5.7 GEOLOGY AND SOILS

This section of the Draft Environmental Impact Report (DEIR) evaluates the potential for implementation of the proposed project to impact geological and soil resources, paleontological resources, or unique geologic features in the City of Brea and its sphere of influence (SOI). The analysis in this section is based in part on the following technical report(s):

- *EIR-Level Geotechnical Assessment*, Alta California Geotechnical Inc., December 19, 2018 (Appendix F).
- *Third-Party Review of Alta Report dated December 19, 2018, and Site Reconnaissance Visit, Proposed Brea 265 Residential Development, City of Brea, California*, LGC Geotechnical Inc., February 6, 2019 (Appendix G).

Complete copies of these studies are in Appendix F and Appendix G of this Draft EIR.

5.7.1 Environmental Setting

5.7.1.1 REGULATORY BACKGROUND

California Alquist-Priolo Earthquake Fault Zoning Act

The Alquist-Priolo Earthquake Fault Zoning Act was signed into state law in 1972. Its primary purpose is to mitigate the hazard of fault rupture by prohibiting the location of structures for human occupancy across the trace of an active fault. The act delineates "Earthquake Fault Zones" along faults that are "sufficiently active" and "well defined." The act also 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. Pursuant to this act, structures for human occupancy are not allowed within 50 feet of the trace of an active fault.

Seismic Hazard Mapping Act

The Seismic Hazard Mapping Act (SHMA) was adopted by the state in 1990 to protect the public from the effects of nonsurface fault rupture earthquake hazards, including strong ground shaking, liquefaction, seismically induced landslides, or other ground failure. The goal is to minimize loss of life and property by identifying and mitigating seismic hazards. The California Geological Survey prepares and provides local governments with seismic-hazard-zone maps that identify areas susceptible to amplified shaking, liquefaction, earthquake-induced landslides, and other ground failures. SHMA requires responsible agencies to approve projects within seismic hazard zones only after a site-specific investigation to determine if the hazard is present, and if so, the inclusion of appropriate mitigation(s). In addition, the SHMA requires real estate sellers and agents at the time of sale to disclose whether a property is within one of the designated seismic hazard zones.

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 in Title 24, Part 2 of the California Code of Regulations. The most recent building standard adopted by the legislature and used throughout the state is the 2019 version of the CBC (effective January 1, 2020), often with local, more restrictive amendments that are based on local geographic, topographic, or climatic conditions. These codes provide 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 has provisions for earthquake safety based on factors such as occupancy type, the types of soil and rock on-site, and the strength of ground shaking with specified probability of occurring at a site.

Natural Hazards Disclosure Act

The Natural Hazards Disclosure Act requires that sellers of real property and their agents provide prospective buyers with a "Natural Hazard Disclosure Statement" when the property lies within one or more State-mapped hazard areas, including a Seismic Hazard Zone. California law also requires that when houses built before 1960 are sold, the seller must give the buyer a completed earthquake hazards disclosure report and the booklet, "The Homeowners Guide to Earthquake Safety." This publication was written and adopted by the California Seismic Safety Commission.

Soils Investigation Requirements

Requirements for soils investigations 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 Section 1802 of the CBC. Testing 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.

City of Brea General Plan

The public safety element of the general plan has the following approach related to allowing development in areas with various geologic conditions.

Goal PS-1: Reduce the risk to the community from seismic activity and geologic conditions, including ground shaking, fault rupture, liquefaction, and landslides.

- **Policy PS-8.1.** Minimize the potential damage to structures and loss of life that may result from an earthquake.
- **Policy PS-8.2.** Require seismic safety standards for construction of all new buildings.
- **Policy PS-8.3.** Continue to require geological and geotechnical investigations of all new developments in areas of potential seismic or geologic hazards as part of the environmental and development review process.

- **Policy PS-8.4.** Require that careful, site-specific evaluations based on detailed surface and subsurface geotechnical studies be conducted in areas where landslides are suspected or known to occur.
- **Policy PS-8.5.** Participate in Federal, State, and local earthquake preparedness and emergency response programs.
- **Policy PS-8.6.** Continue programs, such as the Community Assistance and Response to Emergency Situations (C.A.R.E.S), that further educate and train individuals and neighborhoods how to respond to emergency situations.

5.7.1.2 EXISTING CONDITIONS

Topographically, the project site is characterized by low-lying alluvial terraces with minimal changes in elevation on the southern portions of the site. The northeastern portion of the project site consists of rounded hills and ridgelines of moderate height with intervening canyons and draws. A draw is low ground between two parallel ridges or spurs. The area of low ground itself is the draw, and it is defined by the spurs surrounding it. Draws are similar to very small valleys, but valleys are parallel to a ridgeline; a draw is perpendicular to the ridge and rises with the surrounding ground, disappearing upslope. A steep slope is present on the northeastern edge of the project area above the Carbon Canyon streambed.

