8 GEOLOGY AND SOILS

8.1 INTRODUCTION

The Geology and Soils chapter of the EIR describes the geologic and soil characteristics of the project site and evaluates the extent to which implementation of the proposed project could be affected by unstable earth conditions and various geologic and geomorphic hazards. In addition, the chapter evaluates known mineral resources on the project site, any potential adverse effects of the proposed project on the availability of such resources, and any adverse impacts on paleontological resources.

Information from this chapter is primarily drawn from a Geotechnical Engineering Study prepared by Ace Quality Control (Appendix F),[1] a Mineral Resource Determination prepared by RCH Group,[2] a Cultural and Paleontological Resources Assessment performed by Natural Investigations Company,[3] and a Paleontological Records Search performed by Kenneth L. Finger, Ph.D.[4] In addition, information was sourced from the Placer County General Plan,[5] the Placer County General Plan EIR,[6] and the Dry Creek West Placer Community Plan (DCWPCP).[7]

8.2 EXISTING ENVIRONMENTAL SETTING

Background setting information regarding the geology, soils, seismicity, mineral resources, and paleontological resources associated with the project site and the surrounding region is provided below.

Regional Setting

The project site is located within the boundaries of the DCWPCP in Placer County, California. The DCWPCP area lies within the eastern portion of the Sacramento Valley, which extends from Redding in the north to the Sacramento-San Joaquin Delta region in the south. The Sacramento Valley is bordered by the Coast Ranges to the west and the Sierra Nevada foothills to the east. The following section describes the geology and seismicity of the project region.

The project site is located within California's Great Valley Geomorphic Province, a geologically young, large, flat-lying alluvial plain in the central portion of California. The plain is 40 to 60 miles wide and stretches approximately 450 miles from north-northwest to south-southeast, inland from and parallel to the Pacific Ocean Coast Ranges to the west and the Sierra Nevada to the east. The Great Valley has been filled with hundreds to thousands of feet of eroded sediments, ranging in age from Pleistocene to Holocene. Relatively recent alluvial deposits generally consist of poorly

1 Ace Quality Control. *Preliminary Geotechnical Engineering Study Brady Residential Subdivision.* July 25, 2017.
2 RCH Group. *Mineral Resource Determination, Brady-Vineyard Project, West Placer County*. May 30, 2018.
3 Natural Investigations Company. *Cultural and Paleontological Resources Inventory and Effects Assessment for the Brady at Vineyard Project.* May 21, 2018.
4 Kenneth L. Finger, Ph.D. *Paleontological Records Search: Brady Vineyard Project, Roseville, Placer County.* February 1, 2018.
5 Placer County. *Countywide General Plan Policy Document.* August 1994 (updated May 2013).
6 Placer County. *Countywide General Plan EIR*. July 1994.
7 Placer County. *Dry Creek-West Placer Community Plan.* Amended May 12, 2009.

sorted silts, fine sands and clays with less extensive lenses of medium to coarse grained sands and gravel.

Regional Geology

The geology of the DCWPCP area is generally categorized by sedimentary or metasedimentary rocks.[8] Such underlying rock formations are primarily composed of alluvium, an unconsolidated sediment of relatively recent geologic age deposited by flowing water. The three general types of rocks found within the DCWPCP area fall into the following categories:

- Riverbank Formation – Pleistocene deposits of alluvium;
- Turlock Lake Formation – Pleistocene deposits of partially consolidated sand, silt, and gravel derived primarily from Sierran granitic and metamorphic rocks, generally found outside the Dry Creek floodplain; and
- Modesto-Riverbank Formation – Pleistocene deposits of alluvium generally found within the Dry Creek floodplain.

Regional Seismicity

A fault is defined as a fracture or zone of closely associated fractures along which rocks on one side have been displaced with respect to those on the other side. A fault zone is a zone of related faults that is commonly braided and subparallel, but may be branching or divergent. Movement within a fault causes an earthquake. When movement occurs along a fault, the energy generated is released as waves that cause ground shaking. Ground shaking intensity varies with the magnitude of the earthquake, the distance from the epicenter, and the type of rock or sediment the seismic waves move through.

The potential risk of fault rupture is based on the concept of recency and recurrence. The more recently a particular fault has ruptured, the more likely the fault would rupture again. The California Geological Survey defines an "active fault" as one that has had surface displacement within the past 11,000 years (Holocene). Potentially active faults are defined as those that have ruptured between 11,000 and 1.6 million years before the present (Quaternary). Faults are generally considered inactive if evidence of displacement is not present during the Quaternary. Per the California Department of Conservation, potentially active faults with Holocene-epoch surface displacement are not known to exist within the project region.

According to the Placer County General Plan, Placer County lies within a seismically active area of the western U.S., but beyond the influence of the highly active faults found along California's coast. The South Placer area is classified by the State Department of Conservation as a low-severity earthquake zone.[9] The western portion and central portions of the County are generally characterized by low seismicity, while the eastern area of the County in the vicinity of Lake Tahoe has relatively higher seismicity.[10] The areas of Placer County with the largest groundshaking risk are in the vicinity of Stampede Valley and Tahoe faults in the Truckee-Tahoe area.

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8 Placer County. *Dry Creek-West Placer Community Plan* [pgs. 101-102]. Amended May 12, 2009.

9 California Department of Conservation. *Regulatory Maps and Reports (Alquist-Priolo and Seismic Hazard Zones).* Available at: https://maps.conservation.ca.gov/cgs/informationwarehouse/regulatorymaps/. Accessed March 2019.

