3.8 GEOLOGY, SOILS, AND MINERALS

3.8.1 INTRODUCTION

This section covers four closely related topics: geology (including geologic hazards such as earthquakes), soils, mineral resources, and paleontological resources. For each of these topics, it describes existing conditions at and surrounding the project site, summarizes relevant laws and policies, and analyzes the anticipated impacts of implementing the Proposed Action and its alternatives.

Sources of information used in this analysis include

- Placer Vineyards Specific Plan EIR prepared by the Placer County
- Phase I Environmental Site Assessment (ESA)
- Phase II Environmental Site Assessment
- maps and reports by the United States Geological Survey (USGS) and California Geological Survey (CGS)
- maps and reports by the United Stated Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS)
- published geologic and paleontological literature
- museum and university databases

3.8.2 AFFECTED ENVIRONMENT

3.8.2.1 Physiographic Setting

The project site is located in the Sacramento Valley, which forms the northern portion of California's Great Valley geomorphic province. Bounded by the Sierra Nevada on the east and the Coast Ranges on the west, the Great Valley is only about 40 miles (64 kilometers) wide, but extends nearly 500 miles (805 kilometers) along the axis of the state, from the Klamath and Cascade Mountains in the north to the Tehachapi Mountains in the south. Much of the valley floor is near sea level (Norris and Webb 1990), with the conspicuous exception of the Sutter Buttes, 40 miles (64 kilometers) northwest of the project site, which rise to an elevation of about 2,100 feet (640 meters) above mean sea level (msl) (Norris and Webb 1990). The Sacramento Valley floor contains a thick sequence of sedimentary deposits that range in age from Jurassic through Quaternary that were derived from the weathering and erosion of the Sierra Nevada and the Coast Ranges, and carried by water and deposited on the valley floor (Norris and Webb 1990; Gutierrez et al. 2010).

3.8.2.2 Regional Seismicity and Fault Zones

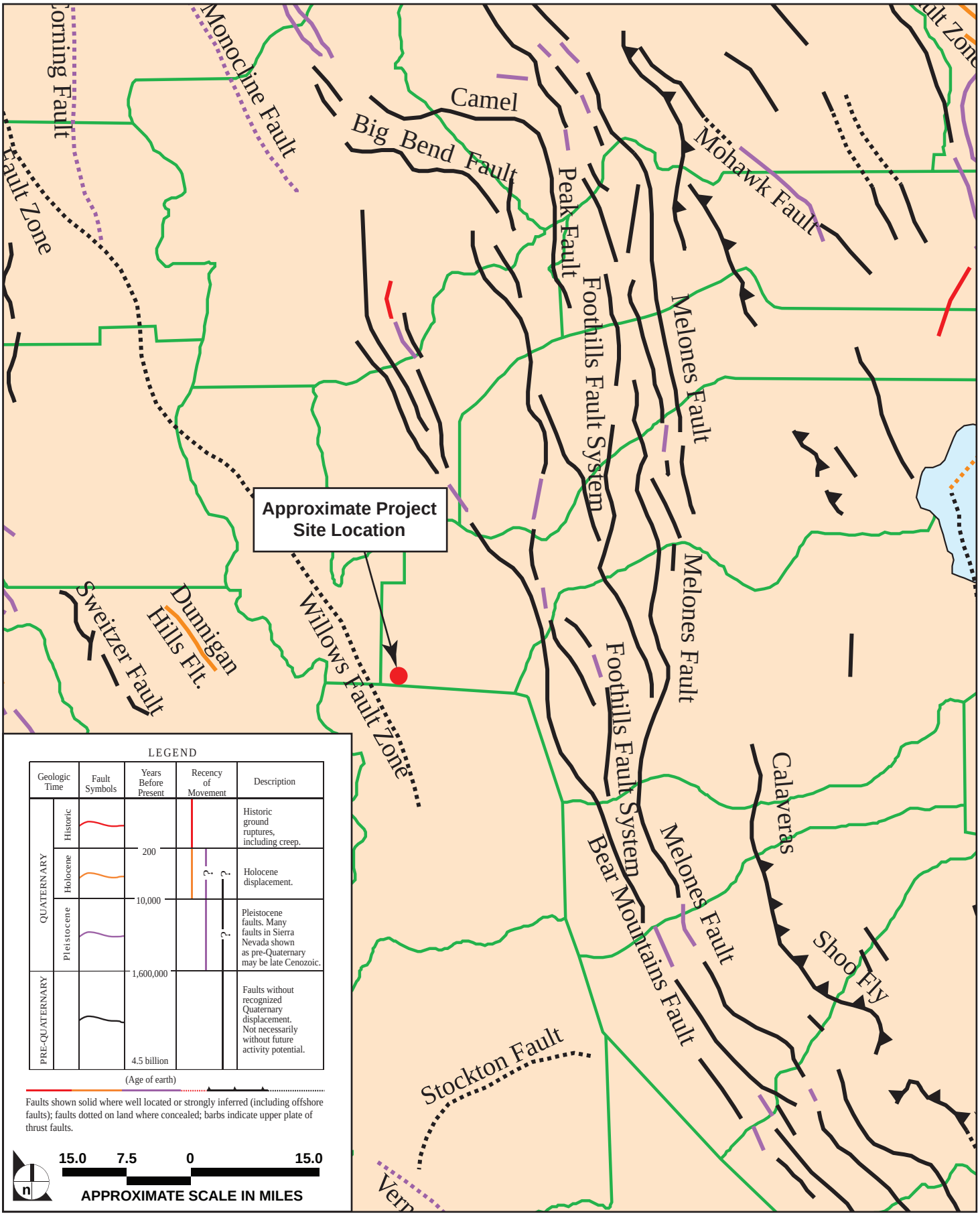
The closest State-zoned faults to the project site are portions of the Foothills fault zone, located approximately 18 miles (29 kilometers) east of the site. Farther away to the west, a number of faults are present in the Coast Ranges and San Francisco Bay Area, including the Ortigalita, Green Valley, Concord, Calaveras, Hayward, and San Andreas faults (**Figure 3.8-1, Regional Fault Map**).

