

5. Environmental Analysis

5.6 GEOLOGY AND SOILS

This section of the Draft Environmental Impact Report (DEIR) evaluates the potential for implementation of the Laguna Niguel New City Center Mixed Use Project to impact geological and soil resources, paleontological resources, or unique geologic features in the City of Laguna Niguel (City). The analysis in this section is based in part on the following technical report(s):

- *Updated Geotechnical Evaluation Report for CEQA, Proposed Laguna Niguel Town Center, 30102 Pacific Island Drive, Laguna Niguel, California*, Geotechnical Professionals Inc., October 2019 (updated August 13, 2021)
- *Geotechnical Review Sheet*, GMU Geotechnical, Inc. October 8, 2021.
- *Paleontological Resources Summary*, Cogstone, March, 2016

Complete copies of these studies are in DEIR Appendices G1 and G2, respectively.

5.6.1 Environmental Setting

5.6.1.1 REGULATORY BACKGROUND

Federal

Earthquake Hazards Reduction Act

The Earthquake Hazards Reduction Act was enacted in 1997 to “reduce the risks to life and property from future earthquakes in the United States through the establishment and maintenance of an effective earthquake hazards and reduction program.” To accomplish this, the act established the National Earthquake Hazard Reduction Program (NEHRP), which refined the description of agency responsibilities, program goals, and objectives. NEHRP’s mission includes improved understanding, characterization, and prediction of hazards and vulnerabilities; improvement of building codes and land use practices; risk reduction through post-earthquake investigations and education; development and improvement of design and construction techniques; improvement of mitigation capacity; and accelerated application of research results. NEHRP designates the Federal Emergency Management Agency as the lead agency of the program and assigns it several planning, coordinating, and reporting responsibilities. Programs under NEHRP help inform and guide planning and building code requirements such as emergency evacuation responsibilities and seismic code standards.

Paleontological Resources

A variety of federal statutes specifically address paleontological resources. They are generally applicable to a project if that project includes federally owned or federally managed lands or involves a federal agency license, permit, approval, or funding. The first of these is the Antiquities Act of 1906 (54 U.S.C. 320301-320303 and 18 U.S.C. 1866(b)), which calls for protection of historic landmarks, historic and prehistoric structures, as well as other objects of historic or scientific interest on federally administered lands, the latter of which would include fossils. The Antiquities Act both establishes a permit system for the disturbance of any object of antiquity on federal land and also sets criminal sanctions for violation of these requirements. The Antiquities Act was extended

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to specifically apply to paleontological resources by the Federal-Aid Highways Act of 1958. More recent federal statutes that address the preservation of paleontological resources include the National Environmental Policy Act, which requires the consideration of important natural aspects of national heritage when assessing the environmental impacts of a project (P.L. 91-190, 31 Stat. 852, 42 U.S.C. 4321–4327). The Federal Land Policy Management Act of 1976 (P.L. 94-579; 90 Stat. 2743, U.S.C. 1701–1782) requires that public lands be managed in a manner that will protect the quality of their scientific values, while Title 40 Code of Federal Regulations Section 1508.2 identifies paleontological resources as a subset of scientific resources. The Paleontological Resources Preservation Act (Title VI, Subtitle D, of the Omnibus Land Management Act of 2009) is the primary piece of federal legislation.

Paleontological Resources Preservation Act

The Paleontological Resources Preservation Act offers provisions of paleontological resources identified on federal, Native American, or state lands and guidance for their management and protection, and promotes public awareness and scientific education regarding vertebrate fossils. The law also requires federal agencies to develop plans for inventory, collection, and monitoring of paleontological resources and establishes stronger criminal and civil penalties for the removal of scientifically significant fossils on federal lands.

State

California Alquist-Priolo Earthquake Fault Zoning Act

The California Alquist-Priolo Earthquake Fault Zoning Act was signed into state law in 1972, and its primary purpose is to mitigate the hazard of fault rupture by prohibiting structures for human occupancy across the trace of an active fault. The act was a direct result of the 1971 San Fernando Earthquake, which caused extensive surface ruptures that damaged homes, commercial buildings, and other structures. The act requires the State Geologist (chief administrator of the California Geologic Survey [CGS]) to delineate regulatory zones known as “earthquake fault zones” along faults that are “sufficiently active” and “well defined” and to issue and distribute appropriate maps to all affected cities, counties, and state agencies for their use in planning and controlling new or renewed construction. Pursuant to this act, the California Code of Regulations (CCR) Section 3603(a) stipulated that structures for human occupancy are not permitted to be placed across the trace of an active fault. The act also prohibits structures for human occupancy within 50 feet of the trace of an active fault, unless proven by an appropriate geotechnical investigation and report that the development site is not underlain by active branches of the active fault (CCR Section 3603(a)). It further requires that cities and counties withhold development permits for sites within an earthquake fault zone until geologic investigations demonstrate that the sites are not threatened by surface displacement from future faulting (CCR Section 3603(d)).