Drainage from the project site is by sheet flow to the canyons and draw areas, which drain to the south and southwest. Elevations range from 586 feet to 385 feet. The natural slopes are gentle to very steep and range from 1:1 to 5:1 (horizontal : vertical). Figure 4-2, *Existing Slope Analysis*, shows the existing slope characteristics. Vegetation consists of native grasses, shrubs, and trees and ranges from light to heavy areas, with the heavy vegetation and trees concentrated in the draws and canyons.

The project site is currently being used for oil production, with a nursery on the eastern side. Numerous roadways associated with oil field exploration and production exist throughout the project site. The project site was used extensively in the past for agricultural purposes. Small-scale sand-and-gravel quarrying has also occurred on-site in the past. The Carbon Canyon flood control dam and flood basin lie immediately off-site of the south-central portion of the site.

Several utilities cross the site within easements. A Metropolitan Water District easement crosses the far southern portion of the project area to Rose Drive. A 30-inch, high-pressure gas line crosses the southern portion of the project below the Carbon Canyon dam, and a Mobil Oil gasoline line runs in a roughly north-south direction across the eastern portions of the site from Blake Road to Carbon Canyon Road. The Carbon Canyon Dam sewer line and numerous other utilities associated with oil field production and the nursery traverse the project site.

Existing Geologic Conditions

The project site is on the southwestern flank of the Puente Hills. The Puente Hills form the western to northwestern margin of the Los Angeles Basin, which is in the Peninsular Ranges Geomorphic Province. The Puente Hills are bracketed by the Whittier and Chino fault zones and have been created by uplift along these

faults. Approximately 13,000 feet of Miocene-aged marine elastic sedimentary rock underlie the Puente Hills. These sediments overlie approximately 16,000 feet of Cenozoic-aged rock, which are underlain by Mesozoic plutonic basement rock (Geotech Inc. 2018).

Uplift of the Puente Hills in the late Pleistocene and Holocene created erosional geomorphic features that have been filled in with older alluvial and terrace materials. These older alluvial and terrace deposits underlie the broad alluvial plains, adjacent to the Puente Hills, on which the southern and western portions of the project site lie. More recent accumulations of alluvium and colluvium are present in the canyons and draws on-site.

Stratigraphy

The project area is underlain by engineered artificial fills, undocumented artificial fills, landslide debris, colluvium, alluvium, older alluvium, terrace deposits, upper and lower members of the Fernando Formation, and the Puente Formation. Figure 5.7-1, *Project Area Geologic Units*, shows the geologic units in the project area.

Puente Formation, Sycamore Canyon member (Tpsc). The Miocene-aged Sycamore Canyon member of the Puente Formation is on the far north side of the site. It was not explored in the subsurface but, based on observed outcrops and mapping by others, it is composed of conglomerates. The rock is described in the reviewed literature as moderately hard to hard, moist, and moderately to well cemented.

Fernando Formation, lower member (Tfl). The Pliocene-aged lower member of the Fernando Formation is on the northeastern portion of the site. It is composed of siltstone and clayey siltstone with minor fine-grained sandstone beds. The rock is moderately hard to hard and slightly moist to moist.

