3.1.3 Geology and Soils

This section addresses the potential geology and soils impacts associated with implementation of The Villages – Escondido Country Club Project (Project). The section describes the existing geology, soils, and seismic conditions within the Project site and the off-site infrastructure improvement areas and analyzes the potential physical environmental effects related to seismic hazards, underlying soil characteristics, slope stability, erosion, and excavation. This section is based on the information provided in the *Updated Geotechnical Report: The Villages at Escondido Country Club, Escondido, California* (Geotechnical Report), prepared by GEOCON in October 2016 and included in Appendix 3.1.3-1 of this Environmental Impact Report (EIR).

GEOCON conducted a geotechnical investigation of the Project site and subsequent investigation of the proposed off-site improvement areas. The investigations included field mapping, subsurface exploration, laboratory testing, and additional engineering and geologic analysis. In particular, field work consisted of drilling 14 hollow-stem auger borings, 49 exploratory trenches, and 8 seismic traverses. The investigation evaluated the surface and subsurface soil and geologic conditions and provided recommendations as to the feasibility of the Project site development, along with off-site improvements. The Geotechnical Report included in Appendix 3.1.3-1 provides the findings of this investigation and updates previous reports entitled *Preliminary Geotechnical Investigation, The Lakes, Escondido, California*, dated July 3, 2013, and *Update Geotechnical Report, The Lakes Escondido, Escondido, California*, dated May 26, 2015.

Potential effects of soil conditions on air quality related to fugitive dust and water quality related to groundwater, erosion, and siltation as a result of construction-related activities are discussed in Section 2.1, Air Quality, and Section 3.1.5, Hydrology and Water Quality, respectively.

3.1.3.1 Existing Conditions

3.1.3.1.1 Environmental Setting

This section describes the location and existing geologic conditions related to the Project and off-site infrastructure improvements with respect to (1) regional geology, (2) topography, (3) soils and geologic formations, (4) geologic structure, and (5) geologic hazards.

Project Location

The Project site consists of approximately 109 acres located within the boundaries of the former Escondido Country Club situated within the northwest portion of Escondido, California.

Regional Geology

The Project lies within the Peninsular Range Region of San Diego County. The lower Peninsular Range Region is made up of foothills that span in elevation from 600 to 2,000 feet above mean sea level. It is characterized by rolling to hilly uplands that contain frequent narrow, winding valleys. Specifically, the Project is located in the foothills subprovince of the Peninsular Ranges Geomorphic Province, a region typified by northwest-southeast trending structural blocks separated by major regional fault zones (City of Escondido 2012).

Topography

Topographically, the Project site consists of generally flat terrain with some gently to moderately sloped areas in the eastern portion of the Project site. The topography is characteristic of the geologic units present where surface morphology is dictated by the resistance of each unit to erosion. Gentle slopes comprise the lower elevations of the site (alluvium and colluvium), while exposure to hard rock resulted in the moderately sloped, cone-shaped projections observed within and surrounding the Project site.

Soils and Geologic Formations

Field investigations encountered four surficial soil types and two geologic formations. The surficial deposits consist of undocumented fill, topsoil, alluvium, and colluvium. The formational units include Cretaceous-age granitic rock and Jurassic-age metasedimentary/metavolcanic rock. Due to their random occurrence and difficulty in identifying these units, the bedrock is identified as Mesozoic rock on the Figure 3.1.3-1, Geologic Map. Each of the surficial soil types and geologic units encountered is described in order of increasing age.

Undocumented Fill ($Qudf_1$ and $Qudf_2$)

Two types of undocumented fill soils were encountered within the Project site and are identified on Figure 3.1.3-1, Geologic Map. Fill soils associated with the development of the golf course are identified as $Qudf_1$ and embankments associated with the surrounding developments and infrastructure are identified as $Qudf_2$ (Appendix 3.1.3-1).

The majority of the undocumented fill soils were identified within the interior of the Project and were placed on site as part of the former golf course. The fill soils are expected to be widespread and vary in thickness from a thin veneer to approximately 10 feet thick. Only the fill deposits ($Qudf_1$) estimated to be over 2 feet thick were mapped (Appendix 3.1.3-1).The materials observed within five of the exploratory trenches (T-1, T-2, T-4, T-6, and T-10) generally consist of silty sands with some gravel. Complete removal of these embankments would be required in areas of proposed on-site improvements.