Seismic Hazard Mapping Act

The Seismic Hazard Mapping Act was adopted by the state in 1990 to protect the public from the effects of earthquake hazards other than surface fault rupture, such as strong ground shaking, liquefaction, seismically induced landslides, or other ground failure. The goal of the act is to minimize loss of life and property by identifying and mitigating seismic hazards. The CGS prepares seismic hazard zones maps and provides them

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to local governments. The maps identify areas susceptible to amplified shaking, liquefaction, earthquake-induced landslides, and other ground failures.

California Building Code

Current law states that every local agency enforcing building regulations, such as cities and counties, must adopt the provisions of the California Building Code (CBC) within 180 days of its publication. The publication date of the CBC is established by the California Building Standards Commission, and the code is under 24 CCR Part 2. The CBC provides minimum standards to protect property and public safety by regulating the design and construction of excavations, foundations, building frames, retaining walls, and other building elements to mitigate the effects of seismic shaking and adverse soil conditions. The CBC contains provisions for earthquake safety based on factors including occupancy type, the types of soil and rock on-site, and the strength of ground shaking with a specified probability at a site. The 2019 CBC took effect on January 1, 2020.

Requirements for Geotechnical Investigations

Requirements for geotechnical investigations are in the CBC's Appendix J, Section J104. Additional requirements for subdivisions requiring tentative and final maps and for other specified types of structures are in California Health and Safety Code Sections 17953 to 17955 and in CBC Section 1802. Testing of samples from subsurface investigations is required, such as from borings or test pits. Studies must be done as needed to evaluate slope stability, soil strength, position and adequacy of load-bearing soils, the effect of moisture variation on load-bearing capacity, compressibility, liquefaction, differential settlement, and expansiveness. CBC Section J106 sets forth requirements for inspection and observation during and after grading.

State Water Resources Control Board General Construction Permit

The SWRCB has adopted a statewide Construction General Permit (Order No. 2012-0006-DWQ) for stormwater discharges associated with construction activity. These regulations prohibit the discharge of stormwater from construction projects that include one acre or more of soil disturbance. Construction activities subject to this permit include clearing, grading, and other disturbance to the ground, such as stockpiling or excavation, that result in soil disturbance of at least one acre. Individual developers are required to submit permit registration documents to the SWRCB for coverage under permit prior to the start of construction. The documents include a notice of intent, risk assessment, site map, Stormwater Pollution Prevention Plan (SWPPP), annual fee, and a signed certification statement. They are submitted electronically to the SWRCB via the Stormwater Multiple Application and Report Tracking System's website.

The Construction General Permit requires all dischargers to (1) develop and implement a SWPPP, which specifies best management practices (BMP) to be used during construction of the project; (2) eliminate or reduce non-storm water discharge to stormwater conveyance systems; and (3) develop and implement a monitoring program of all specified BMPs. The two major objectives of the SWPPP are to (1) help identify the sources of sediment and other pollutants that affect the water quality of stormwater discharges and (2) to describe and ensure the implementation of BMPs to reduce or eliminate sediment and other pollutants in stormwater and other water discharges.

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Local

Laguna Niguel General Plan

The Seismic/Public Safety Element of the Laguna Niguel General Plan includes the following policies, and actions that relate to geology and soils:

Policy 1.1. Mitigate potential adverse impacts of geologic and seismic hazards. Actions

Action 1.1.1: Require site specific geologic and soils studies as part of the approval process for new development. This analysis must identify on-site geologic hazards, determine risk potential and provide mitigation measures for all pertinent geologic hazards.

Action 1.1.3: Maintain existing standards and requirements for grading and construction to eliminate the potential for erosion, slope failure, landslides, and other geologic hazards.