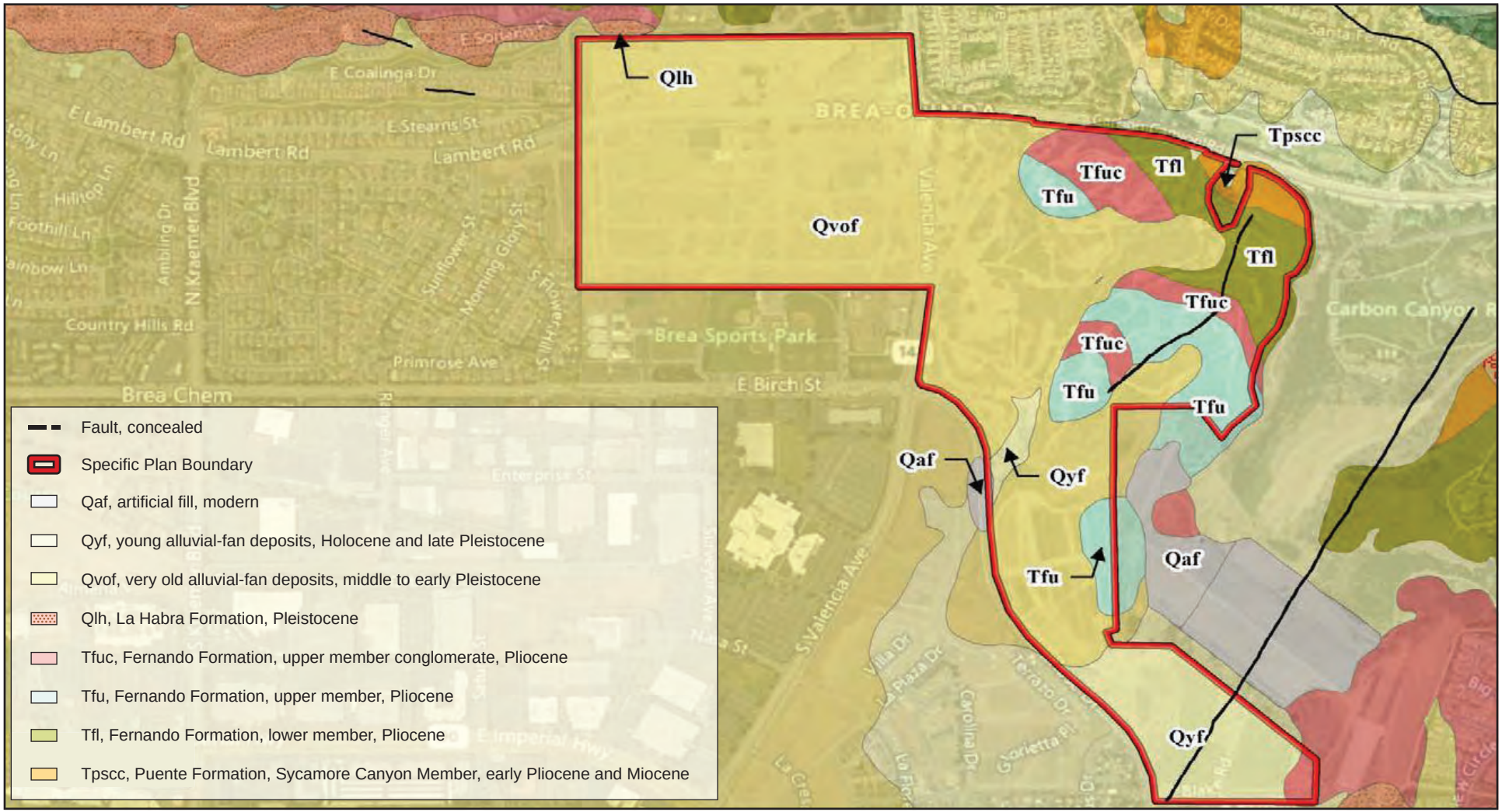
Fernando Formation, upper member (Tfu). The upper member of the Pliocene Fernando Formation is on the northeasterly to easterly portions of the site and composed of interbedded siltstones and conglomerates. The siltstones of the upper member of the Fernando Formation are moist, moderately hard to hard, with minor cemented zones. Minor fine-grained sandstone interbeds are within the siltstones. The siltstone is generally massive with locally well-bedded zones associated with the sandstone interbeds.

The conglomerates are subrounded to rounded pebble- to cobble-sized clasts that range from ½ inch to 6 inches in diameter. The cobbles are in a matrix of coarse to very coarse sand. The conglomerate is hard, poorly to well cemented, and locally fossiliferous.

Terrace Deposits (Qt). Pleistocene-aged terrace deposits are located throughout the central, north central, and western portions of the site. The terrace deposits are composed of sandy to clayey silts and silty sands, which are dark reddish brown, firm to stiff and dense, slightly moist to moist.

Older Alluvium (Qoal): Young Alluvial Fan Deposits (Qyf) and Very Old Alluvial Fan Deposits (Qvof). The late Pleistocene- to early Holocene-aged older alluvium is on the southeastern portion of the project. It is composed of silty to sandy clays and clayey to silty sands. The older alluvium is firm and medium dense to dense and stiff, slightly moist to moist, and predominantly dark reddish to yellowish brown.

Figure 5.7-1 - Project Area Geologic Units
5. Environmental Analysis



Source: Cogstone, 2019

5. Environmental Analysis
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Alluvium (Qal). Recent alluvial soils are in the draws and canyons throughout the site and in the Carbon Canyon channel area below the Carbon Canyon retention dam. The alluvium is composed of clayey to sandy silt, silty sand, and silty clay. The soils are loose and soft to firm and medium dense and dry to moist.

Colluvium (Qcol). Recent colluvial soils are present on the slope flanks throughout the hillier portions of the project site. The colluvium consists of silty to sandy clays, clayey silts, and silty sands in a slightly moist to moist and soft to firm condition.

Landslide Debris (Qls). Two questioned landslides have been mapped on the northeast side of the site. The slides were mapped based on geomorphic expression and aerial photographic review and have not been explored previously. The landslide debris, if it exists, is derived from the siltstone member of the Fernando Formation.

Undocumented Artificial Fill (Qaf). Undocumented artificial fills are scattered over the site. The fills are associated with access road construction, oil field exploration/production, and past and present agricultural uses. The fills are derived from the surrounding soils and are dry to slightly moist and loose/soft.

Engineered Artificial Fill (afel, afe2, afe3). Engineered artificial fill was placed on-site as part of the development of the adjacent Shea Homes project, the Brea Sports Park, and the Carbon Canyon Dam Sewer project.