Topsoil (Unmapped)

Topsoils were encountered in four exploratory trenches (T-20, T-28, T-32, and T-38) and varied thickness from 1 to 2 feet (Figure 3.1.3-1). The topsoils are characterized as loose, silty sands and are considered unsuitable in their present condition. These deposits would require remedial grading in areas of proposed improvements.

Alluvium (Qal)

Alluvial soils were found throughout the property with a maximum thickness of approximately 26 feet (Boring B-8). These deposits primarily consist of loose to dense, silty to clayey sands with varying amounts of gravel, cobble, and boulder size rock fragments derived from the bedrock units. Some silt and clayier lenses were encountered in several of the borings and trenches as well. Laboratory analysis indicates that portions of the alluvium have adequate compression characteristics to support the anticipated structural loads. Therefore, only the compressible portions of the alluvium will require remedial grading.

It is anticipated that grading will expose alluvial and colluvial deposits within the majority of the proposed cut slopes throughout the Project site. Additional observation and testing during grading may be necessary to evaluate the suitability of these materials in the slopes. Remedial measures consisting of stability fills may be necessary where unsuitable materials are exposed in cut slope areas.

Colluvium (Qc)

Colluvial deposits were encountered up to a maximum of 6 feet thick along the hillsides above the alluvial drainages overlying the formational rock units. These deposits generally consist of loose to medium dense, silty to clayey sands with varying amounts of gravel, cobble, and boulder size rock fragments. These deposits are similar to the alluvial soils in that the material observed/tested appears to have adequate strength to support fill soils and/or structural loads. As such, the same remedial grading requirements also would be recommended within future improvement areas as discussed below.

Mesozoic Rock (Mr)

The Project site is underlain by Cretaceous-age granitic rock and Jurassic-age Santiago Peak volcanics, which are both Mesozoic in origin. The emplacement of the granitic rock through the other metavolcanic and medasedimentary units created mixing zones and outcrops of varying composition across the Project area. Since it was difficult to distinguish between these units, bedrock units are designated as (Mr)-Mesozoic rock on Figure 3.1.3-1, Geologic Map.

In general, the composition of the rock units encountered consisted primarily of weakly to moderately metamorphosed sandstones and siltstones, while other areas contained granite and andesite. The rocks exhibited a variable weathering pattern ranging from completely weathered to slightly weathered, weak to very strong rock (Trench T-28). It should be anticipated that excavations within the various rock units may generate boulders and oversize materials (rocks greater than 12 inches in length) that would require special handling and placement.

Groundwater

Groundwater and/or seepage were encountered within several of the exploratory trenches and borings performed during the field investigation. Groundwater/seepage was found as shallow as 4.5 feet in Trench No. T-22 and as deep as 24 feet in Boring No. B-8. However, due to the geologic conditions and the natural and artificial water sources inherent to the property, groundwater conditions are expected to fluctuate seasonally.

Remedial grading likely would encounter excavation and compaction difficulty due to wet and/or saturated soil conditions (see Trench Nos. T-13, T-21, and T-22). Dewatering and top loading may be required in the low-lying alluvial areas in order to remove the unsuitable materials.

Six groundwater wells were identified during the geotechnical study (Appendix 3.1.3-1). The wells were constructed to provide irrigation for the golf course and are generally positioned in alluvial areas. Three of the wells (W-4 through W-6) were measured to identify the existing groundwater elevations. The elevations varied between minus 2 and 5 feet below existing grade.

Geologic Hazards

A review of the referenced geologic materials and knowledge of the general area indicate that the Project site is not underlain by active, potentially active, or inactive faults. An active fault is defined by the California Geological Survey as a fault showing evidence for activity within the last 11,000 years. The site is not located within a State of California Earthquake Fault Zone.

According to the computer program EZ-FRISK (Version 7.62), nine known active faults are located within a search radius of 50 miles from the property (Fugro Risk Engineering 2011). The nearest known active fault is the Elsinore Fault, located approximately 14 miles east of the site, and is the dominant source of potential ground motion. Earthquakes that might occur on the Elsinore Fault Zone or other faults within the Southern California and northern Baja California area are potential generators of significant ground motion at the site. The estimated deterministic maximum earthquake magnitude and peak ground acceleration for the Elsinore Fault are 7.85g and 0.25g, respectively. Table 3.1.3-1 lists the estimated maximum earthquake magnitude and peak ground acceleration for the most dominant faults in relationship to the site location.