A review of the map of earthquakes in California and Nevada (Goter and others, 1994) reveals numerous epicenters within 60 miles (100 kilometers) of the project site. These epicenters are generally located southwest of the project site in the eastern Coast Ranges, and to the east and north in the Sierra Nevada and central area of the Sacramento Valley. The historical pattern of seismic activity in Placer, Sacramento, and Sutter counties has generally consisted of a scattering of small magnitude (less than 5.5 on the Richter Scale) earthquakes generally located near concealed and mapped faults east and west of the project site. Three seismic events are recorded within 100 kilometers of the project site, two in the Vacaville to Vallejo area as being greater than magnitude 6.5 (1892 and 1898), and one in the Oroville area (Cleveland Hill, 1975) and Sierra Nevada northeast of Nevada City between magnitude 5.5 and 6.4. The most recent seismic event with an intensity of 4.0 or greater measured on the Richter scale was recorded in the vicinity of the project site in 1908. The epicenter of this event was located on a north/south line between Folsom and Auburn and on an east/west line between Placerville and Roseville. There have been several less severe events since 1908.

3.8.2.3 Project Site Topography and Geology

The project site lies within the geomorphic unit referred to as "Dissected Alluvial Plains." This unit is characterized by rolling topography and rounded knolls and ridges that are separated by intermittent streams. The entire region slopes gently westward toward the Sacramento River. Several streams, with narrow floodplains entrenched 10 to 15 feet (3 to 4.5 meters) below the surrounding topography, drain the area flowing east to west. The elevation of the project site ranges from approximately 100 feet (30 meters) above mean sea level (msl) in the eastern portion of the site to about 50 feet (15 meters) above msl in the western portion.

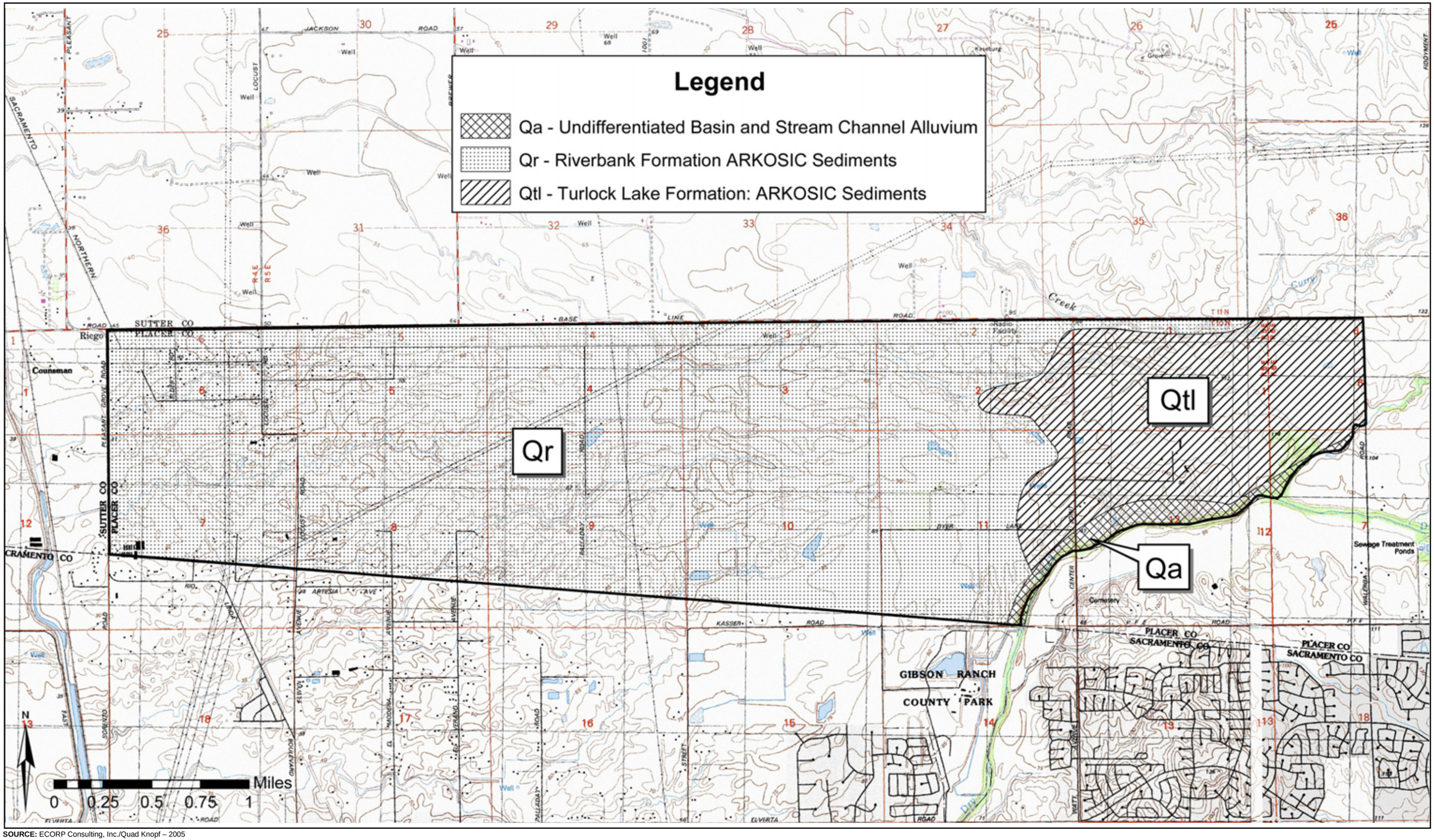
Figure 3.8-2, Geologic Formations, shows the geology of the project site and its immediate vicinity. The geology in the vicinity of the project site consists of transitional formations between the alluvial deposits of the Valley and granitic material characteristic of the Sierra Nevada range. The project site is underlain by strata of the Riverbank Formation, strata of the Turlock Lake Formation, and a small portion is underlain with Quaternary Period Alluvium. The Riverbank and Turlock Lake Formations are alluvial deposits consisting of material derived from erosion of the Sierra Nevada. The Riverbank Formation ranges in age from about 450,000 to about 130,000 years (Pleistocene) and consists of weathered reddish gravel, sand and silt formed from mafic (primarily dark mineral) igneous rock fragments. This unit forms clearly recognizable alluvial terraces and fans. The alluvial component of this unit was likely derived from the Sierra Nevada and was deposited by the ancestral American and other rivers. The Turlock Lake Formation is generally characterized by partially consolidated gravel, sand, and silt, and the surface soil typically contains zones of cemented sand and silt (hardpan). This formation consists of eroded alluvial fans derived primarily from plutonic rocks of the Sierra Nevada. A principal constraint associated with the Turlock Lake Formation is the relative impermeability and limited water holding capability of the material. Quaternary Period Alluvium is described as undifferentiated basin and stream channel alluvium consisting of unweathered unconsolidated silt, sand, and gravel. This unit is exposed along Dry Creek (Placer County 2007).