10 Placer County. *Countywide General Plan EIR* [pg. 9-1]. July 1994.

Project Site Characteristics

The project site consists of approximately 35 acres located at the northwest corner of Vineyard Road and Brady Lane. The project site is currently vacant and adjacent to the west of the City of Roseville city limits. The geologic conditions on the project site are discussed below in further detail, including descriptions of existing site geology, soil conditions, seismicity and ground shaking, potential for earthquake-induced liquefaction, and expansive soils. In addition, this section includes a description of known mineral and paleontological resources within the project area.

Site Geology and Subsurface Soil Conditions

The project site is underlain by Pleistocene alluvial deposits consisting of gravels, sands, silts, and clays of the Turlock Lake Formation. Per the Phase I ESA, soils mapped within the project site include the Ramona and Cometa Series. The Ramona series consists of fine and coarse-grained soils, sands, silts, and clays. Ramona series soils are typically found on terraces and fans at elevations ranging from 250 to 3,500 feet above sea level on nearly level areas to moderately steep slopes. Such soils are formed in alluvium derived primarily from granitic and related rock sources. The Cometa series consists of moderately deep, moderately well or well drained soils that formed in alluvium from granitic rock sources. Such soils are typically clayey, have a high-water table, and are found on gently sloping slightly dissected older stream terraces with slopes of zero to 15 percent.

During exploratory borings conducted on the project site by Ace Quality Control, the soil encountered was mainly medium dense to very dense, brown and brown with red and gray discolorations, moist, silty sand with variable gravel and well graded sand to maximum depths explored of approximately 21.5 feet below existing ground surface. Some lenses of dense, brown, moist, silt was encountered at variable depths and thicknesses in some of the explorations.

Seismicity and Ground Shaking

Fault rupture hazards are important near active faults and tend to reoccur along the surface traces of previous fault movements. The site is not located within an Alquist-Priolo Special Studies Zone and the potential for fault rupture, damage from fault displacement, or fault movement directly below the site is considered to be very low. However, the site is located within an area where shaking from earthquake generated ground motion waves should be considered likely.

Liquefaction

Liquefaction occurs when saturated fine-grained sands and/or silts lose physical strength temporarily during earthquake induced shaking and behave as a liquid due to the loss of point-to-point grain contact and transfer of normal stress to the pore water. Liquefaction potential varies with water level, soil type, material gradation, relative density, and probable intensity and duration of ground shaking. Saturated and loose fine sands/silts were not encountered during site explorations. The California Geologic Survey (CGS) has designated certain areas within California as potential liquefaction hazard zones, which are areas considered at risk of liquefaction-related ground failure during a seismic event based upon mapped surficial deposits and the depth to the areal groundwater table. The project site is not currently mapped for potential liquefaction hazard by the CGS. The Geotechnical Engineering Report concluded that the overall potential for liquefaction within Placer County and, consequently, within the project site, is considered to be very low.

Expansive Soils

Expansive soils are characterized by their ability to undergo significant volume change due to variation in moisture content. Compressible materials consisting of surficial organic material, loose soils, undocumented fills, debris, rubble, rubbish, etc., are considered unsuitable materials for support of proposed structures as such materials can differentially settle. Changes in soil moisture content can result from rainfall, landscape irrigation, utility leakage, roof drainage, perched groundwater, drought, or other factors and may cause unacceptable settlement of structures. According to the Geotechnical Engineering Study performed for the proposed project, the granular soils encountered on the project site have relatively low plasticity, and are considered to have very low potential for expansion. Additionally, a Web Soil Survey conducted for the project site indicates that the soils present on the project site have a relatively low shrink-swell potential.[11]

Groundwater

Groundwater was encountered in multiple test borings on the project site at approximate depths of 13 to 21 feet below the estimated ground surface. However, groundwater levels at the site might be higher during the winter and spring months. In addition, the potential exists that shallow groundwater might be encountered in low-lying areas and intermittent swales.

Mineral Resources

Department of Conservation maps were reviewed to examine the potential of a mine or prospect being located on the project site.[12] Maps contained in the *Mineral Land Classification of Placer County, California* do not identify any documented mines or prospects on the project site or in the project vicinity. The DCWPCP does not identify any substantial mineral resources within the project area.

Paleontological Resources

A search of the paleontological records on the University of California Museum of Paleontology (UCMP) database was performed by Natural Investigations Company in order to determine the project's potential to impact significant paleontological resources in the vicinity of the project site.[13] The search indicated 64 fossil localities have been recorded within Placer County. Of the identified fossil localities, only three localities have produced vertebrate fossils. A locality near Rocklin yielded a Pleistocene-age mastodon from the Mehrten Formation, while a locality near Lincoln produced three Tertiary-age vertebrates, a bony fish, a mammal, and a reptile. A cartilaginous fish from the Cretaceous was recovered from the third locality in the Sierras. The remaining localities recorded in the UCMP database have produced plant and invertebrate specimens, mainly from the Middle Eocene Ione and Late Cretaceous Chico formations, as well as plant microfossils from Early Holocene lacustrine deposits west of Lake Tahoe. Additionally, a small outcrop of the Chico Formation, now a residential development near Granite Bay, has produced a diverse array of Late Cretaceous fossils, including invertebrates, plants, and dinosaurs. Petrified wood specimens were also unearthed in the Ione Formation during a recent roadway widening project near Granite Bay. None of the above geologic rock units occur in the project area.