3.1.3.1.2 Regulatory Setting

Federal

International Building Code

The International Building Code (IBC) is a model building code developed by the International Code Council and provides the basis for the California Building Code (CBC). The IBC provides minimum standards for building construction to ensure public safety, health, and welfare. Prior to the creation of the IBC, several different building codes were used; by the year 2000, the IBC replaced these previous codes. The IBC is updated every 3 years.

Occupational Safety and Health Administration Regulations

Excavation and trenching are among the most hazardous construction activities. The Occupational Safety and Health Administration (OSHA) Excavation and Trenching Standard (29 CFR, Part 1926(P) et seq.) covers requirements for excavation and trenching operations. OSHA requires that all excavations in which employees could potentially be exposed to cave-ins be protected by sloping or benching the sides of the excavation, supporting the sides of the excavation, or placing a shield between the side of the excavation and the work area.

State

California Geological Survey

The California Geological Survey provides guidance with regard to seismic hazards. The California Geological Survey's Special Publication 117A, Guidelines for Evaluating and Mitigating Seismic Hazards in California (2008), provides guidance for evaluation and mitigation of earthquake-related hazards for projects within designated zones of required investigation.

State of California Division of Occupational Safety and Health, California Department of Industrial Relations

The State of California Division of Occupational Safety and Health (Cal OSHA) Excavations Standard (Subchapter 4, Article 6) details requirements for excavation operations. Cal OSHA requires that all excavations in which employees could potentially be exposed to cave-ins be protected by sloping or benching the sides of the excavation, supporting the sides of the excavation, or placing a shield between the side of the excavation and the work area. Article 6 also includes a Tailgate/Toolbox guide for Trenching Safety before and during excavation activities.

California Building Code

The CBC is based largely on the IBC. The CBC includes the addition of more specific seismic provisions for structures located in seismic zones. The provisions of the CBC apply to the construction, alteration, movement, replacement, and demolition of every building or structure or any appurtenances connected or attached to such buildings or structures throughout California.

California Environmental Quality Act

Primary environmental legislation in California is found in the California Environmental Quality Act (CEQA) and its implementing guidelines (CEQA Guidelines), which require that projects with potential adverse effects (or impacts) on the environment undergo environmental review. Adverse environmental impacts are typically mitigated as a result of the environmental review process in accordance with existing laws and regulations.

Alquist–Priolo Earthquake Fault Zoning Act

The California Legislature, as a result of the 1971 San Fernando Earthquake, passed the Alquist–Priolo Earthquake Fault Zoning Act (California Public Resources Code, Sections 2621 et seq.) in 1972. The act provides a mechanism for reducing losses from surface fault rupture on a statewide basis. Specifically, the act requires that proposed developments incorporating tracts of four or more dwelling units investigate the potential for ground rupture within designated Alquist–Priolo Zones. These zones serve as an official notification of the probability of ground rupture during future earthquakes. Where such zones are designated, no building may be constructed on the line of fault, and before any construction is allowed, a geologic study must be conducted to determine the locations of all active fault lines in the zone. Local agencies must regulate most development projects within the zones.

Seismic Hazards Mapping Act

The Seismic Hazards Mapping Act (California Public Resources Code, Sections 2690–2699.6) addresses earthquake hazards from non-surface fault rupture, including liquefaction, landslides, strong ground shaking, or other earthquake and geologic hazards. The Seismic Hazards Mapping Act specifies that the lead agency for a project may withhold development permits until geologic or soils investigations are conducted for specific sites and mitigation measures are incorporated into plans to reduce hazards associated with seismicity and unstable soils.

Local

Chapter 22 of the City of Escondido Municipal Code

Chapter 22 of the City's Municipal Code establishes regulations related to stormwater management and discharge control, harmful waters and wastes, sewer service charges, private sewage disposal systems, sewer connection fees, sewer-connection laterals, and industrial wastewater. Article 5 of Chapter 22 of the code requires all subsurface sewage disposal units and systems to be designed, placed, and maintained in accordance with the rules and regulations of the County of San Diego (City of Escondido 2016). Delegated by the Regional Water Quality Control Board, the County Department of Environmental Health is the primary agency charged with regulating the design, construction, and maintenance of septic tanks, leach lines, seepage pits, and alternative on-site wastewater treatment systems throughout the County.