Action 1.1.4: Maintain existing building safety and design standards for protection from geologic and seismic related events.

Laguna Niguel Municipal Code

Article 8, Grading and Excavation Code, regulates grading, drainage, and hillside construction. Section 8-1-805 requires grading permits for all project sites requiring excavation, fills, and paving. Each application for a grading permit requires plans and specifications and applicable soils engineering and engineering geology reports. Section 8-1-836 requires that erosion control plans be prepared in accordance with the City's Grading Manual and submitted to the Building Official for approval for projects under grading permits.

Article 2 (2019 Edition of the California Building Code) adopts the 2019 CBC by reference.

5.6.1.2 EXISTING CONDITIONS

Geologic Setting

The project site is in the Los Angeles Basin, which is part of the Peninsular Ranges Geomorphic Province of California. The Peninsular Ranges are characterized by a series of northwest-trending mountain ranges separated by valleys.

More locally, the site is within the San Joaquin Hills, which consist of moderate to steep hillside terrain underlain by sedimentary bedrock. The San Joaquin Hills are traversed by streams and drainage divides that slope south and southwest toward the coastline. Typically, the drainages are partially filled by poorly consolidated colluvial and alluvial deposits overlying the deeper formational bedrock materials.

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Faulting and Seismic Hazards

Laguna Niguel is exposed to risk from multiple earthquake fault zones. Faults near the project site include the Newport-Inglewood and Palos Verdes faults (see Figure 5.6-1). At its closest approach, the Newport-Inglewood fault is about four miles east of the project site. The Palos Verdes fault is about five miles south of the site at its closest approach.

The 1933 Long Beach earthquake was on the Newport-Inglewood Fault immediately offshore of the Balboa Peninsula in Newport Beach (SCEDC 2020). Other notable earthquakes affecting the greater Los Angeles region within the last 50 years are:

- The 1971 San Fernando Earthquake, magnitude 6.6, caused 65 deaths and over \$500 million in property damage.
- The 1992 Landers Earthquake, magnitude 7.3, caused three fatalities.
- The 1992 Big Bear Earthquake, magnitude 6.4.
- The 1994 Northridge Earthquake, magnitude 6.7, caused at least 57 fatalities and property damage estimated between \$13 billion and \$40 billion.

Fault Rupture

The project is not in an Alquist-Priolo Earthquake Fault Zone, so the potential for surface fault rupture is very low (CGS 2010).

Ground Shaking

Laguna Niguel is in a highly active seismic region. Although there are no active or potentially active faults in the City, there are two active faults in the vicinity of the City. The Newport-Inglewood fault angles from offshore near Dana Point and passes through the northwestern portion of Orange County. In 1933 the destructive Long Beach Earthquake was on the fault just offshore of Newport Beach. The event caused considerable damage and a high loss of life. Since then the various strands of the fault have produced many minor earthquakes at a magnitude of 4.5 or less. The Palos Verdes fault is usually described as three individual segments, namely the San Pedro Bay, the onshore, and the Santa Monica Bay segments. Seismicity associated with the fault is relatively low, and most events recorded are microearthquakes.

Liquefaction and Related Ground Failure

Strong ground shaking in sediment layers that are saturated with groundwater may cause them to lose strength and behave as a fluid. Liquefaction near or at the ground surface can result in property damage and structural failure. Surface ground failure usually takes the form of lateral spreading, flow failures, ground oscillation, and/or general loss of bearing strength. Sand boils (injections of fluidized sediment) commonly accompany these types of failure.

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Three major factors determine a region's susceptibility to liquefaction:

- Intensity and duration of ground shaking.
- Age and texture of the alluvial sediments. Generally, the younger, less compacted sediments are more susceptible to liquefaction. The texture of sediment also plays a role. Sand and silty sands deposited in river channels and floodplains tend to be more susceptible to liquefaction than coarser or finer grained alluvial materials.
- Depth to groundwater. Earthquake-induced liquefaction requires that sediments be saturated. In general, groundwater depths shallower than 10 feet to the surface cause the highest liquefaction susceptibility.

The California Division of Conservation (CDC) does not identify the project site as a liquefaction hazard zone (CDC 2015). In addition, the soils underlying the proposed site are primarily high plasticity, cohesive fills and bedrock materials.