SOURCE: Compiled by Charles W. Jennings and George J. Saucedo – 1999 (Revised 2002, Tousson Toppozada and David Branum)

FIGURE **3.8-1**

Regional Fault Map



SOURCE: ECORP Consulting, Inc./Quad Knopf – 2005

FIGURE **3.8-2**

Geologic Formations

Ground subsidence has occurred in some parts of the Great Valley geomorphic province as a result of groundwater overdraft. The western Placer County area is not known to have experienced subsidence that would limit or constrain development (Placer County 2007).

3.8.2.4 Project Site Seismic and Geologic Conditions

Potential seismic hazards from a moderate to major earthquake are generally classified as primary and secondary. The primary effect is ground fault rupture or surface faulting. Review of available information indicates that no faults with a surface expression have been mapped on the project site. The latest revision of DMG Special Publication 42 (Fault-Rupture Hazard Zones in California, revised 1997) indicates that fault zones previously mapped on the project site are not included in a fault-rupture hazard zone (Placer County 2007).

Secondary seismic hazards include ground shaking, liquefaction, and slope failure. Because of its distance from major fault systems, Placer County is considered a low-severity earthquake zone. The maximum earthquake intensity anticipated would correspond to an intensity of VI or VII on the Modified Mercalli scale (5.0 to 5.9 in magnitude on the Richter scale).[1] According to the California Building Code (CBC), the project site is located in Seismic Zone 3.

Liquefaction is the transformation of saturated granular material from a solid to a liquid caused by a rapid increase in liquid pore pressure brought about by ground shaking. In general, considering that most of the undisturbed firm native surficial material present in the project site is mapped as geologic units that are older than the Holocene Epoch, and recent (since approximately 1964) reported depth to groundwater is greater than 50 feet (15 meters) below ground surface (bgs) (depth to groundwater reported as shallow as 25 to 30 feet (7.5 to 9 meters) bgs around 1950), the project site should not be susceptible to liquefaction under the current groundwater regime (Placer County 2007).

The topography of the project site is gentle to moderate. Due to the topography and the relative strength of the soil and rock units present on the site, the likelihood of slope failures induced by seismic forces is low (Placer County 2007).

3.8.2.5 Project Site Soils

The soils on the project site generally consist of 12 soil mapping units, as indicated on the "Soil Survey of Placer County California, Western Part" (Rogers, 1980 - USDA Soil Conservation Service [now called Natural Resources Conservation Service, NRCS]) (see **Figure 3.8-3, Project Site Soils)**. The soils belong to complexes of related units and individual units, and include: the Alamo-Fiddyment complex; Cometa sandy loam; Cometa-Fiddyment complex; Cometa-Ramona sandy loam; Fiddyment loams; Fiddyment- Kaseberg loams; Ramona sandy loam; San Joaquin-Cometa sandy loams; Xerofluvents, occasionally flooded; Xerofluvents,

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1 The Modified Mercalli Scale describes earthquake intensity based on observed effects. Mercalli intensity VI corresponds to the following observations: "Felt by all, many frightened. Some heavy furniture moved; a few instances of fallen plaster. Damage slight." Mercalli intensity VII is described as follows: "Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable damage in poorly built or badly designed structures; some chimneys broken." (U.S. Geological Survey 1989)

frequently flooded; Xerofluvents, hardpan substratum; and water. In general, the soils consist of clays, loams, and sandy loams that formed primarily on low terraces and on alluvial bottoms. The Xerofluvent soils are found adjacent to Dry Creek and Curry Creek in the eastern portions of the project site, and are gravelly loams and sands. The mapped soils are well to poorly drained, have moderately slow to very slow permeability, medium to slow runoff, moderate to slight erosion potential (only the Xerofluvents are described with high erosion potential), and pose low to high risks of corrosion to steel and concrete. Hardpan layers are reported to be found at depths ranging from 16 inches to 35 inches (40 to 89 centimeters) below the surface, and a high shrink-swell potential is reported for Alamo, Cometa, and Fiddyment soils (Placer County 2007).