City of Escondido Grading and Erosion Control Ordinance

Article 55 of the City's Municipal Code establishes the grading and erosion control regulations for the City. The article ensures that development occurs in a manner that protects the natural and topographic character and identity of the environment; visual integrity of hillsides and ridgelines; sensitive species and unique geologic/geographic features; and the health, safety, and welfare of the public. Article 55 regulates grading on private and public property and provides standards and design criteria to control stormwater and erosion during construction activities. The ordinance sets forth rules and regulations to control excavation, grading, earthwork construction (including fills and embankments), and development on hillsides and along ridgelines; establishes the administrative procedures for the issuance of permits; and provides for approval of plans and inspection of grading construction in compliance with stormwater management requirements.

3.1.3.2 Analysis of Project Effects and Determination as to Significance

3.1.3.2.1 Guidelines for the Determination of Significance

For purposes of this EIR, Appendix G of the CEQA Guidelines (14 CCR 15000 et seq.) will apply to the direct, indirect, and cumulative impact analyses. A significant impact to geology and soils would occur if the 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 based on other substantial evidence of as known fault. Refer to Division of Mines and Geology Special Publication 42;

ii. Strong seismic ground shaking;

iii. Seismic-related ground failure, including liquefaction; or

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 wastewater disposal systems where sewers are not available for the disposal of wastewater.

3.1.3.2.2 Analysis

A. Would the Project 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 based on other substantial evidence of as known fault? Refer to Division of Mines and Geology Special Publication 42.

The Geotechnical Report (Appendix 3.1.3-1) concluded the site is not underlain by active, potentially active, or inactive faults. The California Geological Survey defines an active fault as a fault showing evidence for activity within the last 11,000 years. Additionally, the site is not located within a State of California Earthquake Fault Zone. The nearest known active fault is the Elsinore Fault, located approximately 14 miles east of the site and has an estimated deterministic maximum earthquake magnitude (Mw) and peak ground acceleration (g) of 7.85 Mw and 0.25g, respectively. Due to the distance of the nearest fault and magnitude of past seismic activity, the Project would not expose people or structures to potential substantial adverse effects associated with the rupture of a known earthquake fault. Therefore, impacts would be **less than significant.**

ii. Strong seismic ground shaking?

The nearest known active fault is the Elsinore Fault, located approximately 14 miles east of the site. The Elsinore Fault is the dominant source of potential ground motion. Other nearby active faults include the Elsinore Fault Zone and the Rose Canyon Fault Zone, which are located approximately 15 miles from the Project site. Earthquakes that might occur on the Elsinore Fault Zone or other faults within the Southern California and northern Baja California area are potential generators of significant ground motion at the site. The estimated deterministic maximum earthquake magnitude and peak ground acceleration for the Elsinore Fault are 7.85 Mw and 0.25g, respectively (see Appendix 3.1.3-1).

The Project site is likely to be subjected to strong ground motion from seismic activity similar to that of the rest of the San Diego County and Southern California, due to the seismic activity of the region as a whole. However, compliance with the CBC and the seismic design criteria recommendations described in Appendix 3.1.3-1 would reduce exposure of people or structures to potential substantial adverse effects from seismic ground shaking. Therefore, impacts would be **less than significant.**

iii. Seismic-related ground failure, including liquefaction?

Liquefaction typically occurs when a site is located in a zone with seismic activity, the on-site soils are cohesionless, groundwater is encountered within 50 feet of the surface, and soil relative densities are less than about 70%. If four of the previous criteria are met, a seismic event could result in a rapid pore-water pressure increase from the earthquake-generated ground accelerations. Seismically induced settlement may occur whether the potential for liquefaction exists or not. The potential for liquefaction at the site is considered low due to the relative density of the alluvium/colluvium to remain in place, dense formational material encountered, and remedial grading recommended (Appendix 3.1.3-1). Despite the shallow depth of groundwater encountered in low-lying drainages on site, the Geotechnical Report recommends the possible removal of surficial deposits within these areas to further stabilize these areas (Appendix 3.1.3-1). Additionally, according to the *City of Escondido General Plan* (General Plan), the Project site is not located on a site subject to liquefaction (City of Escondido 2012, Figure VI-9). Therefore, impacts associated with liquefaction would be **less than significant**.

iv. Landslides?