Earthquake-Induced Landslides

Slope failures in the form of landslides are common during strong seismic shaking in areas of steep hills. The ground surface elevation across the site varies from an elevation of about 305 to 370 feet. A 40- to 50-foot-high ascending slope extends along the western and southwestern property lines and is a landslide hazard identified by the CDC, and the project site is in a landslide hazard zone (CDC 2015).

Geologic Hazards

Expansive Soils

Expansive soils generally consist of clays that can shrink and swell with changes in moisture content. Movement of soils in response to shrinkage and swelling has the potential to impact near-surface improvements such as lightly loaded foundations and floor slabs. Based on a data review of the project site, near-surface soils are anticipated to have high to very high expansion potential.

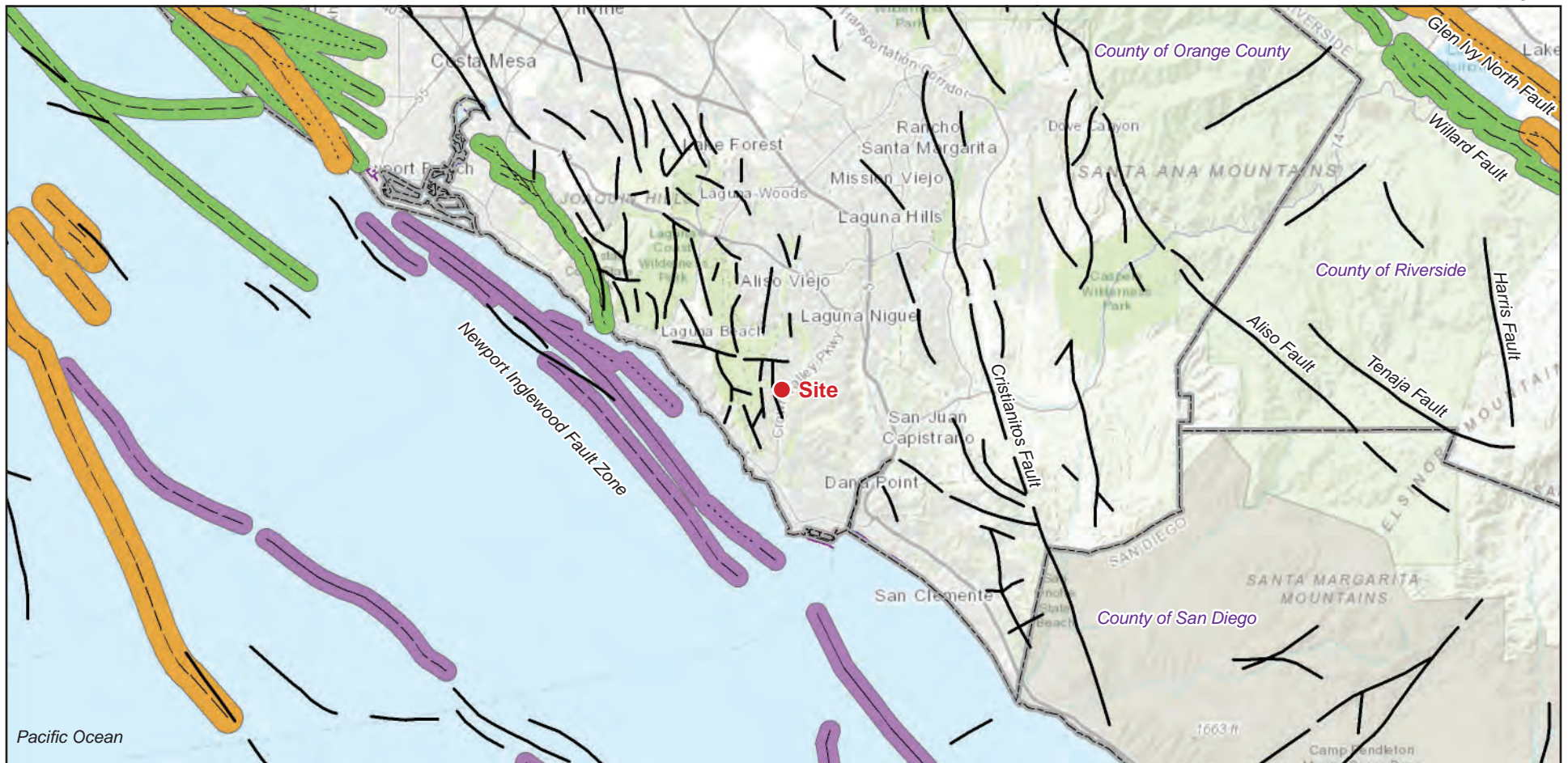
Collapsible Soils

Collapsible soils generally consist of relatively dry, low-density materials that become weaker and more compressible with the addition of water or excessive loading. Due to the cohesive and very stiff to hard nature of the on-site soils, the potential for collapse of soils at the project site is considered very low.