5.7.2 Thresholds of Significance

According to Appendix G of the CEQA Guidelines, 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 waste water disposal systems where sewers are not available for the disposal of waste water.

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

Chapter 8, *Impacts Found Not to Be Significant*, substantiates that impacts associated with the following thresholds would be less than significant:

- Threshold G-5

This impact will not be addressed in the following analysis.

5.7.3 Plans, Programs, and Policies

Regulatory Requirements

PPP GEO-1 The proposed project will be designed and constructed in accordance with the California Building Code (CBC), which is based on the International Building Code and has been adopted by the City of Brea. New construction, alteration, or rehabilitation shall comply with applicable City ordinances and/or by 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 geotechnical investigation is required that 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 geotechnical investigation must be prepared by registered professionals (i.e., California Registered Civil Engineer or Certified Engineering Geologist). Recommendations of the report pertaining to structural design and construction recommendations for earthwork, grading, slopes, foundations, pavements, and other necessary geologic and seismic considerations must be incorporated into the design and construction of the project.

PPP HYD-1 The proposed project is required to be developed in compliance with the following state, regional, and local regulations concerning grading, stormwater, and water quality control:

State

- National Pollutant Discharge Elimination System General Construction Permit: Notice of Intent and Storm Water Pollution Prevention Plan Requirements
- State Water Resources Control Board General Industrial Activities Storm Water Permit

Regional

- Santa Ana Regional Water Quality Control Board Waste Discharge Permits and Water Quality Certifications
- Orange County Municipal Separate Storm Sewer Systems Permit
- Orange County Model Water Quality Management Plan and Technical Guidance Document
- Orange County Drainage Area Management Plan: New Development/Significant Redevelopment Program
- Orange County Hydrology Manual and 1996 Addendum
- Orange County Water District Groundwater Replenishment Program
- Orange County Flood Control District Local Implementation Plan 2019

5.7.4 Environmental Impacts

The following impact analysis addresses thresholds of significance for which the Initial Study disclosed potentially significant impacts. The applicable thresholds are identified in brackets after the impact statement.

Impact 5.7-1: The proposed project would not directly or indirectly cause substantial adverse effect, including the risk of loss, injury, or death involving rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map. [Threshold G-1.i]

The project site is not subject to surface rupture of a known active earthquake (Alta 2018). Based on a review of the Alquist-Priolo Earthquake Fault Zoning Map and the City of Brea General Plan Public Safety Element, the project site is not in an Alquist-Priolo Zone (CGS 2015; Brea 2003). Figure 5.7-2, *Geologic and Seismic Hazards*, shows the Alquist-Priolo earthquake fault zones. The proposed project would not directly or indirectly cause substantial adverse effect involving fault rupture.

Level of Significance Before Mitigation: No impact.

Impact 5.7-2: The proposed project would not directly or indirectly cause substantial adverse effect, including the risk of loss, injury, or death involving strong seismic ground shaking. [Threshold G-1.ii]

There are several large active fault systems in the region surrounding the project site. The prominent regional fault systems are the Whittier, Newport-Inglewood, Elsinore, San Jacinto, and San Andreas faults and Elysian Park seismic zone. The nearest fault system is the Whittier Fault, approximately 2,000 feet to the north. This fault is the main spur of the Elsinore fault system and extends northwesterly from Santa Ana Canyon through the Puente Hills to the Santa Monica Mountains. The Elysian Park Seismic Zone, an active blind thrust fault line, lies approximately two miles westerly of the project site. This seismic zone is a part of the north Los Angeles Thrust Belt, which is marked by blind thrust faults (not reaching to the earth's surface)

and associated anticlines, which are expressed as the low hills that ring the northern Los Angeles area. The second nearest fault system is the Newport-Inglewood fault system, approximately 19 miles southwest of the project site.

The type and magnitude of seismic hazards affecting a site are dependent on the distance to the fault and the intensity and magnitude of the seismic event. The seismic hazard may be primary, such as surface rupture and/or ground shaking, or secondary, such as liquefaction and/or ground lurching and earthquake-induced landslides. There are no active nor potentially active faults known to exist along or across the project site but considering proximity to multiple fault systems in the region, such as the Whittier and Newport-Inglewood faults, the proposed project development could subject persons on-site to strong ground shaking.

However, structures for human occupancy must be designed to meet or exceed 2019 CBC standards for earthquake resistance. The CBC has provisions for earthquake safety based on factors such as occupancy type, the types of soil and rock on-site, and the strength of ground motion with a specified probability at the site. The required geotechnical investigation for the proposed project, pursuant to PPP GEO-1, would calculate seismic design parameters that must be used in the design of the proposed building, pursuant to CBC requirements.

Level of Significance Before Mitigation: Less than significant impact with the implementation of PPP GEO-1.