Based on literature research and on-site reconnaissance, the soils within the project site do not appear to have collapsible characteristics. The U.S. Department of Agriculture (USDA) Natural Resources Conservation Service mapping information however indicates that the Alamo, Cometa, and Fiddyment soil mapping units in the project site have high expansion potentials.

Subsidence is the sinking of the ground surface usually resulting from groundwater withdrawal or other subsurface collapse or extraction. The vicinity around the project site is not known to have experienced significant subsidence. Based on current conditions, land subsidence within the project site is considered unlikely (Placer County 2007).

3.8.2.6 Project Site Mineral Resources

The State of California Division of Mines and Geology has classified the site as mineral resource zone (MRZ) 4 pursuant to the Surface Mining and Reclamation Act of 1975 (Placer County 2007). As discussed in more detail in **Subsection 3.8.3 Regulatory Framework – Applicable Laws, Regulations, Plans, and Policies**, below, this designation identifies areas where available information is inadequate to support assignment into any other MRZ category and "does not rule out either the presence or absence of significant mineral resources." No extraction activities are currently taking place in the vicinity of the project site (Placer County 2007).

3.8.3 REGULATORY FRAMEWORK – APPLICABLE LAWS, REGULATIONS, PLANS, AND POLICIES

3.8.3.1 Federal Laws and Regulations

There are no federal laws related to geology, soils, and minerals that are applicable to the Proposed Action. Although the Earthquake Hazards Reduction Act (42 USC § 7704), enacted in 1977, established the National Earthquake Hazards Reduction Program (NEHRP) as a means to address earthquake risks to life and property in the nation's seismically active states, including California, that Act is not directly applicable to the Proposed Action.

Legend

SOIL MAPPING UNITS

104, ALAMO-FIDDYMENT COMPLEX, 0-5% SLOPES
140, COMETA SANDY LOAM, 1-5% SLOPES
141, COMETA-FIDDYMENT COMPLEX, 1-5% SLOPES
142, COMETA-RAMONA SANDY LOAMS, 1-5% SLOPES
146, FIDDYMENT LOAM, 1-8% SLOPES
147, FIDDYMENT-KASEBERG LOAMS, 2-9% SLOPES
174, RAMONA SANDY LOAM, 0-2% SLOPES
182, SAN JOAQUIN-COMETA SANDY LOAMS, 1-5% SLOPES
193, XEROFLUVENTS, OCCASIONALLY FLOODED
194, XEROFLUVENTS, FREQUENTLY FLOODED
195, XEROFLUVENTS, HARDPAN SUBSTRATUM
198, WATER

SOURCE: ECORP Consulting, Inc./Quad Knopf – 2005

FIGURE **3.8-3**

Project Site Soils

1090-002•07/12

3.8.3.2 State Laws and Regulations

Alquist-Priolo Earthquake Fault Zoning Act

The Alquist-Priolo Earthquake Fault Zoning Act (California Public Resources Code Section 2621 et seq.) charges the State of California with defining hazard corridors (Earthquake Fault Zones) along active faults, within which local jurisdictions must strictly regulate construction; in particular, the Act prohibits construction of structures intended for human occupancy (defined for purposes of the Act as more than 2,000 person-hours per year) across active faults. The Act establishes a legal definition for the term *active*, defines criteria for identifying active faults, and establishes a process for reviewing building proposals in and adjacent to defined Earthquake Fault Zones, to be implemented by the state's local jurisdictions (cities and counties), who typically do so through the building permit review process.

Under the Alquist-Priolo Act, a fault is considered active if one or more of its segments or strands shows evidence of surface displacement during Holocene time.[2] Because of the Alquist-Priolo Act's statewide purview, the Earthquake Fault Zone maps are a key tool for assessing surface fault rupture risks to projects of all types, even though the Act regulates only construction for human occupancy.

Seismic Hazards Mapping Act

The Seismic Hazards Mapping Act of 1990 (California Public Resources Code Sections 2690–2699.6) addresses secondary earthquake-related hazards, including liquefaction and seismically induced landslides. Like the Alquist-Priolo Act, the Seismic Hazards Mapping Act charges the state with mapping areas subject to hazards, and makes cities and counties responsible for regulating development for human occupancy within mapped Seismic Hazard Zones. In practice, as with the Alquist-Priolo Act, local jurisdiction building permit review serves as the primary mechanism for controlling public exposure to seismic risks, since cities and counties are prohibited from issuing development permits for sites within Seismic Hazard Zones until or unless appropriate site-specific geologic/geotechnical investigations have been carried out and measures to avoid or reduce damage have been incorporated into the development proposal. Like the Alquist-Priolo Earthquake Fault Zone Maps, the maps produced by the Seismic Hazards Mapping Program are useful as a first-order risk assessment tool for liquefaction and seismically induced landslide risks to projects of all types, although the Seismic Hazards Mapping Act, like the Alquist-Priolo Act, regulates only construction for human occupancy.