Subsidence

Subsidence occurs when a large portion of land sinks, usually due to the withdrawal of groundwater, oil, or natural gas. Soils that are particularly subject to subsidence include those with high silt or clay content. The site is not in an area of known ground subsidence (USGS 2019). No large-scale extraction of groundwater, gas, oil, or geothermal energy has occurred, is occurring now, or is planned to occur in the future at or near the site. There appears to be little or no potential for ground subsidence due to withdrawal of fluids or gases at the site.

Figure 5.6-1 - Fault Map
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Holocene fault displacement (during past 11,700 years) without historic record

Late Quaternary fault displacement (during past 700,000 years)



Quaternary fault (age undifferentiated; Quaternary Period extends from the present to 1.6 million years before present)

Pre-Quaternary fault (older than 1.6 million years) or fault without recognized Quaternary displacement

NOTE: Fault traces on land are indicated by solid lines where well located, by dashed lines where approximately located or inferred, and by dotted lines where concealed by younger rocks or by lakes or bays.

Source: ESRI, 2019



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Paleontological Resources

No paleontological resources are known to exist within the project area. The closest vertebrate fossil locality identified by the Natural History Museum of Los Angeles County (NHMLA) is LACM 4166, found nearby in the Capistrano Formation, south of the project area along Crown Valley Parkway and north of the intersection with Paseo del Niguel. LACM 4166 included fossil specimens of bonito shark (*Isurus*), bull shark (*Carcharhinus*), undetermined bony fish (*Osteichthyes*), sea lion (*Otariidae*), and porpoise (*Phocoenidae*). The NHMLA also noted several fossil localities within the Capistrano Formation (LACM 4337, 4950, and 5468) north of the project site along Alicia Parkway. These fossil localities included undetermined specimens of sea lions, whales (*Cetacea*), and sea cow (*Hydrodamalis cuestas*).

Paleontological monitoring was conducted for the construction of the Crestavilla Retirement and Assisted Living Community project located at the intersection of Crown Valley Parkway and Niguel Road about 0.30-mile northeast of the project site. Several fossils were discovered within the Capistrano Formation during construction and removed from the construction site in accordance with the fossil treatment plan (PCR 2016).

5.6.2 Thresholds of Significance

According to Appendix G of the CEQA Guidelines and the City's CEQA Manual, a project would normally have a significant effect on the environment if the project would:

- G-1 Directly or indirectly cause 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.
- G-2 Result in substantial soil erosion or the loss of topsoil.
- G-3 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.
- G-4 Be located on expansive soil, as defined in Table 18-1B of the Uniform building Code (1994), creating substantial direct or indirect risks to life or property.
- G-5 Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of waste water.

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G-6 Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?

5.6.3 Plans, Programs, and Policies

- PPP GEO-1 The proposed project will be designed and constructed in accordance with the Laguna Niguel Building Code, which adopts the California Building Code (CBC), which is based on the International Building Code. New construction, alteration, or rehabilitation shall comply with applicable ordinances of the City and/or the most recent City building and seismic codes in effect at the time of project design. In accordance with Section 1803.2 of the 2019 CBC, a final geotechnical investigation is required based on the final grading plans and must evaluate soil classification, slope stability, soil strength, position and adequacy of load-bearing soils, the effect of moisture variation on soil-bearing capacity, compressibility, liquefaction, and expansiveness, as determined by the City building official. The final geotechnical investigation must be prepared by registered professionals (i.e., California Registered Civil Engineer or Certified Engineering Geologist). Recommendations from the preliminary geotechnical investigation and the final geotechnical investigation shall be incorporated into the final Geotechnical Design Report to provide design details on structural design and construction for earthwork, grading, slopes, foundations, pavements, and other necessary geologic and seismic considerations that must be incorporated into the design and construction of the proposed project.
- PPP GEO-2 The proposed project shall apply for a grading permit, which requires the preparation of an erosion control plan prepared in accordance with the City's Grading Manual.
- PPP HYD-1 The proposed project shall be constructed in accordance with the General Permit for Storm Water Discharges Associated with the Construction and Land Disturbance Activities, NPDES No. CAS000002. Compliance requires filing a notice of intent, a risk assessment, a site map, a Storm Water Pollution Prevention Plan and associated best management practices, an annual fee, and a signed certification statement. Also, the County requires preparation of an erosion and sediment control plan for projects that disturb more than one acre of land and implementation of best management practices to control erosion, debris, and construction-related pollutants.
- PPP HYD-2 The MS4 permit requires new development and redevelopment projects to:
- Control contaminants into storm drain systems.
 - Educate the public about stormwater impacts.
 - Detect and eliminate illicit discharges.
 - Control runoff from construction sites.
 - Implement best management practices and site-specific runoff controls and treatments for new development and redevelopment.