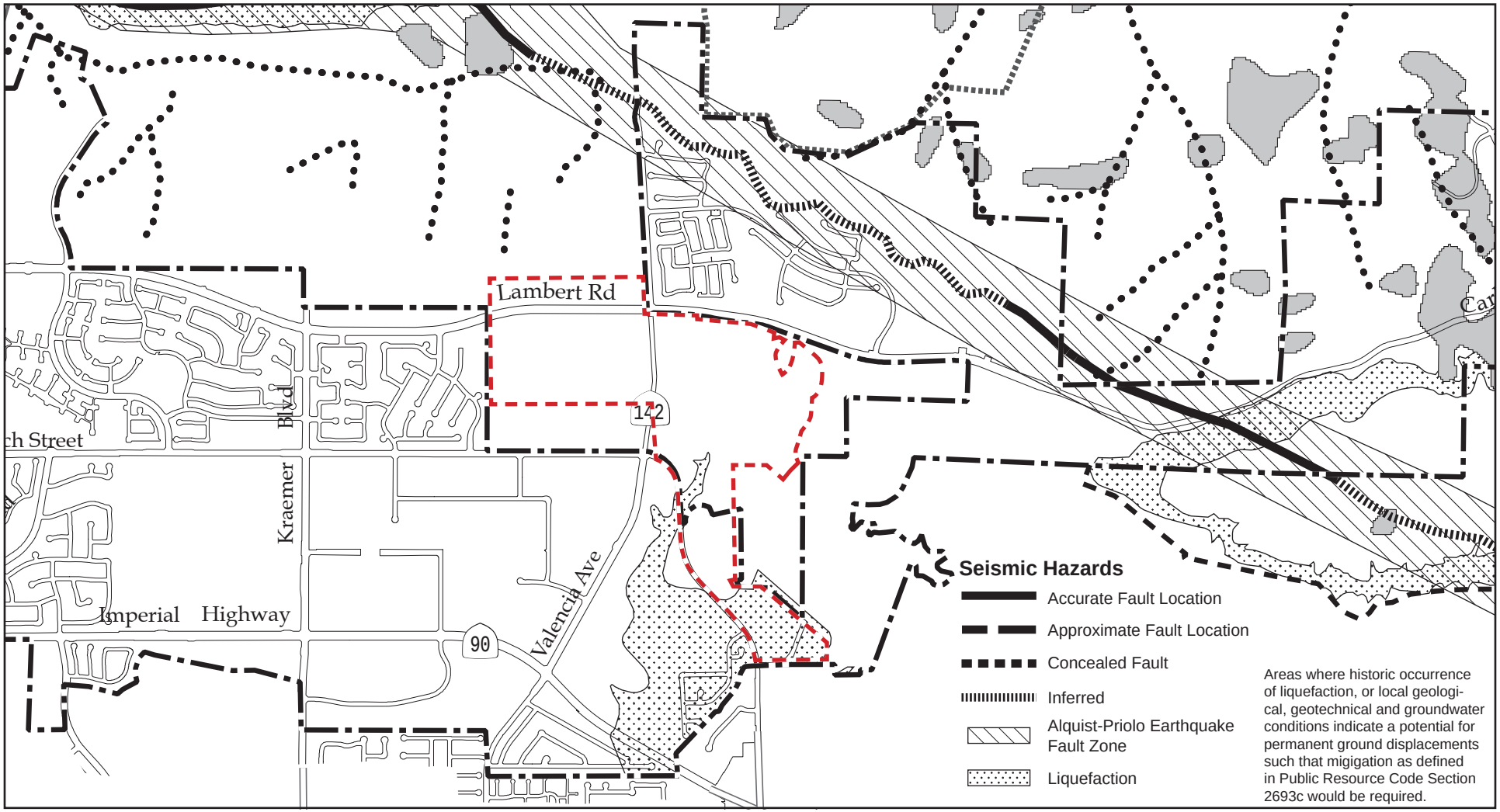
Impact 5.7-3: The proposed project would not directly or indirectly cause substantial adverse effect related to on- or offsite liquefaction, landslide, lateral spreading, subsidence, or collapse. [Threshold G-1.iii, G-1.iv, and G-3]

Liquefaction and Lateral Spreading

Liquefaction refers to loose, saturated sand or gravel deposits that lose their load supporting capability when subjected to intense shaking. Any buildings or structures on these sediments may float, sink, or tilt as if on a body of water. Based on the limited subsurface investigation, liquefaction potential of the project site is considered low due to the depth of the groundwater (51 feet) measured on-site. However, the State of California Seismic Hazards Zone Map for the Yorba Linda Quadrangle (CGS 2015) identifies areas on the eastern portion of the project site that may have a potential for liquefaction. Lateral spreading refers to lateral displacement of large, surficial blocks of soil as a result of liquefaction in a subsurface layer. The project site contains areas with potential for liquefaction; therefore, it also has potential for lateral spreading.