The risk associated with ground rupture hazards, such as landslides, is very low due to the absence of active faults within the Project site. According to the City's General Plan, the Project site is not located in an area subject to a potential landslide (City of Escondido 2012, Figure VI-9). Additionally, the Project would be designed in accordance with the 2013 CBC, which would minimize any potential risks associated with landslides. Therefore, impacts would be **less than significant**.

B. Would the Project result in substantial soil erosion or the loss of topsoil?

The demolition and construction phases of the Project would require grading, excavation, and the import and export of soil from the Project site and therefore would increase the potential for erosion. Soil erosion and loss of topsoil could occur through runoff, wind transport, and vehicle movement. Grading would consist of approximately 850,000 cubic yards of cut and fill. Cut and fill slopes are designed at 2:1 (horizontal:vertical) or flatter, with maximum heights of 35 and 55 feet, respectively. The site is underlain by surficial units that include undocumented fill soils, topsoils, colluvium, and alluvium. The undocumented fill, topsoils, and upper portions of alluvium and colluvium deposits are presently unsuitable to support fill and/or structural loads and would require remedial grading where improvements are planned. Additionally, all Project site slopes would be landscaped with drought-tolerant vegetation having variable root depths and requiring minimal landscape irrigation, and all slopes would be drained and properly maintained to reduce erosion. These site design measures are included in project design feature **PDF-GE-1**, presented below (see also Table 1-2, Project Design Features, in Chapter 1 of this EIR).

PDF-GE-1 The Update Geotechnical Report and Recommended Grading Specifications (Appendix 3.1.3-1, prepared by GEOCON Inc.), shall be adhered to for construction of the Project. The recommendations and site design features include but are not limited to the following:

- All Project site slopes would be landscaped with drought-tolerant vegetation having variable root depths and requiring minimal landscape irrigation.
- All Project slopes would be drained and properly maintained to reduce erosion.
- Concrete cracking would be prevented by limiting the slump of the concrete, proper concrete placement and curing, and placement of crack control joints at periodic intervals, in particular, where re-entrant slab corners occur.

The Project would not be approved or built without adequately demonstrating to the City compliance with the CBC and applicable geologic hazards regulations. Thus, in combination with the above discussion of planned grading and landscaping to avoid soil erosion, the Project would not result in substantial soil erosion or the loss of topsoil, and impacts would be **less than significant**.

C. Would the Project 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.

As previously stated, liquefaction occurs when the pore water pressures generated within a soil mass become near or equal to the overburden pressure. This results in a loss of strength, and the soil develops a certain degree of mobility. Groundwater conditions, soil type, particle size, distribution, earthquake magnitude and acceleration, and soil density are all factors considered when evaluating liquefaction potential. Soils subject to liquefaction comprise saturated fine-grained sands and coarse silts. Coarser-grained soils are considered free draining and therefore dissipate excess pore pressures, while fine-grained soils possess higher shear strength.

According to the City's General Plan, the Project site is not located in an area subject to landslide, lateral spreading, subsidence, liquefaction, or collapse (City of Escondido 2012). The site was previously developed and disturbed, and there are no known cases of landslide, lateral spreading, subsidence, liquefaction, or collapse occurring on site. Additionally, the Project would not be approved or built without adequately demonstrating compliance with the CBC and applicable geologic hazards regulations. Therefore, impacts associated with placement on a geologic unit or soil that is unstable, or that would become unstable as a result of the Project, would be **less than significant**.

D. Would the Project 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?

Expansive soils contain minerals, such as clay, that are capable of absorbing water and expanding, and losing water and shrinking. The repetitive stress of a swell/shrink cycle on a foundation can cause severe damage to buildings and structures. The soil encountered in the field investigation is considered to be "expansive" (expansion index of greater than 20) as defined by 2013 CBC Section 1803.5.3.