California Building Standards Code

The State of California's minimum standards for structural design and construction are given in the California Building Standards Commission (CBSC) (CCR Title 24). The CBC is based on the International Code Council's International Building Code, which is used widely throughout United States (generally

2 Under the Alquist-Priolo Act, Holocene time is conservatively defined as referring to approximately the last 11,000 years, although it is more commonly understood as including only the last 10,000 years.

adopted on a state-by-state or district-by-district basis) and has been modified for California conditions with numerous, more detailed or more stringent regulations. The CBC provides standards for various aspects of construction, including but not limited to, excavation, grading, earthwork, fills, embankments, construction on expansive soils, foundation investigations, liquefaction potential, and soil strength.

Surface Mining and Reclamation Act

The California Surface Mining and Reclamation Act (SMARA) of 1975 is the state's primary mineral resources law. The stated purpose of the act is to provide a comprehensive surface mining and reclamation policy that will encourage the production and conservation of mineral resources while ensuring that adverse environmental effects of mining are prevented or minimized, that mined lands are reclaimed, and residual hazards to public health and safety are eliminated. SMARA requires the State Geologist to classify mineral resources in order to help identify and protect mineral resources in areas within the state subject to urban expansion. The State Geologist is charged with evaluating mineral resource potential and assigning one of three MRZ designations that reflect the known or inferred presence and significance of a given mineral resource:

- MRZ-1: areas where adequate information indicates that no significant mineral deposits are present, or where it is judged that little likelihood exists for their presence;
- MRZ-2: areas where adequate information indicates that significant mineral deposits are present, or where it is judged that a high likelihood for their presence exists; or
- MRZ-3: areas containing mineral deposits, the significance of which cannot be evaluated from available data.

In practice, an additional category, MRZ-4, is used to designate areas for which available information is inadequate for assignment into any other MRZ. In addition, at least once every 10 years (following the completion of each decennial census) SMARA requires the state's Office of Planning and Research to identify areas that are already urbanized, subject to urban expansion, or under other irreversible land uses that preclude mineral extraction. Under SMARA, permitting, oversight, and enforcement responsibility for mining operations (including mine reclamation) is assigned to the local jurisdiction level.

California Public Resources Code

Section 5097.5 of the California Public Resources Code prohibits "knowing and willful" damage (excavation, removal, destruction, injury, and defacement) to paleontological resources on public lands without express permission from the agency with jurisdiction. Public lands in this context are understood to include lands under state, County, City, district, or public authority jurisdiction, or the jurisdiction of a public corporation. Public Resources Code Section 30244 requires reasonable mitigation for impacts on paleontological resources resulting from development on public lands.

3.8.3.3 Local Plans, Policies, and Ordinances

Placer County Building Code

Building codes are adopted at the local jurisdiction level and enforced through the local jurisdiction building permit process. Placer County uses several model codes, including the 2007 CBC and some model building codes from the International Code Council (ICC).

Grading, Erosion and Sediment Control Ordinance

The County's Grading, Erosion and Sediment Control (Placer County Code Chapter 15.48) requires a grading permit (Grading plan approval) for fill or excavation greater than 250 cubic yards, cuts or fills exceeding 4 feet (1.2 meters) in depth, soil disturbances exceeding 10,000 square feet (929 square meters), grading within or adjacent to a drainage course or wetland, and grading within a floodplain. For many types of grading, a grading plan must be submitted and approved before grading may proceed. In addition, a soil or geologic investigation report is required if grading includes cut or fill exceeding 10 feet (3 meters) in depth, when highly expansive soils are present, and in areas of known or suspected geological hazards.

Placer County General Plan

Placer County General Plan goal, policies, and implementation measures relevant to geology, soils, and geologic hazards include the following:

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

Policy 8.A.1. The County shall require the preparation of a soils engineering and geologic-seismic analysis prior to permitting development in areas prone to geological or seismic hazards (i.e., ground shaking, landslides, liquefaction, critically expansive soils and avalanche).

Policy 8.A.2. The County shall require submission of a preliminary soils report, prepared by a 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 risk or these conditions.

Policy 8.A.4. The County shall ensure that areas of slope instability are adequately investigated and that any development in these areas incorporates appropriate design provisions to prevent landsliding.

Policy 8.A.5. In landslide hazard areas, the County shall prohibit avoidable alteration of land in a manner that could increase the hazard, including concentration of water through drainage, irrigation, or septic systems; removal of vegetative cover; and steepening of slopes and undercutting the bases of slopes.

Policy 8.A.6. The County shall require the preparation of drainage plans for development in hillside areas that direct runoff and drainage away from unstable slopes.

Policy 8.A.7. In areas subject to severe ground shaking, the County shall require that new structures intended for human occupancy be designed and constructed to minimize risk to the safety of occupants.

Policy 8.A.8. The County shall continue to support scientific geologic investigations which refine, enlarge, and improve the body of knowledge on active faults zones, unstable areas, severe ground shaking, avalanche potential, and other hazardous conditions in Placer County.

Policy 8.A.9. The County shall require that the location and/or design of any new buildings, facilities, or other development in areas subject to earthquake activity minimize exposure to danger from fault rupture or creep.

Policy 8.A.10. The County shall require that new structures permitted in areas of high liquefaction potential be sited, designed, and constructed to minimize the dangers from damage due to earthquake-induced liquefaction.