Reducing impacts for liquefaction/dynamic settlement potential include removal and replacement with compacted, drained fills; ground modification; and/or designing for potential settlement of liquefiable materials.

Figure 5.7-2 - Geologic and Seismic Hazards
5. Environmental Analysis



Source: City of Brea, 2003

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Earthquake-Induced Landslides

The project site contains slopes and areas susceptible to landslides. The northeastern side of the site can be characterized as moderate to locally steep hillside terrain with eroded canyons. Natural slopes in these canyon areas vary in slope ratio from approximately 1:1 to 5:1 (horizontal : vertical). The State of California Seismic Hazards Zone Map for the Yorba Linda quadrangle identified natural slopes onsite that may be subject to seismically induced landslides.

Subsidence and Collapsible Soils

Collapsible soils shrink when wetted and/or subjected to a load. Based on the data from the previous subsurface investigation and laboratory testing, weathered older alluvium and terrace deposits, highly weathered bedrock, colluvium, alluvium, undocumented artificial fill, and the landslide debris are likely to be compressible. The colluvium, alluvium, and portions of the older alluvium and terrace deposits on-site are subject to hydrocollapse. Hydrocollapse is when loose dry soils undergo rapid consolidation (collapse) when wetted. The presence of such collapsible soils below fills can cause structural damage to buildings.

Compressible and collapsible soils are typically mitigated by using a combination of overexcavation of the susceptible soils and recompaction as engineered fills. These techniques may be used in conjunction with enhanced foundation design.

The proposed project has potential to be impacted by on- or off-site liquefaction, lateral spreading, landslide, subsidence, or collapse. The proposed project would be designed and constructed to protect structural integrity and infrastructure against geologic hazards per the recommendations in a geotechnical report required under PPP GEO-1 and prepared in accordance with CBC requirements and reviewed and approved by the City of Brea. The geotechnical investigation report will include recommendations for reducing impacts from adverse subsurface soil conditions, such as removal and/or overexcavation or soils and replacement with recompacted engineered fills to meet the required state and local regulations.

Level of Significance Before Mitigation: Less than significant impact with the implementation of PPP GEO-1.

Impact 5.7-4: Project development could cause substantial soil erosion or the loss of topsoil. [Threshold G-2]

Erosion is a natural process of the movement of soil from place to place. The main natural agents of erosion in the region are flowing water and wind. Erosion can be accelerated dramatically by ground-disturbing activities if effective erosion control measures are not used. Soil can be carried off construction sites or bare land by wind and water, and tracked off construction sites by vehicles.

The project applicant is required to comply with the National Pollutant Discharge Elimination System permit from the State Water Resources Control Board, including submittal of a Notice of Intent and preparation of a Storm Water Pollution Prevention Plan, which will specify best management practices to minimize stormwater pollution from project construction, including erosion and sediment. The project construction

contractor would implement the specified best management practices. At project completion, the project site would be developed with buildings, surface parking, walkways and other paved areas, and landscaping; thus, soil on-site would not be susceptible to substantial erosion.

Level of Significance Before Mitigation: Less than significant impact with the implementation of PPP HYD-1.

Impact 5.7-5: The project site is not located on expansive soils that create substantial direct or indirect risks to life or property. [Thresholds G-4]

Expansive soils contain substantial amounts of clay that swell when wetted and shrink when dried; the swelling or shrinking can shift, crack, or break structures built on such soils. The expansion potential of on-site soils during grading would likely range from "very low" to "high" (Alta 2018). However, the presence of expansive soil is commonly and effectively reduced by various techniques such as 1) proper design of foundations, slabs, streets, and other improvements subject to the influence of the soils; 2) overexcavation of the expansive soils/bedrock and replacement with less-expansive fill soils; 3) selective grading techniques to place more highly expansive soils well below foundation elements; 4) presaturation techniques to lessen expansion potential; 5) control of surface and subsurface drainages to prevent moisture variations; and 6) combinations of these various techniques.

Therefore, to ensure that risks from expansive soils remain less than significant, the geotechnical investigation report required under PPP GEO-1 will include recommendations for maintaining the moisture content in the slab and subgrade to minimize potential soil expansion after grading and prior to concrete placement.

Level of Significance Before Mitigation: Less than significant impact with the implementation of PPP GEO-1.

Impact 5.7-6: Project development could directly or indirectly destroy a unique paleontological resource or site or unique geologic feature. [Threshold G-6]

The project site is mapped as modern artificial fill, Pleistocene to Holocene alluvial fans, the La Habra Formation, the Fernando Formation, and the Puente Formation. A record search of the project area and a one-mile radius was conducted as part of the Paleontological and Cultural Resources Assessment, and this report is included as Appendix E to the DEIR. No fossil localities are known from the project area or within a mile of the project site, but numerous localities have been found within 10 miles of the project site in the same sedimentary units that are present in the project site. These units include unnamed Pleistocene deposits, the La Habra Formation (Pleistocene), Fernando Formation (Pliocene), Puente Formation, and Sycamore Canyon Conglomerate (late Miocene to Pliocene). Additionally, a small oyster fossil was identified in the project area in the Fernando Formation that dates to Pliocene age. Appendix B of the Paleontological and Cultural Resources Assessment (DEIR Appendix E) includes results of the paleontological resources records search.