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PPP HYD-3 As required by the City of Laguna Niguel's municipal ordinances on stormwater quality management, the proposed project must submit a priority-project-specific water quality management plan to the City for approval before the City issues any building or grading permits.

5.6.4 Environmental Impacts

5.6.4.1 IMPACT ANALYSIS

The following impact analysis addresses thresholds of significance. The applicable thresholds are identified in brackets after the impact statement.

Impact 5.6-1: Project occupants would be subject to strong ground shaking; however, project development would not subject people or structures to seismic-related ground failure, including liquefaction and landslides. [Threshold G-1 (i), (ii), (iii), (iv)]

Laguna Niguel is exposed to risk from multiple earthquake fault zones. Active faults near the project site include the Newport-Inglewood and the Palos Verdes fault. The Newport-Inglewood Fault is four miles from the project site. Based on the distance, this fault would not cause adverse impacts from potential rupture, and impacts would be less than significant.

As is the case with most locations in Southern California, the subject site is in a seismically active area. The type and magnitude of seismic hazards that may affect the site are dependent on both the distance to causative faults and the intensity and duration of the seismic event. The subject site will likely experience strong ground shaking caused by earthquakes on active, regional faults in the future. A geotechnical investigation of the site conditions and an assessment of potential development was performed and documented in a preliminary geotechnical investigation report titled "*Geotechnical Evaluation Report for CEQA Purposes*" by Paul R. Schade, G.E. 2371, Principal, Geotechnical Professionals Inc. The report was peer reviewed by the City's geotechnical consultant, GMU Geotechnical, Inc., and conditionally approved (report and conditional approval included in Appendix G). Prior to issuance of any future grading permit for project development, a final Geotechnical Design Report in accordance with the Laguna Niguel Building Code (i.e., proper earthquake design and engineering) would be required as a standard condition of approval for the proposed project, and included as PPP GEO-1. The final Geotechnical Design Report would supplement the preliminary *Geotechnical Evaluation Report for CEQA Purposes* and would incorporate recommendations from the preliminary report and provide more detailed analyses and geotechnical recommendations for design and construction. The report would include requirements pertaining to structural design and construction recommendations for earthwork, grading, slopes, foundations, pavements, and other necessary geologic and seismic considerations. The Geotechnical Design Report would reduce potential ground-shaking hazard impacts to less than significant.

The CDC does not identify the project site as a liquefaction hazard zone. In addition, the subsurface soils consist primarily of high plasticity, cohesive fills and bedrock materials. Therefore, liquefaction is considered unlikely at this site and impacts are less than significant.

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The slopes ascending from the western and southwestern property boundaries are mapped in an area designated by the State Geologist as a "zone of required investigation" due to the potential for earthquake-induced landslides. While the majority of the western and southwestern slopes are off-site, the proposed project would include the construction of retaining structures on the project site to support the slopes where they extend onto the site and establish adequate offsets between the base of the slopes and the proposed site structures. Retaining structures along the property line within the slope would consist of a soldier pile or equivalent retaining wall designed to resist static and seismic earth pressures imposed by the adjacent slope. The final Geotechnical Design Report would evaluate the suitability of a soldier pile retaining wall, providing geotechnical design parameters or recommendations for an equally or more effective design solution. In addition, the 2019 CBC requires a minimum lateral offset between the toe of a descending slope and the face of buildings at the base of the slope to be the smaller of 15 feet or one-half the height of the slope. The final Geotechnical Design Report would evaluate the stability of the on-site and adjacent slopes, confirm the suitability of the offset, or provide an equally or more effective design solution.