Policy 8.A.11. The County shall limit development in areas of steep or unstable slopes to minimize hazards caused by landslides or liquefaction.

Implementation Program 8.1 The County shall continue to enforce provisions of the Uniform Building Code which address seismic concerns, including masonry building design requirements.

Implementation Program 8.2 The County shall assess the need for an ordinance requiring evaluation of un-reinforced masonry structures and the repair or replacement of identified hazardous structures.

Placer County Department of Public Works/Environmental Health Division

The Placer County Department of Public Works maintains policies and guidelines regarding grading, erosion control, storm water design, inspection, and permitting. The Environmental Health Division has permitting authority for well installation/destruction.

3.8.4 SIGNIFICANCE THRESHOLDS AND ANALYSIS METHODOLOGY

3.8.4.1 Significance Thresholds

Council on Environmental Quality (CEQ) regulations require an evaluation of the degree to which the proposed action could affect public health or safety as well as an evaluation of the effects of the proposed action on natural resources. The U.S. Army Corps of Engineers (USACE) has determined that the Proposed Action or its alternatives would result in substantial adverse effects related to geology and soils if the Proposed Action or an alternative would:

- expose people or structures to increased risk from rupture of a known earthquake fault;
- expose people or structures to increased risk related to strong seismic ground shaking;
- expose people or structures to increased risk related to seismically induced ground failure, including liquefaction;
- expose people or structures to increased risk of landslides and/or other slope failure;
- result in substantial soil erosion or the loss of topsoil;
- be located on a geologic unit or soil (including expansive soils) that is unstable or that would become unstable as a result of the project and potentially result in an on-site or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse, or
- Impede extraction of mineral resources that are of regional importance.

3.8.4.2 Analysis Methodology

Impacts of the Proposed Action and alternatives related to geology, geologic hazards, and mineral resources were evaluated qualitatively, based on professional judgment in consideration of the prevailing engineering geologic and geotechnical engineering standard of care. The analysis relied on information available from the published literature; no new fieldwork was determined to be necessary and was not conducted for this EIS. As discussed in the **Affected Environment** subsection, above, the project site is not within or traversed by any earthquake fault zone defined by the State of California pursuant to the Alquist-Priolo Earthquake Fault Zoning Act, and there is no evidence suggesting the presence of other active but currently unzoned faults within the site. Therefore, neither the Proposed Action nor any of the alternatives is expected to result in adverse effects related to the exposure of structures and their occupants to surface fault rupture hazard. This issue is not analyzed further below, and the analysis is focused on effects related to seismic ground shaking, liquefaction, slope failure, and expansive soils. Note that impacts related to soil erosion are addressed in **Section 3.10, Hydrology and Water Quality.**

3.8.5 ENVIRONMENTAL CONSEQUENCES AND MITIGATION MEASURES

Impact GEO-1 Hazards associated with Seismic Ground Shaking

No Action Alt. Hazards associated with seismic ground shaking to the development under the No Action Alternative would be **less than significant.** Any potential for seismic impacts would be further reduced by **PVSP EIR Mitigation Measure 4.5-1a.** Both primary and secondary seismic hazards are associated with regional faults and earthquakes. However, the project

site is located in an area of low seismic activity and compliance with CBC standards would ensure that significant effects associated with seismic ground shaking would not occur for the No Action Alternative.

Because of its distance from major faults, Placer County is a comparatively low-severity earthquake zone. The CBC classifies the project site as being within Seismic Zone 3. Accepted seismic design criteria are presented in the CBC, Chapter 16. Minimum ground accelerations of 0.3 g are used for structure design within this region. As discussed in **Local Plans, Policies, and Ordinances**, above, the County requires new construction to comply with the CBC. Although risks associated with seismic ground shaking cannot be entirely avoided in a seismically active area, implementation of CBC seismic design requirements would manage these unavoidable risks consistent with the prevailing engineering standard of care, and would avoid significant effects such as major structural damage and loss of life.

Liquefaction typically occurs in well-sorted, saturated sandy materials, at depths of less than 50 feet (15.25 meters) below ground surface. Based on site materials and the depth to groundwater, the potential for liquefaction on the project site is low. As part of the building permit process, the County will require geologic-seismic analysis prior to permitting developments within areas that are susceptible to seismic hazards (see Placer County General Plan policy 8.A.1). Moreover, as discussed above, the County routinely requires compliance with the CBC, which includes provisions for foundation design in areas with liquefiable soils. With building code compliance, risks associated with liquefaction and other types of seismically induced ground failure and settlement will be managed consistent with the prevailing engineering standard of care.

While adverse effects associated with seismic ground shaking are not anticipated for the No Action Alternative and the effect would be **less than significant**, any potential for ground shaking impacts would be further minimized by **PVSP EIR Mitigation Measure 4.5-1a**.

This mitigation measure was adopted by Placer County at the time of the approval of the PVSP. The USACE assumes that Placer County would impose the same mitigation measure on the No Action Alternative to address this effect. The mitigation measure requires new development within the project site to submit a geotechnical report prepared by a California Registered Civil or Geotechnical Engineer to the County Department of Public Works for review prior to improvement plans approval. The report shall meet all relevant requirements of the most recently adopted version of the Uniform Building Code. Placer County concluded that with this mitigation, the effect will be reduced to a less than significant level. The USACE finds that this mitigation measure will further reduce the less than significant effect of the No Action Alternative.