According to the Paleontological Records Search performed on February 1, 2018 by Dr. Kenneth L. Finger, geologic maps indicate the project site is underlain by the Early Pleistocene-age Turlock

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11 U.S. Department of Agriculture, Natural Resources Conservation Service. *Web Soil Survey.* Available at: https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx. Accessed February 13, 2019.

12 RCH Group. *Mineral Resource Determination*. May 30, 2018.

13 Natural Investigations Company. *Cultural and Paleontological Resources Inventory and Effects Assessment for the Brady at Vineyard Project, Placer County, California.* May 21, 2018.

Lake Formation (Qts). The Modesto Formation (Qm), which underlies the Dry Creek drainage is located within one half mile of the project site. Additionally, four small outcrops of Middle Pleistocene-age Riverbank Formation (Qr) alluvial sediments were mapped at the southeastern extent of Kasenberg Creek, also located less than one half mile northwest of the project.

All three of the above-mentioned formations have a high paleontological potential. However, records of fossils or unique geologic features have not been recorded within the project area.

8.3 REGULATORY CONTEXT

The following section is a brief summary of the regulatory context under which soils, geology, seismic hazards, mineral resources, and paleontological resources are managed at the federal, State, and local levels.

Federal Regulations

The following are the federal environmental laws and policies relevant soils, geology, seismic hazards, mineral, and paleontological resources.

Federal Earthquake Hazards Reduction Act

Passed by Congress in 1977, the Federal Earthquake Hazards Reduction Act is intended to reduce the risks to life and property from future earthquakes. The Act established the National Earthquake Hazards Reduction Program (NEHRP). The goals of NEHRP are to educate and improve the knowledge base for predicting seismic hazards, improve land use practices and building codes, and to reduce earthquake hazards through improved design and construction techniques.

International Building Code

The Uniform Building Code (UBC) was first published in 1927 by the International Council of Building Officials and is intended to promote public safety and provide standardized requirements for safe construction. The UBC was replaced in 2000 by the new International Building Code (IBC), published by the International Code Council (ICC), which is a merger of the International Council of Building Officials' UBC, Building Officials and Code Administrators International's National Building Code, and the Southern Building Code Congress International's Standard Building Code. The intention of the IBC is to provide more consistent standards for safe construction and eliminate any differences between the three preceding codes. All State building standard codes are based on the federal building codes.

State Regulations

The following are the State environmental laws and policies relevant to soils, geology, seismic hazards, mineral resources, and paleontological resources.

Alquist-Priolo Earthquake Fault Zoning Act

The 1972 Alquist-Priolo Earthquake Fault Zone Act was passed to prevent the new development of buildings and structures for human occupancy on the surface of active faults. The Act is directed at the hazards of surface fault rupture and does not address other forms of earthquake hazards. The locations of active faults are established into fault zones by the Alquist-Priolo Zone Act. Local agencies regulate any new developments within the appropriate zones in their jurisdiction.

The Alquist-Priolo Zone Act regulates development near active faults so as to mitigate the hazard of surface fault rupture. The Alquist-Priolo Zone Act requires that the State Geologist (Chief of the California Department of Mines and Geology [CDMG]) delineate "special study zones" along known active faults in California. Cities and counties affected by the special study zones must regulate certain development projects within the special study zones. The Alquist-Priolo Zone Act prohibits the development of structures for human occupancy across the traces of active faults. According to the AP Zone Act, active faults have experienced surface displacement during the last 11,000 years. Potentially active faults are those that show evidence of surface displacement during the last 1.6 million years. A fault may be presumed to be inactive based on satisfactory geologic evidence; however, the evidence necessary to prove inactivity sometimes is difficult to obtain and may not exist.

Seismic Hazards Mapping Act

The California Seismic Hazards Mapping Act of 1990 (California Public Resources Code Section 1690-2699.6) addresses non-surface rupture earthquake hazards, including liquefaction, induced landslides, and subsidence. A mapping program is also established by this Act, which identifies areas within California that have the potential to be affected by such non-surface rupture 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.

California Building Standards Code

The State of California regulates development within the State through a variety of tools that reduce or mitigate potential hazards from earthquakes or other geologic hazards. The 2016 California Building Standards Code (CBC) (California Code of Regulations, Title 24) governs the design and construction of all building occupancies and associated facilities and equipment throughout California. In addition, the CBC governs development in potentially seismically active areas and contains provisions to safeguard against major structural failures or loss of life caused by earthquakes or other geologic hazards. The California building standards include building standards in the national building code, building standards adapted from national codes to meet California conditions, and building standards adopted to address particular California concerns. It should be noted that the CBC is updated on a triennial cycle. The 2019 CBC, which contains new code changes, will become effective on January 1, 2020.

Local Regulations

Relevant goals and policies from the Placer County General Plan and various other local guidelines and regulations related to soils, geology, seismic hazards, mineral resources, and paleontological resources.

Placer County General Plan

The following goals and policies from the Placer County General Plan are applicable to the proposed project:

Goal 5.D To identify, protect, and enhance Placer County's important historical, archaeological, paleontological, and cultural sites and their contributing environment.

Policy 5.D.2 The County shall solicit the cooperation of the owners of cultural and paleontological resources, encourage those owners to treat these resources as assets rather than liabilities, and encourage the support of the general public for the preservation and enhancement of these resources.