Level of Significance Before Mitigation: With the implementation of PPPs GEO-1 and GEO-2, Impact 5.6-1 would be less than significant.

Impact 5.6-2: The proposed project would not result in substantial soil erosion or loss of topsoil [Thresholds G-2]

See the analysis of Impact 5.9-1.

Level of Significance Before Mitigation: With the implementation of PPPs HYD-1 through 3, Impact 5.6-2 would be less than significant.

Impact 5.6-3: The proposed project would not result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse and is located on expansive soils that would not create a direct or indirect risk to life and property. [Thresholds G-3 and G-4]

As discussed in Impact 5.6-1, impacts from liquefaction and landslides are less than significant. Furthermore, because the potential for seismic-related liquefaction is considered unlikely at the site, the corresponding potential for lateral spreading to occur during liquefaction is also considered unlikely.

As mentioned under section 5.6.1.2, the potential for collapse of soils at the project site is considered very low, and there appears to be little or no potential for ground subsidence due to withdrawal of fluids or gases at the site.

Highly expansive soils were encountered up to depths of 30 feet in recent and previous explorations at the site. The project design would implement appropriate controls to minimize the impact of expansive soils on the proposed project, which would be provided in the design-level geotechnical report. Measures to reduce the adverse impact of expansive soils would include:

- In-place chemical treatment of the expansive soils (cement or lime treatment, or equivalent).

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- Removal and replacement of the expansive soils with non-expansive import soils where the potential for shrink/swell is not tolerable.
- Design of foundations, floor slabs, and hardscape to resist the potential swell pressures of the expansive soils by increasing concrete reinforcing or using post-tension methods as outlined in the California Building Code.

These measures would decrease the impact from expansive soils to less than significant.

Level of Significance Before Mitigation: Less than significant.

Impact 5.6-4: The proposed project would not include the installation of septic tanks. [Threshold G-5]

The project site has sewer connections maintained by the Moulton Niguel Water District. The project would connect to the existing sewer lines in Alicia Parkway, Pacific Island Drive, and Crown Valley Parkway to accommodate additional flows generated by the proposed development. The project would not use alternative wastewater disposal systems such as septic tanks, and no impact would occur.

Level of Significance Before Mitigation: No impact.

Impact 5.6-5: The project could directly or indirectly destroy a unique paleontological resource or site or unique geologic feature. [Threshold G-6]

No paleontological resources are known to exist within the project area. The Capistrano Formation underlies the project area. The closest vertebrate fossil locality identified by the NHMLA is LACM 4166 in the Capistrano Formation, found approximately 0.4-mile south of the project site along Crown Valley Parkway and north of the intersection with Paseo del Niguel. LACM 4166 included fossil specimens of bonito shark (*Isurus*), bull shark (*Carcharhinus*), undetermined bony fish (*Osteichthyes*), sea lion (*Otariidae*), and porpoise (*Phocoenidae*).

Farther from the project site, several fossil localities have been found in the Capistrano Formation north of the project area along Alicia Parkway. These included specimens of sea lions, whales (*Cetacea*), and sea cow (*Hydrodamalis cuestae*). Paleontological monitoring was conducted for the Crestavilla Retirement and Assisted Living Community construction project located at the intersection of Crown Valley Parkway and Niguel Road. Several fossils were discovered during construction and removed from the construction site in accordance with the fossil treatment plan (PCR 2016).

Although no resources were found on-site, the majority of the site has not been excavated or graded and could have undiscovered paleontological resources. Construction of the proposed project would require earthwork activities, such as grading, to ensure the proper base and slope for the proposed buildings. The potential exists that unique paleontological resources may be unearthed. Therefore, development of the proposed project has the potential to result in a significant impact. Mitigation measures GEO-1 would include monitoring in areas identified as likely to contain paleontological resources during project construction and would require appropriate treatment of unearthed paleontological resources during construction. Potential impacts to

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unknown paleontological resources would be mitigated to less than significant through the implementation of Mitigation Measures GEO-1.

Level of Significance Before Mitigation: Potentially significant.