Proposed Action (Base Plan and Blueprint Scenarios)

Compared to the No Action Alternative, the Proposed Action (Base Plan and Blueprint Scenarios) would construct a larger mixed-use development on the project site. Based on the significance criteria listed above and for the same reasons presented for the No Action Alternative, the risk of structural damage, ground failure and settlement from seismic ground shaking would be minimized by compliance with the CBC seismic design requirements and the effect would be **less than significant**.

PVSP EIR Mitigation Measure 4.5-1a would further minimize this effect. This mitigation measure was adopted by Placer County at the time of the approval of the PVSP (Base Plan). The USACE assumes that Placer County would impose the same mitigation measure on the Proposed Action Blueprint scenario (or any level of development under the Proposed Action) to address this effect. Placer County concluded that with this mitigation measure, the effects will be reduced to a less than significant level. The USACE finds that the effect related to structural damage, ground failure and settlement from seismic ground shaking would be further reduced by this mitigation measure.

Alts. 1 through 5

All of the on-site alternatives would construct a project broadly similar to the Proposed Action, although Alternative 1, which involves a higher density of development on Property 1B, would construct slightly taller buildings on that site. To the extent that the buildings are taller, they may be more susceptible to damage from ground shaking. However, the risk of structural damage, liquefaction, ground failure or settlement from seismic ground shaking would be minimized by compliance with the CBC seismic design requirements. Based on the significance criteria listed above and for the same reasons presented for the No Action Alternative, the hazards associated with seismic ground shaking would be **less than significant.**

PVSP EIR Mitigation Measure 4.5-1a would further minimize this effect. The USACE assumes that Placer County would impose the same mitigation measures on Alternatives 1 through 5 to address this impact. As noted above, Placer County concluded that with this mitigation measure, the effects will be reduced to a less than significant level. The USACE finds that the effect related to structural damage, ground failure and settlement from seismic ground shaking would be further reduced by this mitigation measure.

PVSP EIR Mitigation Measure 4.5-1a: Site-Specific Geotechnical Reports
(*Applicability – Proposed Action and All Alternatives)*

Requires new development within the project site to submit a geotechnical report prepared by a California Registered Civil or Geotechnical Engineer to the County Department of Public Works for review prior to improvement plans approval. The report shall meet all relevant requirements of the most recently adopted version of the Uniform Building Code. The full text of the mitigation measure is presented in ***Appendix 3.0****.*

Impact GEO-2 Hazard associated with Slope Failure

No Action Alt.

Because of the project site's gentle topography, development on the site is not expected to be subject to slope failure related to natural slopes. The effect related to failure of natural slopes is anticipated to be **less than significant**.

The project will involve substantial grading activities, including the construction of cut slopes and fill embankments. Cut and fill slopes can become unstable if they are improperly designed or constructed. However, as identified above, the County routinely requires compliance with the CBC, which includes provisions for the design and construction of cuts and fills, including limitations on the materials suitable for use as fill, specifications for fill compaction, and requirements for slope drainage. In addition, in compliance with **PVSP EIR Mitigation Measure 4.5-1a**, above, all new development will be required to submit a site-specific geotechnical report to the County for approval and implement the recommendations of that report. With building code compliance and adherence to recommendations of a site-specific geotechnical investigation prepared by licensed personnel, the potential for slope instability or failure of cuts and fills would be reduced consistent with prevailing engineering practices. The effect related to slope failure is anticipated to be **less than significant**. Additional mitigation is not required.

Proposed Action (Base Plan and Blueprint Scenarios)

The Proposed Action (Base Plan and Blueprint Scenarios) would construct a larger mixed-use residential community on the project site. The risk of slope failure associated with cut and fill slopes would be similar to that described above for the No Action Alternative and would be minimized by compliance with the County's requirements, including the CBC design requirements and implementation of **PVSP EIR Mitigation Measure 4.5-1a**. Based on the significance criteria listed above and for the same reasons presented for the No Action Alternative, the effect related to slope failure is anticipated to be **less than significant**. Additional mitigation is not required.

Alts. 1 through 5

All of the alternatives would construct a project broadly similar to the Proposed Action. The risk of slope failure associated with cut and fill slopes would be similar and minimized by compliance with the County's requirements, including the CBC design requirements and implementation of **PVSP EIR Mitigation Measure 4.5-1a**. Based on the significance criteria listed above and for the same reasons presented for the No Action Alternative, the effect related to slope failure is anticipated to be **less than significant**. Additional mitigation is not required.

Impact GEO-3 Potential Structural Damage due to Expansive Soils

No Action Alt.

Collapsible soils have not been identified on the project site, but, as shown in **Table 3.8-2** above, some of the site soils are highly expansive. Expansive soils, which shrink and swell cyclically as they are wetted and dried by seasonal rains or irrigation, can result in substantial damage to improperly designed or constructed structures over time. However, as discussed above, the County routinely requires compliance with the CBC, which includes provisions for the foundation design and construction in areas with expansive soils. Depending on site conditions and the nature of a project, a variety of approaches are available to address expansive soils, including over-excavation and replacement of native soils with non-expansive fills, amendment and on-site use of native soils, and implementation of specialized foundation designs. Buildings within the project site would be required to comply with the CBC design requirements. However, there could be a **significant** effect related to expansive soils.

PVSP EIR Mitigation Measure 4.5-1a would address this effect. Implementation of **PVSP EIR Mitigation Measure 4.5-1a,** discussed above, would require preparation of site-specific geotechnical reports prepared by licensed personnel. With building code compliance and adherence to recommendations of a site-specific geotechnical investigation prepared by licensed personnel, the effect related to construction in an area with expansive soils would be **less than significant**.