Policy 5.D.4 The County shall coordinate with the cities and municipal advisory councils in the County to promote the preservation and maintenance of Placer County's paleontological and archaeological resources.

Policy 5.D.6 The County shall require that discretionary development projects identify and protect from damage, destruction, and abuse, important historical, archaeological, paleontological, and cultural sites and their contributing environment. Such assessments shall be incorporated into a County-wide cultural resource data base, to be maintained by the Division of Museums.

Policy 5.D.7 The County shall require that discretionary development projects are designed to avoid potential impacts to significant paleontological or cultural resources whenever possible. Unavoidable impacts, whenever possible, shall be reduced to a less than significant level and/or shall be mitigated by extracting maximum recoverable data. Determinations of impacts, significance, and mitigation shall be made by qualified archaeological (in consultation with recognized local Native American groups), historical, or paleontological consultants, depending on the type of resource in question.

Goal 1.J To encourage commercial mining operations within areas designated for such extraction, where environmental, aesthetic, and adjacent land use compatibility impacts can be adequately mitigated.

Policy 1.J.4 The County shall discourage the development of incompatible land uses in areas that have been identified as having potentially significant mineral resources.

Policy 1.K.4 The County shall require that new development incorporates sound soil conservation practices and minimizes land alterations. Land alterations should comply with the following guidelines:

a. Limit cuts and fills;
b. Limit grading to the smallest practical area of land;
c. Limit land exposure to the shortest practical amount of time;

d. Replant graded areas to ensure establishment of plant cover before the next rainy season; and
e. Create grading contours that blend with the natural contours on site or with contours on property immediately adjacent to the area of development.

Goal 8.A To minimize the loss of life, injury, and property damage due to seismic and geological hazards.

Policy 8.A.2 The County shall require submission of a preliminary soils report, prepared by a California registered civil engineer and based upon adequate test borings, for every major subdivision and for each individual lot where critically expansive soils have been identified or are expected to exist.

Policy 8.A.3 The County shall prohibit the placement of habitable structures or individual sewage disposal systems on or in critically expansive soils unless suitable mitigation measures are incorporated to prevent the potential risks of these conditions.

Dry Creek-West Placer Community Plan

The following policy from the Environmental Resources Management Element of the DCWPCP is applicable to the proposed project.

Policy 23 Require the application of measures which mitigate soil erosion and air and water pollution from earth-disturbing activities related to land development.

Placer County Code

Articles 15.01 and 15.48 of the Placer County Code are applicable to the proposed project and are summarized below.

California Building Codes

Article 15.01, California Building Codes, of the Placer County Code includes definitions, standards, and enforcement guidelines to ensure all new development comply with the latest version of the CBC. Section 15.04.121 outlines the violations and penalties for any person who violates or fails to comply with any of the provisions in Article 15.01 of the Code.

Grading, Erosion and Sediment Control Ordinance

Article 15.48, Grading, Erosion and Sediment Control, of the Placer County Code, establishes regulations to limit the pollution of watercourses with hazardous materials, nutrients, sediments, and/or other earthen materials on or caused by surface runoff. Per Section 15.48.580, all drainage facilities must be designed and engineered consistent with the West Placer Storm Water Quality Design Manual. Section 15.48.630 establishes erosion and sediment controls for grading operations, including, but not limited to, use of stabilization methods to control erosion, preservation of natural features, limiting of runoff discharged from the site, and limiting the transport of dust off the project site or into any drainage course or body of water.

8.4 IMPACTS AND MITIGATION MEASURES

This section describes the standards of significance and methodology used to analyze and determine the proposed project's potential impacts related to geology, soils, mineral resources, and paleontological resources. In addition, a discussion of the project's impacts, as well as mitigation measures where necessary, is also presented.

Standards of Significance

Consistent with Appendix G of the CEQA Guidelines, a significant impact would occur if the proposed project would result in any of the following:

- Directly or indirectly cause potential substantial adverse effects, 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 issued by the State Geologist for the area based on other substantial evidence of a known fault;
    - Strong seismic ground shaking;
    - Seismic-related ground failure, including liquefaction;
    - Landslides;
- Result in substantial soil erosion or the loss of topsoil;
- 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;
- 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;
- Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature;
- Result in significant disruptions, displacements, compaction or overcrowding of the soil;
- Result in substantial change in topography or ground surface relief features;
- Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state; and/or
- Result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan.

Method of Analysis

The analysis for the proposed project's geology, soils, and mineral impacts is based primarily on the Geotechnical Engineering Study prepared by Ace Quality Control. The analysis for the proposed project's impact to paleontological resources is based primarily on the Cultural and Paleontological Resources Assessment prepared for the proposed project. In addition, information from the California Department of Conservation, United States Department of Agriculture, the Placer County General Plan, and associated EIR were used for analysis.

Geotechnical Engineering Study Analysis

The Geotechnical Engineering Study relied on a number of analytical tasks. Field exploration included a general geotechnical engineering reconnaissance within the study area, as well as the excavation of subsurface explorations. During explorations, nine samples were taken at 21.5 inches below surface elevation.

The explorations and the soil sampling/logging were performed by a Staff Engineer under the direct supervision of a Geotechnical Engineer. The borings were advanced with a four-inch outer-diameter continuous flight helical solid stem auger powered by a CME 45 truck-mounted drill rig. Relatively undisturbed soil samples were recovered from the borings at selected intervals by a 1.4-inch inner-diameter "standard penetration" sampler advanced with an automatic hammer driving a 140-pound hammer freely falling 30 inches (standard 350-foot/pound striking force).

