering plans consistent with this measure to the County of Monterey Resource Management Agency – Planning Department for review and approval to establish compliance with this measure.*
Residual Impacts	
With implementation of the above mitigation measure, residual impacts associated with exposure of people and/or structures to potential adverse effects associated with seismic hazards would be *less than significant*.	

4.5.5.2 Result in Substantial Soil Erosion or the Loss of Topsoil

The project site is located in an area identified as having a high erosion potential (refer to Figure 4.5-1). The proposed project includes construction activities, which would require demolition of the existing single-family residence, and removal of all existing structures and paved areas, foundation, debris, and the landscape irrigation system. Construction would include site clearing, rough grading, and cut and fill activities for the building pad for the proposed new single-family residence and associated built components. Approximately 0.55 acre of the

property is proposed for site preparation, ground disturbance, and/or grading, including 1,200 cubic yards of cut and 500 cubic yards of fill. Approximately 700 cubic yards of excess material would be exported offsite (refer to Figure 2-11, Grading and Drainage Plan). All removed materials would be hauled offsite for recycling or disposal at the MRWMD facility.

Construction and grading activities are expected to last approximately 18 to 24 months. Construction staging areas are also proposed within the construction footprint, within the 30-foot front yard setback along Signal Hill Road. No staging or grading is proposed within the Dune Restoration Area or any adjacent property. The combination of all ground-disturbing construction activities, if not properly managed, could result in increased erosion, loss of topsoil, and the transportation of sediment and/or construction debris off-site during rain events.

The completed project would create a 2,990-square-foot increase in impervious surfaces at the site. An increase in impervious surfaces would prevent surface water infiltration into the ground surface on a portion of the site and would increase the stormwater runoff volume and rate compared to existing conditions, which could also cause erosion and loss of topsoil at the site.

As detailed in the project description, the proposed project includes the implementation of an erosion control plan and a drainage plan. Proposed erosion control measures to be implemented during construction would include installation of silt fencing and sediment rolls; hydroseeding and application of straw following seeding to stabilize soils; storm drain inlet protection, including filter fabric or silt sacks installed around the inlet and on top of the storm drain grate and catch basin; and construction and use of a stabilized construction entrance (refer to Figure 2-12, Erosion Control Plan). Runoff from the site would be retained or filtered by berms, vegetated filter strips, and/or catch basins to prevent the escape of sediment from the site. The proposed drainage plan includes construction of a series of downspout outlets, 12-inch-diameter drainage inlets surrounding the proposed residence, 4- to 6-inch-diameter storm drains, a 6-inch trench drain across the proposed driveway, and two medium rock cobble stilling basins at the storm drain outlets. Stormwater would be directed into the proposed storm drain system, which would flow into the rock cobble stilling basins. All drain system components would be located within the proposed construction footprint (refer to Figure 2-11, Grading and Drainage Plan).

Implementation of the proposed erosion control plan, drainage plan, and compliance with applicable local planning documents would ensure that the proposed project minimizes erosion and sedimentation associated with disturbed soils and creation of new impervious surfaces. Therefore, impacts associated with erosion and loss of topsoil would be *less than significant with mitigation*.

GEO Impact 2
Construction activities and the increase in impervious surfaces as a result of the project would result in increased erosion, loss of topsoil, and the transportation of sediment and/or construction debris off-site during rain events, resulting in a potentially significant impact.
Mitigation Measures (mm) and Mitigation Monitoring Actions (mma)
Implement GEO/mm-1.1, GEO/mma-1.1.1, HYD/mm-1.1, HYD/mma-1.1.1, HYD/mm-2.1, and HYD/mma-2.1.1.

GEO Impact 2
Residual Impacts
With implementation of the above mitigation measures, residual impacts associated with soil erosion would be *less than significant*.

4.5.5.3 Result in On or Off-Site Soil Instability

As discussed previously, the project site is not located in an area identified as being prone to landslide, lateral spreading, subsidence, or collapse. The project site is located within a high liquefaction risk area, as shown on Figure 4.5-1; however, based on site conditions observed during the site-specific geotechnical study, the likelihood of soil liquefaction during strong ground shaking at the site is considered low (Cleary 2010).