5.6.5 Cumulative Impacts

Geology and soils impacts related to the proposed project would be specific to the project site and its users and would not be common or contribute to the impacts (or shared with, in an additive sense) on other sites. Compliance with applicable state and local building regulations would be required of all development in the city. Individual projects would be designed and built in accordance with applicable standards in the CBC and the individual building regulations of local jurisdictions, including pertinent seismic design criteria. Site-specific geologic hazards would be addressed by the final Geotechnical Design Report required for each building. These geologic investigations would identify the specific geologic and seismic characteristics on a site and provide guidelines for engineering design and construction to maintain the structural integrity of proposed structures and infrastructure. Therefore, compliance with applicable state and local building regulations and standard engineering practices related to seismic and geologic hazard reduction would prevent significant cumulative adverse impacts associated with geologic and seismic hazards.

Implementation of the proposed project in conjunction with other planned projects in the city could result in cumulative impacts to paleontological resources. However, other development projects would be required to undergo discretionary review and would be subject to the same resource protection requirements and CEQA review as the proposed project. For example, other development projects may require some degree of ground disturbance but would be required to comply with applicable regulations, which would minimize the potential to disturb significant paleontological resources. If paleontological resources were found, they would be addressed through the necessary testing, archiving, and recovery prior to development of the site. Additionally, the proposed project has incorporated mitigation that would reduce the potential for the project to contribute to cumulative impacts to paleontological resources. In consideration of the preceding factors, the project's contribution to cumulative paleontological resource impacts would be less than cumulatively considerable; therefore, project impacts would not be significant.

5.6.6 Level of Significance Before Mitigation

Impact 5.6-4 would have no impact.

Upon implementation of regulatory requirements, Impacts 5.6-1, 5.6-2, and 5.6-3 would be less than significant.

Without mitigation, one impact would be **potentially significant**:

- **Impact 5.6-5** Excavation or grading could uncover paleontological resources.

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5.6.7 Mitigation Measures

Impact 5.6-5

GEO-1 Prior to the issuance of grading permits, and for any subsequent permit involving excavation to increased depths, the project applicant shall provide a letter to the City of Laguna Niguel from a qualified paleontologist and paleontological monitor who meet the Secretary of the Interior's Professional Qualifications Standards. The letters shall state that the applicant has retained these individuals, and that the consultant(s) will monitor all grading and significant ground-disturbing activities in areas identified as likely to contain paleontological resources during project construction. These areas are defined as all excavations of previously undisturbed sediments in areas mapped as the Capistrano Formation and in areas of Quaternary alluvium where excavations would exceed depths of five feet.

The qualified paleontologist and/or paleontological monitor shall attend all pre-grade meetings to ensure all construction personnel that would conduct grading and significant ground-disturbing activities receive training to recognize fossil materials in the event any are uncovered during earthwork.

The qualified paleontological monitor shall be equipped to salvage fossils and samples of sediments as they are unearthed to avoid construction delays and shall be empowered to temporarily halt or divert grading activities in order to recover the fossil specimens. The paleontological monitor may establish a protected buffer around a discovery for the duration of recovery of the discovery.

If previously undiscovered paleontological resources are discovered on-site, suspension of ground disturbances in the vicinity of the discoveries shall not be lifted until the paleontological monitor has evaluated discoveries to assess whether they are classified as unique paleontological resources pursuant to the California Environmental Quality Act (CEQA) and authorized the resumption of construction activities. Recovered specimens shall be prepared to a point of identification and permanent preservation, including washing of sediments to recover small invertebrates and vertebrates. Found specimens shall then be curated into the John D. Cooper Center in Santa Ana or a responsible public or private institution with a suitable repository willing to and capable of accepting and housing the resource. If no museum or repository is willing to accept the resource, it shall be considered the property of the City and may be stored, disposed of, transferred, exchanged, or otherwise handled by the City at its discretion to avoid a significant impact.

Upon completion of construction activities, the qualified paleontological monitor shall prepare a report of paleontological resource findings within 30 days of construction completion. The report shall append itemized inventory of recovered resources, documentation of each locality, and interpretation of recovered fossils. The report and

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inventory, when submitted and approved by the City, will signify completion of the program to mitigate impacts to paleontological resources.

5.6.8 Level of Significance After Mitigation

Implementation of mitigation measure GEO-1 would reduce potential impacts to paleontological resources to a level that is less than significant. Therefore, no significant unavoidable adverse impacts relating to geology and soils have been identified.

5.6.9 References

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