Samples of the subsurface soil deposits were obtained from the test borings for use in laboratory testing to determine the engineering properties and geotechnical design parameters to be used for future site improvements. The samples were tagged for identification, sealed to reduce moisture loss, and taken to the laboratory for further examination, testing, and classification. A bulk soil sample was recovered directly from excavation cuttings of anticipated pavement subgrade soil and placed in a plastic sample bag. Soil samples were then transported to ACE's laboratory for further testing. Upon completion of drilling, the test borings were backfilled from final test boring depth up to original ground surface with excavated soils.

Cultural and Paleontological Resources Assessment Analysis

The Cultural and Paleontological Resources Assessment relied on historical maps and aerial photographs, patent records, and paleontological records in order to conduct a search of previously recorded paleontological resources in the project area. In addition, an intensive-level pedestrian survey within the project site was conducted by a qualified paleontologist on February 1, 2018. Survey transects were spaced at intervals between one and 15 meters. The entire project site was covered by the survey and carefully examined for the presence of cultural resources and geologic outcrops that may contain paleontological resources. The survey transects followed a north-south pattern within the project site.

All visible ground surface within the project site was carefully examined for paleontological resources, cultural material, soil discoloration, soil depressions, and features indicative of the former presence of structures or buildings. A digital camera was used to take photographs of the project parcel, showing ground surface visibility and items of interest.

Project-Specific Impacts and Mitigation Measures

The following discussion of impacts is based on implementation of the proposed project in comparison with the standards of significance identified above.

8-1 Directly or indirectly cause 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, and landslides. Based on the analysis below, the impact is *less than significant*.

According to the Placer County General Plan, Placer County lies within a seismically active area of the western United States, but beyond the influence of the highly active faults found along California's coast. The western portion of the County, in which the proposed project is located, is generally characterized by low seismicity, and is not in an

area at risk for severe ground shaking associated with earthquakes.[14] As discussed above, the project site is not underlain by any active faults and is not located within an Alquist-Priolo Fault Study Zone. While lower-intensity earthquakes could potentially occur at the site, the design of project structures would be required to adhere to the provisions of the 2016 CBC. The 2016 CBC contains provisions to safeguard against major structural failures or loss of life caused by earthquakes or other geologic hazards. In addition, the Geotechnical Engineering Study determined that the overall potential for liquefaction at the site is very low if a seismic event should occur.

Furthermore, because the project site does not contain any steep slopes and is not located at or near any active or potentially active faults, the risk of landslide, liquefaction, and/or ground failure on the site would not be substantial. Therefore, the proposed project would not expose people or structures to the risk of loss, injury, or death involving rupture of an earthquake fault, strong ground shaking, ground failure, liquefaction, or landslides, and a ***less-than-significant*** impact would occur.

Mitigation Measure(s)

None required.

8-2 Result in substantial soil erosion or the loss of topsoil. Based on the analysis below and with implementation of mitigation, the impact is *less than significant*.

Erosion refers to the removal of soil from exposed bedrock surfaces by wind or water. Although naturally occurring, erosion is often accelerated by human activities that disturb soil and vegetation. The soils present on the project site are considered moderately susceptible to erosion where drainage concentrations occur. Buildout of the proposed project would require grading, excavation, and other construction-related activities, which, during the early stages of construction, could cause topsoil to be exposed, potentially resulting in wind erosion or an accelerated rate of erosion during storm events.

The topography of the project site is relatively level, and upon development of the site with buildings and structures, the amount of exposed soil that may be lost due to wind or stormwater runoff would be minimized.

Improvement Plans provided to the County prior to authorization of construction would conform to provisions of the County Grading Ordinance (Article 15.48 of the Placer County Code) and the Stormwater Quality Ordinance (Article 8.38 of the Placer County Code) that are in effect at the time of submittal. The preparation of and compliance with a stormwater pollution prevention plan (SWPPP) would be part of the projects' National Pollutant Discharge Elimination System (NPDES) construction stormwater quality permit, issued by the Central Valley Regional Water Quality Control Board (CVRWQCB). Before Improvement Plan approval, the Placer County ESD would require evidence of the State-issued Waste Discharge Identification Number or filing of the Notice of Intent and fees. The SWPPP would include strategies to manage stormwater from the construction sites and treat runoff before being discharged from the site. The site-specific SWPPP developed for the proposed project would have protocols to be followed and monitored

[14] Placer County. *Countywide General Plan EIR* [pg. 9-1]. July 1994.

during construction, including effective response actions if necessary. The SWPPP is considered a "living document" that could be modified as construction activities progress.

Although topsoil exposure would be temporary during early construction activities and would cease once development of buildings and structures occurs, after grading and leveling and prior to overlaying the ground surface with structures, the potential exists for erosion to occur. Therefore, short-term, construction related impacts associated with soil erosion and the loss of topsoil would be considered ***significant***.

Mitigation Measure(s)

Implementation of the following mitigation measures would reduce the above impact to a *less-than-significant* level.