In order to reduce the effects of expansive soils, the Project would use proper moisture conditioning of subgrade soil supporting flatwork. Prior to concrete placement, the upper 1 foot of subgrade would be scarified, moisture conditioned, and compacted to at least 90% of the maximum dry density, at slightly over optimum moisture content. Soils placed below optimum moisture content should be reworked and retested prior to placing concrete. Additionally, the moisture content would be maintained until the concrete pour. Even with the incorporation of the recommendations presented in the Geotechnical Report (Appendix 3.1.3-1), foundations, stucco walls, and slabs-on-grade placed on expansive soils may still exhibit some cracking due to soil movement and/or shrinkage. The occurrence of concrete shrinkage cracks is independent of the supporting soil characteristics. As recommended in the Geotechnical Report, limiting the slump of the concrete, proper concrete placement and curing, and the placement of crack control joints at periodic intervals, in particular, where re-entrant slab corners occur as a part of the site design would ensure the occurrence of concrete shrinkage cracks would be reduced and/or controlled (Appendix 3.1.3-1). These site design measures are included in **PDF-GE-1**; see Table 1-2. Additionally, the Project would be constructed in conformance with the 2013 CBC, which would minimize impacts associated with expansive soils. With incorporation of these recommendations and compliance with the 2013 CBC, impacts would be **less than significant**.

E. Would the Project 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 wastewater?

The Project would not involve the use of septic tanks or alternative wastewater disposal; therefore, **no impact** related to soils incapable of supporting these uses would occur.

3.1.3.3 Cumulative Impact Analysis

Potential cumulative impacts on geology and soils would result from projects that combine to create geologic hazards, including unstable geologic conditions, or contribute substantially to erosion. The majority of impacts from geologic hazards, such as rupture of a fault line, liquefaction, landslides, expansive soils, and unstable soils, are site specific and are therefore generally mitigated on a project-by-project basis. Each cumulative project would be required to adhere to required building engineering design per the most recent version of the CBC in order to ensure the safety of building occupants and avoid a cumulative geologic hazard. Additionally, as needed, projects would incorporate individual mitigation or geotechnical requirements for site-specific geologic hazards present on each individual cumulative project site. Therefore, a potential cumulative impact related to site-specific geologic hazards such as landslides, liquefaction, soil stability characteristics, seismic hazards, and erosion would not occur. The Project site is currently developed with a golf course, and the Project would be required to adhere to CBC requirements and would incorporate the recommended site design measures set forth above. These site design measures are included in **PDF-GE-1**; see Table 1-2. Therefore, the Project, in combination with other cumulative projects, **would not contribute to a significant cumulative impact** associated with geology and soils.

3.1.3.4 Conclusion

The Project would not expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving rupture of a known earthquake fault, strong seismic ground shaking, seismic-related ground failure including liquefaction, or landslides. The Project would not result in substantial soil erosion or the loss of topsoil, would not be located on a geologic unit or soil that is unstable or that would become unstable as a result of the project, would not be located on expansive soil, and would not involve the use of septic tanks or alternative wastewater disposal. Site design measures would be used to minimize geology and soil impacts including but not limited to removal of all deleterious material and vegetation prior to construction, remedial grading, compacting fill slopes, landscaping with drought-tolerant vegetation, and use of properly compacted soils in the upper 3 feet of all building pads; see

Chapter 7 of Appendix 3.1.3-1 for a complete list of the Project's geotechnical site design measures. These site design measures are included in **PDF-GE-1**; see Table 1-2 in Chapter 1, Project Description, of this EIR. Through site design measures discussed in this analysis and compliance with CBC regulations, impacts associated with geology and soils would be avoided. Therefore, impacts to geology and soils would be **less than significant**.

Table 3.1.3-1
Estimated Maximum Earthquake Magnitude and
Peak Ground Acceleration of Faults in the Project Area

Fault Name	Distance from Site (miles)	Max Earthquake Magnitude (Mw)	Boore Atkinson 2008 (g)	Campbell-Bozorgnia 2008 (g)	Chiou-Youngs 2008 (g)
Elsinore	14	7.85	0.25	0.19	0.25
Newport–Inglewood	15	7.5	0.22	0.17	0.21
Rose Canyon	15	6.9	0.19	0.15	0.16
Coronado Bank	31	7.6	0.15	0.10	0.11
Palos Verdes Connected	31	7.7	0.17	0.11	0.13
Earthquake Valley	31	6.8	0.12	0.08	0.07
San Jacinto	39	7.88	0.15		

Source: See Appendix 3.1.3-1.
Notes: Mw = moment magnitude; g = local acceleration due to gravity.