Paleontological resources sensitivity of the project area was assessed by using the Potential Fossil Yield Classification (PFYC) system developed by Bureau of Land Management. Fossil resources occur in geologic

units (e.g., formations or members), and the PFYC system has a multilevel scale based on demonstrated yield of fossils. Using the PFYC system, geologic units are classified according to the relative abundance of vertebrate fossils or scientifically significant invertebrate or plant fossils as well as their sensitivity to adverse impacts within the known extent of the geological unit. Although significant localities may occasionally occur in a geologic unit, a few widely scattered important fossils or localities do not necessarily indicate a higher PFYC value; instead, the relative abundance of localities is intended to be the major determinant for the value assignment.

For example, the artificial fill has a very low potential for fossils and is assigned PFYC 1. The upper eight feet of the late Pleistocene to Holocene young alluvial fan is assigned PFYC 2, a low potential for fossils at the surface, and the level increases to PFYC 3a, a moderate but patchy sensitivity, by eight feet below the original ground surface. Figure 5.7-3, *Paleontological Sensitivity of the Project*, illustrates these classifications on the project site. Both the upper member conglomerate of the Fernando Formation (*Tfu*) and the Sycamore Canyon member conglomerate of the Puente Formation (*Tpsc*) are assigned a low potential for fossils of PFYC 2 due to the coarseness of these deposits. The early to middle Pleistocene very old alluvial fan, the La Habra Formation, and the nonconglomeratic facies of the upper and lower members of the Fernando Formation (*Tfl*) are assigned a moderate and patchy sensitivity. The majority of the project site is assigned low to moderate sensitivity, PFYC 2 to PFYC 3a, and at PFYC 3, a paleontological resource impact mitigation program and full-time monitoring would be required to reduce potential impacts.

Level of Significance Before Mitigation: Potentially significant impact.

5.7.5 Cumulative Impacts

Geology and soils impacts related to the proposed project would be specific to that site and its users and would not be common or contribute to the impacts on other sites. Compliance with applicable state and local building regulations would be required of all development in Brea and surrounding cities. Individual projects would be designed and built in accordance with applicable standards in the CBC and the individual building regulations of local jurisdictions (see PPP GEO-1), including pertinent seismic design criteria. Site-specific geologic hazards would be addressed by the geotechnical report required for each development project. 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.

Impacts related to paleontological resources would have site-specific impacts, and other cumulative projects would be required to be assessed and mitigated, if necessary. Provided that site-specific impacts are reduced to a less than significant level, no cumulatively significant impacts are anticipated.

Impacts of the proposed project and other development projects on geology and soils would not be cumulatively considerable after compliance with existing regulations and implementation of site-specific mitigation measures.

5.7.6 Level of Significance Before Mitigation

Upon implementation of the plans, programs, and policies, the following impacts would be less than significant: 5.7-1, 5.7-2, 5.7-3, 5.7-4, and 5.7-5.

Without mitigation, these impacts would be **potentially significant**:

- **Impact 5.7-6** The proposed project could result in discovery of paleontological resources during excavation of soils beyond eight feet or greater with Potential Fossil Yield Classification 3 (PFYC 3) or greater.

5.7.7 Mitigation Measures

Impact 5.7-6

GEO-1 The project applicant shall implement a Paleontological Resource Impact Mitigation Program and conduct full-time monitoring by a qualified paleontologist when disturbing deposits with a Potential Fossil Yield Classification (PFYC) ranking of 3 or greater. If unanticipated fossils are unearthed during construction, work shall be halted in that area until a qualified paleontologist can assess the significance of the find. Sediment samples shall be collected in the deposits and processed to determine the small-fossil potential in the project area, and any fossils recovered during mitigation should be deposited in an accredited and permanent scientific institution. Work may resume immediately a minimum of 50 feet away from the find. This procedure shall be included in the Worker Environmental Awareness Program training provided to construction personnel.

Only qualified, trained paleontologists with specific expertise in the type of fossils being evaluated shall determine the scientific significance of paleontological resources. Fossils are considered to be scientifically significant if one or more of the following criteria apply:

1. The fossils provide information on the evolutionary relationships and developmental trends among organisms, living or extinct.