8-2(a) *The Improvement Plans shall show water quality treatment facilities/Best Management Practices (BMPs) designed according to the guidance of the California Stormwater Quality Association Stormwater Best Management Practice Handbooks for Construction, for New Development/ Redevelopment, and for Industrial and Commercial (or other similar source as approved by the Engineering and Surveying Division (ESD).*

Storm drainage from on- and off-site impervious surfaces (including roads) shall be collected and routed through specially designed catch basins, vegetated swales, vaults, infiltration basins, water quality basins, filters, etc. for entrapment of sediment, debris and oils/greases or other identified pollutants, as approved by the ESD. BMPs shall be designed in accordance with the West Placer Storm Water Quality Design Manual for sizing of permanent post-construction Best Management Practices for stormwater quality protection. No water quality facility construction shall be permitted within any identified wetlands area, floodplain, or right-of-way, except as authorized by project approvals.

All permanent BMPs shall be maintained as required to ensure effectiveness. The applicant shall provide for the establishment of vegetation, where specified, by means of proper irrigation. Proof of on-going maintenance, such as contractual evidence, shall be provided to ESD upon request. The project owners/permittees shall provide maintenance of these facilities and annually report a certification of completed maintenance to the County DPW Stormwater Coordinator, unless, and until, a County Service Area is created and said facilities are accepted by the County for maintenance. Prior to Improvement Plan approval or Final Subdivision Map recordation, easements shall be created and offered for dedication to the County for maintenance and access to these facilities in anticipation of possible County maintenance.

8-2(b) *Prior to construction commencing, the applicant shall provide evidence to the ESD of a WDID number generated from the State Regional Water Quality Control Board's Stormwater Multiple Application & Reports Tracking System (SMARTS). This serves as the Regional Water Quality*

Control Board approval or permit under the National Pollutant Discharge Elimination System (NPDES) construction stormwater quality permit.

8-2(c) *The applicant shall prepare and submit Improvement Plans, specifications and cost estimates (per the requirements of Section II of the Land Development Manual [LDM] that are in effect at the time of submittal) to the ESD for review and approval of each project phase. The plans shall show all physical improvements as required by the conditions for the project as well as pertinent topographical features both on and off site. All existing and proposed utilities and easements, on site and adjacent to the project, which may be affected by planned construction, shall be shown on the plans. All landscaping and irrigation facilities within the public right-of-way (or public easements), or landscaping within sight distance areas at intersections, shall be included in the Improvement Plans. The applicant shall pay plan check and inspection fees and, if applicable, Placer County Fire Department improvement plan review and inspection fees, with the 1st Improvement Plan submittal. (NOTE: Prior to plan approval, all applicable recording and reproduction costs shall be paid). The cost of the above-noted landscape and irrigation facilities shall be included in the estimates used to determine these fees. It is the applicant's responsibility to obtain all required agency signatures on the plans and to secure department approvals. If the Design/Site Review process and/or Development Review Committee (DRC) review is required as a condition of approval for the project, said review process shall be completed prior to submittal of Improvement Plans. Record drawings shall be prepared and signed by a California Registered Civil Engineer at the applicant's expense and shall be submitted to the ESD in both hard copy and electronic versions in a format to be approved by the ESD prior to acceptance by the County of site improvements.*

Conceptual landscape plans submitted prior to project approval may require modification during the Improvement Plan process to resolve issues of drainage and traffic safety.

Any Building Permits associated with this project shall not be issued until, at a minimum, the Improvement Plans are approved by the ESD.

8-2(d) *The Improvement Plans shall show all proposed grading, drainage improvements, vegetation and tree removal and all work shall conform to provisions of the County Grading Ordinance (Ref. Article 15.48, Placer County Code) and Stormwater Quality Ordinance (Ref. Article 8.28, Placer County Code) that are in effect at the time of submittal. No grading, clearing, or tree disturbance shall occur until the Improvement Plans are approved and all temporary construction fencing has been installed and inspected by a member of the Development Review Committee (DRC). All cut/fill slopes shall be at a maximum of 2:1 (horizontal: vertical) unless a soils report supports a steeper slope and the ESD concurs with said recommendation.*

The applicant shall revegetate all disturbed areas. Revegetation, undertaken from April 1 to October 1, shall include regular watering to ensure adequate growth. A winterization plan shall be provided with project Improvement Plans. It is the applicant's responsibility to ensure proper installation and maintenance of erosion control/winterization before, during, and after project construction. Soil stockpiling or borrow areas, shall have proper erosion control measures applied for the duration of the construction as specified in the Improvement Plans. Provide for erosion control where roadside drainage is off of the pavement, to the satisfaction of the ESD.

The applicant shall submit to the ESD a letter of credit or cash deposit in the amount of 110 percent of an approved engineer's estimate for winterization and permanent erosion control work prior to Improvement Plan approval to guarantee protection against erosion and improper grading practices. One year after the County's acceptance of improvements as complete, if there are no erosion or runoff issues to be corrected, unused portions of said deposit shall be refunded to the project applicant or authorized agent.

If, at any time during construction, a field review by County personnel indicates a significant deviation from the proposed grading shown on the Improvement Plans, specifically with regard to slope heights, slope ratios, erosion control, winterization, tree disturbance, and/or pad elevations and configurations, the plans shall be reviewed by the DRC/ESD for a determination of substantial conformance to the project approvals prior to any further work proceeding. Failure of the DRC/ESD to make a determination of substantial conformance may serve as grounds for the revocation/modification of the project approval by the appropriate hearing body.

8-3 Be located on a geological 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, or be located on expansive soil, as defined in Table 18-1B of the Uniform Building Code. Based on the analysis below and with implementation of mitigation, the impact is *less than significant*.