The project site is located in an area designated as having a high erosion potential (refer to Figure 4.5-1). Based on NRCS soil mapping resources, the project site is located on dune land soils that are known to have a typical soil profile that consists of 0–60 inches of fine sand (NRCS 2015). Dune land is excessively drained with a very low susceptibility for runoff and is considered very limited for being capable of supporting dwellings, primarily due to slope (NRCS 2015). However, the proposed project would be designed and constructed in accordance with the CBC, which would ensure they are structurally sound and not at risk for landslide, lateral spreading, subsidence, liquefaction, or collapse.

To further ensure that impacts associated with construction and development on potentially unstable soils do not occur, the project shall be designed and constructed in compliance with the recommendations provided in the geotechnical study prepared for the proposed project (Cleary 2010). Therefore, impacts would be *less than significant with mitigation*.

GEO Impact 3
Implementation of the proposed project would result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse due to development being sited on potentially unstable soils.
Mitigation Measures (mm) and Mitigation Monitoring Actions (mma)
Implement GEO/mm-1.1 and GEO/mma-1.1.1.
Residual Impacts
With implementation of the above mitigation measure, residual impacts associated with construction and development on unstable soil would be *less than significant*.

4.5.5.4 Result in Impacts Associated with Expansive Soil

As discussed previously, the site-specific geotechnical study determined that the project site is underlain by approximately 8 to 14 feet of predominantly loose, medium to fine grained, slightly moist to dry cohesionless clean sand overlying 1 to 5 feet of loose to medium dense silty to clayey sand overlying very dense weathered granodiorite bedrock to 31 feet. The upper clean sand was determined to be non-plastic and non-expansive (plasticity index and free swells =

0%) while the underlying silty to clayey sand has a low to moderate expansion potential (plasticity index = 17% and free swells of 0–50%) based on the test data (Cleary 2010).

The proposed project would include replacing an existing single-family residence with a new single-family residence that would be constructed in accordance with the CBC. Compliance with the CBC, in addition to mitigation measure GEO/mm-1.1 above, would minimize impacts associated with construction and development on expansive soils. Therefore, impacts would be *less than significant with mitigation*.

GEO Impact 4
The project would be located in an area with low to moderately expansive soils that could cause damage to structures and safety hazards as a result of soil instability, resulting in a potentially significant impact.
Mitigation Measures (mm) and Mitigation Monitoring Actions (mma)
Implement mitigation measure GEO/mm-1.1 and GEO/mma-1.1.1.
Residual Impacts
With implementation of the above mitigation measure, residual impacts associated with soil erosion would be *less than significant*.

4.5.5.5 Have soils incapable of supporting wastewater disposal systems.

The proposed project does not include the installation or use of septic tanks. The project would utilize the existing wastewater collection infrastructure and disposal systems associated with the existing single-family residence. The Pebble Beach CSD, through its contract with the Carmel Area Wastewater District, would provide wastewater collection, treatment, and disposal. Therefore, *no impact* would occur and mitigation is not necessary.

4.5.6 Cumulative Impacts

Implementation of the proposed project and other present and potential future projects have the potential to contribute to the cumulative ground disturbance and development of the Del Monte Forest area, thus increasing exposure of persons and structures to potential seismic and soil instability hazards. Impacts associated with seismic hazards and soil instability are generally considered site-specific and are, therefore, mitigated on a site-specific, individual basis to reduce impacts on each particular structure.

As discussed previously in this section, there are several state and local regulations in place to ensure geologic and seismic hazards are reduced to acceptable levels. Implementation of the mitigation measures provided above would minimize impacts associated with geologic and seismic hazards during construction and operation of the proposed project to a less than significant level. Therefore, implementation of the proposed project would not contribute to a significant cumulative impact related to geologic and seismic hazards. Impacts would be *less than significant* and no additional mitigation is necessary.

4.5.7 References

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