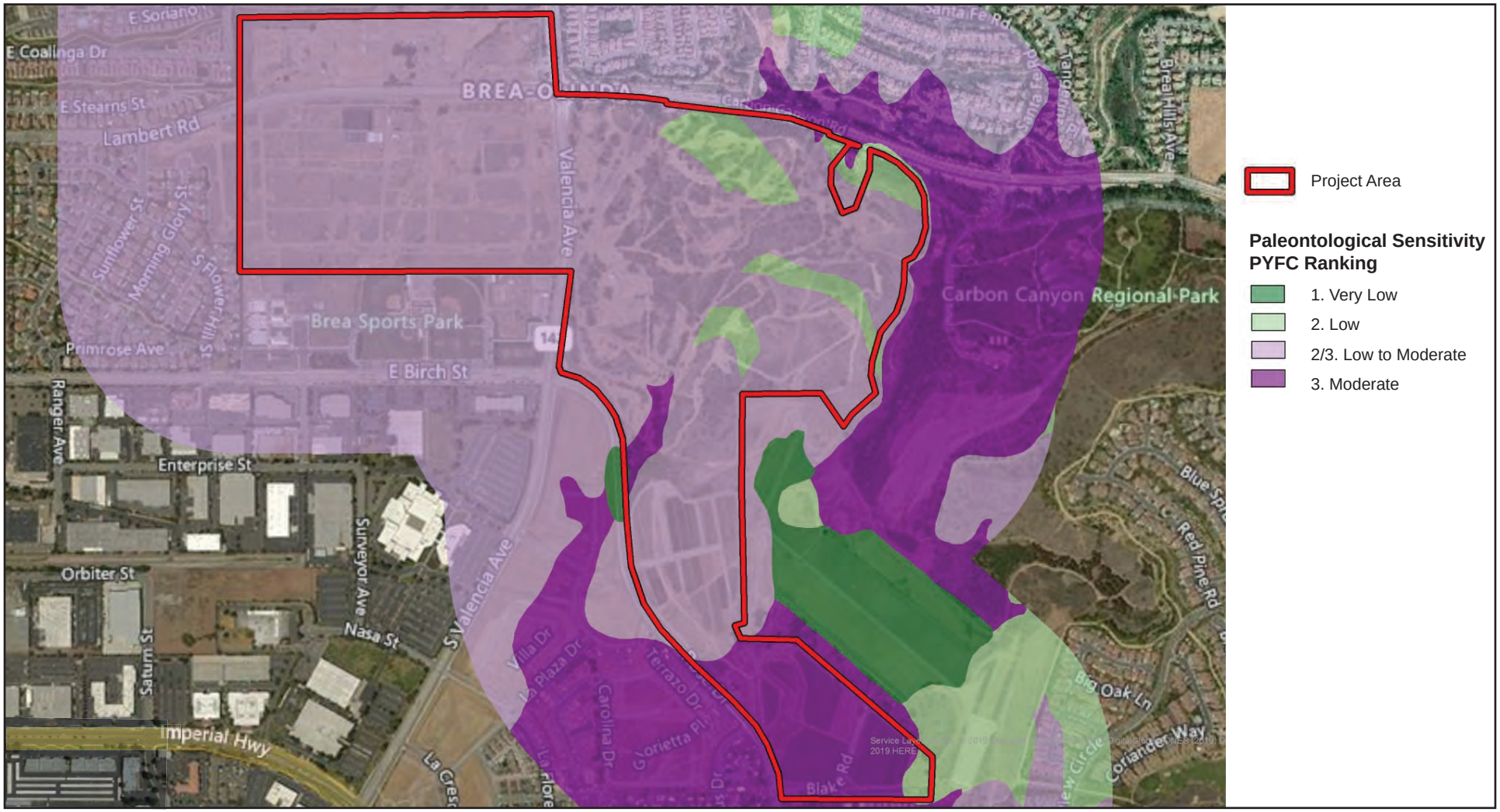
2. The fossils provide data useful in determining the age(s) of the rock unit or sedimentary stratum, including data important in determining the depositional history of the region and the timing of geologic events therein.

3. The fossils provide data regarding the development of biological communities or interaction between paleobotanical and paleozoological biotas.

4. The fossils demonstrate unusual or spectacular circumstances in the history of life.

5. The fossils are in short supply and/or in danger of being depleted or destroyed by the elements, vandalism, or commercial exploitation and are not found in other geographic locations.

Figure 5.7-3 - Paleontological Sensitivity of the Project
5. Environmental Analysis



Source: Cogstone, 2019

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If fossils are considered to be scientifically significant, the fossils shall be curated in perpetuity at an accredited repository after excavations have finished, and nonvertebrate fossils (plants, shells, trace fossils, etc.) may be collected as a representative sample when numerous fossils of the same species are present.

5.7.8 Level of Significance After Mitigation

Impact 5.7-6

Implementation of Mitigation Measure GEO-1 would ensure that impacts to paleontological resources are reduced to a less than significant level. Therefore, impacts would be reduced to a less than significant level, and no significant and unavoidable impact would remain.

5.7.9 References

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5. Environmental Analysis
GEOLOGY AND SOILS

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