Issues associated with unstable geologic units and/or soils, including landslide, lateral spreading, subsidence, liquefaction, and collapse are discussed below.

Expansive Soils

According to the Geotechnical Engineering Study, the soil encountered in the exploratory borings were mainly medium dense to very dense, moist, silty sand with variable gravel. Loose, wet soils were not found in any of the borings. Based on the findings by the Geotechnical Engineering Study, the granular soils on the project site have relatively low plasticity and, thus, are considered to have very low potential for expansion.

Landslide

A landslide is defined as the movement of a mass of rock, debris, or earth down a slope. Almost every landslide has multiple causes. Slope movement occurs when forces acting down-slope exceed the strength of the earth materials that compose the slope. Landslides in California occur mainly due to intense rainfall or are triggered by earthquakes. Based on information available on the CGS website, the project site is not currently within a State of California Seismic Hazard Zone for seismically induced land sliding.[15] In addition, the project area is relatively gently sloping and the slope on the north end of the property does not have any indications of historic slumping. The natural relatively shallow slopes present within the site area are stable under the conditions observed.

Lateral Spreading

Lateral spreading is associated with terrain near free faces such as excavations, channels, or open bodies of water. The project site is relatively level with gentle undulation throughout the property. The site has maximum changes in elevation of approximately 15 feet. The Geotechnical Engineering Study concluded that the soil materials at the site would not create any excavation difficulties, nor would the relatively shallow slopes present within the project site create any slope instability. Given that the proposed development area does not contain any steep slopes or free faces, the proposed project would not be subject to substantial risks related to lateral spreading.

Liquefaction

Liquefaction occurs when saturated fine-grained sand and/or silts lose their physical strength temporarily during earthquake induced shaking and behave as a liquid. The CGS has designated certain areas within California as potential liquefaction hazard zones. The areas considered at risk of liquefaction-related ground failure are based upon mapped surficial deposits and depth to the areal groundwater table. The project site is not currently mapped for potential liquefaction hazard by the CGS. Additionally, saturated and loose, fine sands were not encountered in the exploratory borings conducted as part of the Geotechnical Engineering Study. Thus, the Geotechnical Engineering Study determined that the overall potential for liquefaction at the site is very low.

Collapse

The project site is located on relatively flat ground with a slope of two to nine percent. As discussed above, the design of the project structures would be required to adhere to the provisions of the most recent version of the CBC in effect at the time of building permit issuance. Additionally, the development of the project would follow Article 15.04 of the Placer County Municipal Code. Structures built according to the seismic design provisions of current building codes would be able to resist major earthquakes without collapse, but with some structural, as well as non-structural damage. Given the project's adherence to the CBC requirements, the proposed project would not be subject to substantial risks associated with building collapse.

Conclusion

From a geotechnical standpoint, the project site is preliminarily considered suitable for the proposed construction. Based on the above, the proposed project would not likely be

[15] California Department of Conservation. *CGS Information Warehouse: Landslides*. Available at: http://maps.conservation.ca.gov/cgs/informationwarehouse/. Accessed February 19, 2018.

subject to issues associated with lateral spreading, subsidence, liquefaction, collapse, or expansive soils. However, implementation of the recommendations included in the Geotechnical Engineering Report would be required in order to ensure adequate support of the proposed improvements. Such recommendations include, but are not limited to, overexcavation and recompaction of existing native soils and provision of appropriate drainage at all slope faces. Because a final geotechnical engineering report has not yet been prepared, a ***significant*** impact could occur.

Mitigation Measure(s)

Implementation of the following mitigation measure would reduce the above impact to a *less-than-significant* level.

8-3 *The Improvement Plan submittal shall include a final geotechnical engineering report produced by a California Registered Civil Engineer or Geotechnical Engineer for Engineering and Surveying Division (ESD) review and approval. The report shall address and make recommendations on the following:*

A. Road, pavement, and parking area design;
B. Structural foundations, including retaining wall design (if applicable);
C. Grading practices;
D. Erosion/winterization;
E. Special problems discovered on-site, (i.e., groundwater, expansive/unstable soils, potential for smectite clays etc.); and
F. Slope stability.

Once approved by the ESD, two copies of the final report shall be provided to the ESD and one copy to the Building Services Division for its use. It is the responsibility of the developer to provide for engineering inspection and certification that earthwork has been performed in conformity with recommendations contained in the report.

If the geotechnical engineering report indicates the presence of critically expansive or other soil problems that, if not corrected, could lead to structural defects, a certification of completion of the requirements of the soils report shall be required for subdivisions, prior to issuance of Building Permits. This certification may be completed on a lot- by-lot basis or on a Tract basis. This shall be so noted on the Improvement Plans, in the Development Notebook (if required), in the Conditions, Covenants and Restrictions (CC&Rs), and on the Informational Sheet filed with the Final Subdivision Map(s).

8-4 Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature. Based on the analysis below and with implementation of mitigation, the impact is *less than significant*.