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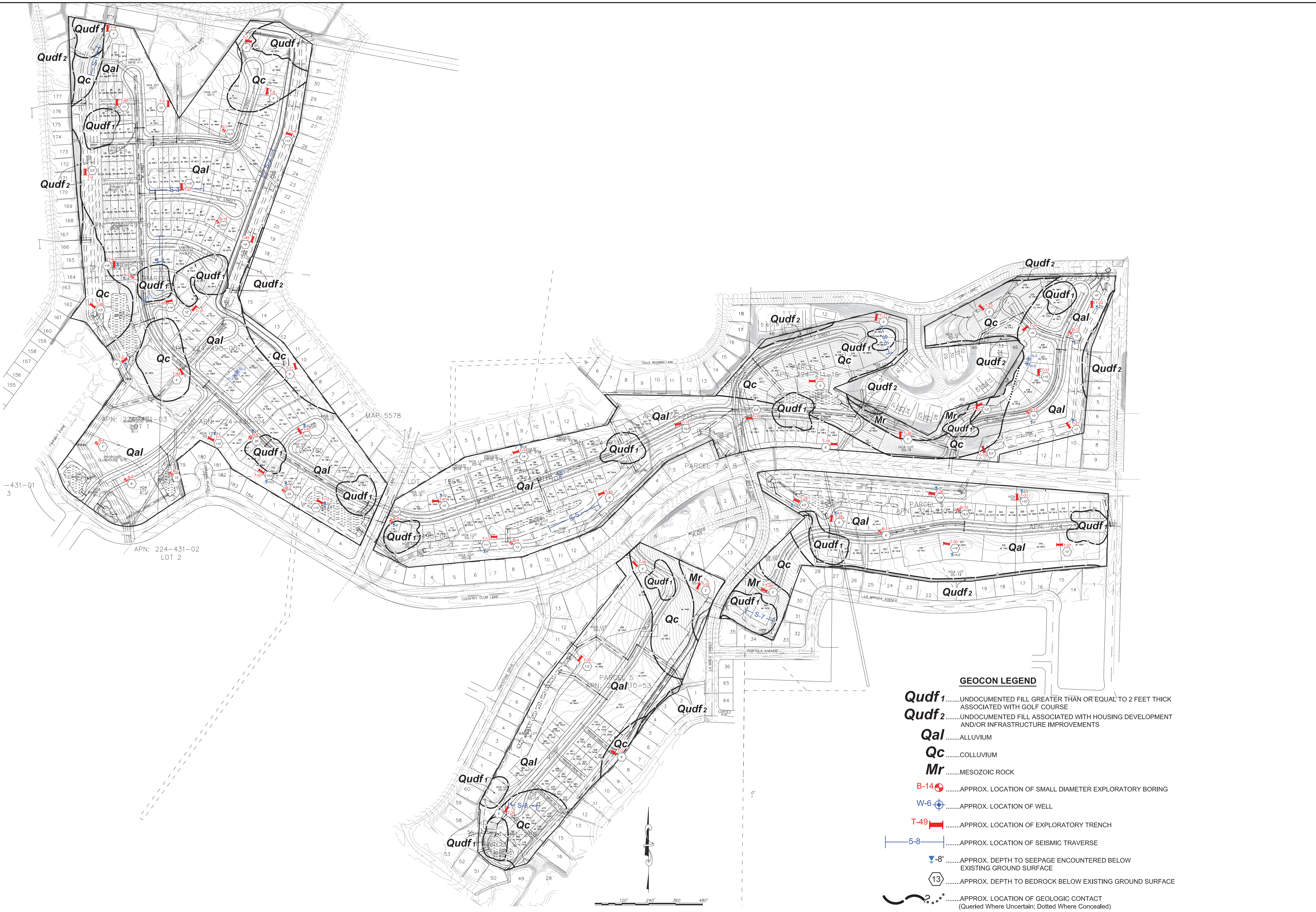

SOURCE: Geocon Inc. (2016)

DUDEK

FIGURE 3.1.3-1

Geologic Map

The Villages - Escondido Country Club EIR

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