Proposed Action (Base Plan and Blueprint Scenarios)

The risk of structural damage from expansive soils to the development under the Proposed Action would be similar to that described above for the No Action Alternative and would be minimized by compliance with the County's requirements, including the CBC design requirements. However, as with the No Action Alternative, there could be a **significant** effect related to expansive soils.

PVSP EIR Mitigation Measure 4.5-1a, discussed above, would address this effect, and its implementation would reduce the effect to a **less than significant** level.

Alts. 1 through 5

All of the alternatives would construct a project broadly similar to the Proposed Action. The risk of expansive soils would be similar and the **significant** effect would be reduced to a **less than significant** level by **PVSP EIR Mitigation Measure 4.5-1a.**

Impact GEO-4 Effect on Mineral Resources

No Action Alt. As discussed in the **Affected Environment** subsection, above, the project vicinity has been designated MRZ-4 by the State of California, meaning that available information is inadequate to demonstrate either the presence or the absence of significant mineral resources. However, based on the geology of the area and the absence of any past or present mineral extraction activities in the project vicinity, the project site is unlikely to contain significant mineral deposits. Therefore, implementation of the No Action Alternative would not impede the extraction of mineral resources that are of regional importance. The effect would be **less than significant.** Mitigation is not required.

Proposed Action (Base Plan and Blueprint Scenarios) The Proposed Action (Base and Blueprint Scenarios) would construct a larger mixed-use development on the project site. For the same reasons presented above for the No Action Alternative, the effect related to mineral resources would be **less than significant**. Mitigation is not required.

Alts. 1 through 5 All of the alternatives would construct a project broadly similar to the Proposed Action. For the same reasons presented for the No Action Alternative, the effect related to mineral resources would be **less than significant**. Mitigation is not required.

Impact GEO-5 Indirect Effects Associated with Geology, Soils, and Minerals from Off-Site Infrastructure Not Constructed as Part of the Project

No Action Alt., Proposed Action (Base Plan and Blueprint Scenarios), and Alts. 1 through 5 The construction and operation of off-site water pipeline infrastructure by the Placer County Water Agency (PCWA) which would be used by the No Action Alternative, Proposed Action, and Alternatives 1 through 5, would result in **less than significant** effects associated with geology, soils, and minerals with implementation of mitigation. The area around the pipeline routes is not known for mineral deposits. In addition, the routes would be constructed along existing roadways and utility easements, which under existing conditions would limit access to potential mineral deposits. Therefore, construction and operation would not prevent access to potential mineral deposits.

The pipeline routes are located in an area of low seismic activity, limiting risk from seismic groundshaking, or liquefaction. The pipelines would be constructed on primarily flat terrain, reducing the possibility of slope failure. There may be expansive soil along the pipeline routes. The County requires compliance with the CBC which would reduce risk associated with seismic hazards and expansive soils. As analyzed in the PVSP Second Partially Recirculated Revised Draft EIR dated March 2007, there are no areas of suspected or potential ground instability. However, erosion is expected to occur in disturbed soil areas. Soil stockpiles are also susceptible to erosion and soil loss. These impacts would be potentially significant.

PVSP EIR Mitigation Measures 4.5-4a through **4.5-4f** were adopted by Placer County at the time of the approval of the PVSP (Proposed Action). The USACE assumes that Placer County would impose the same mitigation measure on the off-site infrastructure associated with the No Action Alternative, Proposed Action, and Alternatives 1 through 5 to address this effect. The mitigation measure requires new development to submit a grading and erosion control/ground instability plan prepared by a California Registered. In addition, a Storm Water Pollution Prevention Plan (SWPP) shall be prepared. Improvement plans shall be submitted to the Department of Public Works for each new development phase. New development with ground disturbance exceeding 1 acre shall obtain an National Pollutant Discharge Elimination System (NPDES) permit. The Placer Vineyards Specific Plan EIR identified these mitigation measures to reduce the effect on erosion from off-site infrastructure to a less than significant level (Placer County 2006). However, in the California Environmental Quality Act (CEQA) Findings of Fact and Statement of Overriding Considerations for the PVSP EIR, the County acknowledged that it did not have the authority to impose these mitigation measures on Placer County Water Agency's (PCWA's) project and the impact would remain significant. USACE concurs with the County that if the PCWA imposes these or similar mitigation measures on the infrastructure project, the effect on erosion would be less than significant. However, USACE also does not have the authority to impose mitigation measures on a project that would be built by the PCWA and finds that the effects would remain **significant**.

PVSP EIR Mitigation Measure 4.5-4a through
PVSP EIR Mitigation Measure 4.5-4f: Erosion Control
(Applicability – No Action, Proposed Action, and All Alternatives)

Would require new development to submit a grading and erosion control/ground instability plan prepared by a California Registered Civil Engineer. In addition, a Storm Water Pollution Prevention Plan (SWPP) shall be prepared. Improvement plans shall be submitted to the Department of Public Works for each new development phase. New development with ground disturbance exceeding 1 acre shall obtain an NPDES permit. The full text of the mitigation measure is presented in ***Appendix 3.0****.*

3.8.6 RESIDUAL SIGNIFICANT IMPACTS

All effects associated with geology, soils, and minerals would be less than significant or reduced to less than significant with mitigation. There would be no residual significant impacts for the Proposed Action and any of the alternatives.

3.8.7 REFERENCES

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