A paleontological record search for the proposed project was performed as part of the Cultural and Paleontological Resources Assessment by the Natural Investigations Company, as well as by Kenneth L. Finger as part of a paleontological records search, in order to determine the presence of paleontological resources or unique geologic features on the project site. Geologic maps indicate the project is underlain by the Early Pleistocene-age Turlock Lake Formation. The alluvial sediments comprising the Turlock Lake Formation originated from the Sierra Nevada and are deeply weathered and dissected. Results of the search determined that one vertebrate locality, located approximately four miles northeast of the project site, has been discovered. In Placer County, fossil fish, plant fragments, petrified wood, and ichnofossils have been found in the Turlock Lake Formation and the geologic formation is known to have a high paleontological potential. Paleontological resources have not been discovered on or in the vicinity of the project site. Thus, implementation of the proposed project would be considered to have a low potential to uncover or damage fossils or cause significant impacts to any resource that currently qualifies as a significant paleontological resource.

Additionally, the field surveys of the project site included inspection for geologic outcrops that may contain paleontological resources, and none were observed.

Although the project site does not contain any known paleontological resources or unique geologic features, due to the potential for paleontological resources to be found in the Turlock Lake Formation, the potential exists that a unique paleontological resource or site could be unearthed during project construction activities. Thus, a ***significant*** impact could occur.

Mitigation Measure(s)

Implementation of the following mitigation measures would reduce the above impact to a *less-than-significant* level.

8-4 *Should paleontological resources be discovered during ground disturbing activities, work shall be halted in the area within 50 feet of the find. The applicant shall notify the Placer County Community Development Resources Agency and retain a qualified paleontologist to inspect the discovery. If deemed significant under criteria established by the Society for Vertebrate Paleontology with respect to authenticity, completeness, preservation, and identification, the resource(s) shall then be salvaged and deposited in an accredited and permanent scientific institution (e.g., University of California Museum of Paleontology [UCMP] or Sierra College), where the discovery would be properly curated and preserved for the benefit of current and future generations. The language of this mitigation measure shall be included on any future grading plans, utility plans, and improvement plans approved by the Placer County Engineering and Surveying Division for the proposed project, where excavation work*

would be required. Construction may continue in areas outside of the buffer zone.

8-5 Result in significant disruptions, displacements, compaction or overcrowding of the soil, or substantial change in topography or ground surface relief features. Based on the analysis below and with implementation of mitigation, the impact is *less than significant*.

The most unique topographic feature of the site is the riparian corridor within the western portion of the project site. Aside from the riparian corridor, the topography of the site consists primarily of gently rolling terrain. The proposed project would include removal of existing vegetation within the proposed development area, grading for building pads, roads, and other associated project improvements. However, as discussed in Chapter 3, Project Description, the riparian corridor and the immediate surrounding area would be retained, and protected with a deed restriction, as open space.

Nonetheless, the proposed project would include site preparation, grading, paving, utility placement, and various other construction activities which would disrupt on-site soils. As such, soils on the project site would be reworked as necessary to support the development, potentially resulting in disruptions, displacements, compaction, or overcrowding of the soils. The proposed project would include modifications to the project site that would alter the existing topography and ground surface relief features. Thus, the proposed project could result in significant disruptions, displacements, compaction or overcrowding of on-site soils, and/or substantial change in topography or ground surface relief features, and a ***significant*** impact could occur.

Mitigation Measure(s)

Implementation of the following mitigation measures would reduce the above potential impact to a *less-than-significant* level.

8-5 Implement Mitigation Measures 8-2(c), 8-2(d), and 8-3.

8-6 Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the State or of a locally important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan. Based on the analysis below, the impact is *less than significant*.

According to the Mineral Resource Determination performed by RCH Group, as well as the Department of Conservation's *Mineral Land Classification of Placer County*, documented mines or prospects do not exist on the project site or in the project vicinity.[16] Neither the Placer County General Plan nor the DCWPCP identify any substantial mineral resources within the project vicinity. Per the Phase I Environmental Site Assessment prepared for the proposed project, the project site has not been formerly used for mineral

[16] California Department of Conservation, Division of Mines and Geology. *Mineral Land Classification of Placer County, California*. 1995.

resource extraction. Furthermore, the project site is not designated or zoned for any mineral resources. Therefore, development of the proposed project would not result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the State, or of a locally-important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan. Thus, a ***less-than-significant*** impact would occur.

Mitigation Measure(s)
None required.

Cumulative Impacts and Mitigation Measures

As defined in Section 15355 of the CEQA Guidelines, "cumulative impacts" refers to two or more individual effects which, when considered together, are considerable, compound, or increase other environmental impacts. The individual effects may be changes resulting from a single project or a number of separate projects. The cumulative impact from several projects is the change in the environment that results from the incremental impact of the project when added to other closely related past, present, and reasonably foreseeable probable future projects.

8-7 Cumulative increase in the potential for geological related impacts and hazards. Based on the analysis below, the cumulative impact is *less than significant*.

Impacts to geology, soils, seismicity, mineral resources, and paleontological resources related to implementation of the proposed project are analyzed throughout this chapter. As discussed above, existing geological and soil conditions on the site would be adequate to support development of the proposed project. In addition, all recommendations in the Geotechnical Engineering Study would be incorporated to mitigate any potential impacts. While some geologic characteristics may affect regional construction practices, impacts and mitigation measures are primarily site-specific and project-specific. For example, impacts resulting from development on expansive soils at one project site are not worsened by impacts from development on expansive soils or undocumented fill at another project site. Rather, the soil conditions, and the implications of such conditions for each project, are independent.

As such, the potential for cumulative impacts related to geology, soils, seismicity and mineral resources, to which implementation of the proposed project might contribute, is ***less than significant***.

Mitigation Measure(s)
None required.