3.7 GEOLOGY, SOILS, MINERALS, AND PALEONTOLOGICAL RESOURCES

3.7.1 AFFECTED ENVIRONMENT

GEOLOGY

Regional Geology

The SPA is located within the northern portion of the Sacramento Valley, which, together with the San Joaquin Valley, comprises the Great Valley geomorphic province. The Great Valley is a forearc basin composed of thousands of feet of sedimentary deposits that has undergone periods of subsidence and uplift over millions of years. The Great Valley basin began to form during the Jurassic period as the Pacific oceanic plate was subducted underneath the adjacent North American continental plate. In the western portion of the Great Valley, Upper Jurassic to Upper Cretaceous rock sequences rest on Upper Jurassic oceanic crust sequences. In contrast, the eastern portion of the Great Valley is composed of shallow Pleistocene nonmarine deposits over a layer of Cretaceous marine/deltaic deposits only a few hundred feet thick, which rests on the metamorphic and igneous rocks of the Sierra Nevada—the western edge of the continental margin.

During the Jurassic and Cretaceous periods of the Mesozoic era, the Great Valley existed in the form of an ancient ocean. By the end of the Mesozoic, the northern portion of the Great Valley began to fill with sediment as tectonic forces caused uplift of the basin. Geologic evidence suggests that the Sacramento Valley and San Joaquin Valley gradually separated into two separate water bodies as uplift and sedimentation continued. By the time of the Miocene epoch (approximately 24 million years ago), sediments deposited in the Sacramento Valley were mostly of terrestrial origin. In contrast, the San Joaquin Valley continued to be inundated with water for another 20 million years, as indicated by marine sediments dated to the late Pliocene (approximately 5 million years ago).

Most of the surface of the Great Valley is covered with Holocene and Pleistocene-age alluvium. This alluvium is composed of sediments from the Sierra Nevada to the east and the Coast Range to the west, which were carried by water and deposited on the valley floor. Siltstone, claystone, and sandstone are the primary types of sedimentary deposits.

Local Geology

The SPA is located along the eastern edge of the Sacramento Valley, adjacent to the Sierra Nevada foothills. According to the U.S. Geological Survey (USGS) Buffalo Creek 7.5-Minute Quadrangle map, the topography is relatively flat over the entire site, gently sloping downward in a westerly direction. Elevations at the SPA range from 120 to 240 feet above mean sea level.

The SPA is underlain by the Laguna Formation, which is of Pliocene age (approximately 5 million years Before Present [B.P.]) (Wagner et al. 1987). The Laguna Formation is composed of a mixture of sedimentary deposits of silt, clay, and sand interbedded with cobbles of the ancestral American River channel. This formation probably extends downward at a 45-degree angle south of the American River, in essence forming a wedge above the underlying volcanic rocks, which thins toward the Sierra Nevada and thickens toward the axis of the valley. The average depth of the Laguna Formation in the eastern portion of the valley is probably less than 500 feet. Volcanic materials forming the basement rocks approximately 250 feet thick have been reported beneath the Laguna Formation south of Folsom in wells drilled for gold-dredging operations (Olmsted and Davis 1961).

REGIONAL SEISMICITY AND FAULT ZONES

Potential seismic hazards resulting from a nearby moderate to major earthquake can generally be classified as primary and secondary. The primary effect is fault ground rupture, also called surface faulting. Common secondary seismic hazards include ground shaking, liquefaction, and subsidence. Each of these potential hazards is discussed below.

Fault Ground Rupture

Surface rupture is an actual cracking or breaking of the ground along a fault during an earthquake. Structures built over a fault can be torn apart if the ground ruptures. Surface ground rupture along faults is generally limited to a linear zone a few yards wide. The Alquist-Priolo Earthquake Fault Zoning Act (Alquist-Priolo Act) (see Section 3.7.3, "Regulatory Framework," below) was created to prohibit the location of structures designed for human occupancy across the traces of active faults, thereby reducing the loss of life and property from an earthquake. The SPA is not located in an Alquist-Priolo Earthquake Fault Zone (California Geological Survey [CGS] 2007, Hart and Bryant 1999). The nearest fault zoned under the Alquist-Priolo Act is the northern segment of the Cleveland Hills Fault, located near Lake Oroville, approximately 50 miles north of the SPA. Research conducted by the California Department of Water Resources (DWR) indicates that the magnitude 5.7 earthquake that occurred on August 1, 1975 along the Cleveland Hills Fault mostly likely resulted from reservoir-induced stress (DWR 1989).

Seismic Ground Shaking

Ground shaking, motion that occurs as a result of energy released during faulting, could potentially result in the damage or collapse of buildings and other structures, depending on the magnitude of the earthquake, the location of the epicenter, and the character and duration of the ground motion. Other important factors to be considered are the characteristics of the underlying soil and rock and, where structures exist, the building materials used and the workmanship of the structures.

Faults in the Project Region

The West Branch of the Bear Mountains fault, within the Foothills fault system, is located approximately 5 miles east of the eastern property boundary; however, Jennings (1994) does not indicate that fault activity has occurred within the last 11,000 years, and the slip rate of the Foothills fault system is extremely low (0.05 millimeters per year), which is well below the planning threshold for major earthquakes (USGS 2000). With the exception of the Dunnigan Hills fault, located in the Woodland area, the Sacramento Valley has generally not been seismically active in the last 11,000 years (Holocene time). Faults with known or estimated activity during the Holocene are generally located in the San Francisco Bay Area to the west, or in the Lake Tahoe area to the east, as shown in Table 3.7-1. In addition, Table 3.7-1 identifies the faults' approximate distance from the SPA, fault type, and maximum moment magnitude.

The intensity of ground shaking depends on the distance from the earthquake epicenter to the site, the magnitude of the earthquake, site soil conditions, and the characteristics of the source. Ground motions from seismic activity can be estimated by probabilistic method at specified hazard levels and by site-specific design calculations using a computer model. The CGS Probabilistic Seismic Hazards Assessment Model indicates a minimum horizontal acceleration of 0.112*g* for soft rock and 0.15*g* for alluvial conditions (where *g* is the percentage of gravity) at the SPA with a 10% probability of earthquake occurrence in a 50-year timeframe for use in earthquake-resistant design (CGS 2010). Stated another way, these calculations indicated there is a 1-in-10 probability that an earthquake will occur within 50 years that would result in a peak horizontal ground acceleration exceeding 0.112 or 0.115*g*.

The current 2010 California Building Standards Code (CBC) specifies more stringent design guidelines where a project would be located adjacent to a Class A or B fault as designated by the California Probabilistic Seismic Hazard Maps. The A and B fault classifications are also used by CGS and USGS in characterizing the level of certainty associated with determining seismologic parameters. As shown in Table 3.7-1, the SPA is located approximately 60 miles from the nearest Class A or B fault.

Table 3.7-1 Faults with Evidence of Activity During Holocene Time in the Project Region					
Fault Name	**Approximate Distance from SPA (miles)**	**Regional Location**	**Maximum Moment Magnitude[1]**	**Slip Rate (mm/yr)**	**Fault Type[2]**
Dunnigan Hills	40	Western Sacramento Valley	6.5	N/A	NA
Cleveland Hills/Swain Ravine	50	Sierra Nevada Foothills	6.5	0.05	NA
Great Valley Fault Zone Segment 4	60	Margin between Sacramento Valley and Coast Range	6.6	1.5	B
Great Valley Fault Zone Segment 5	65	Margin between Sacramento Valley and Coast Range	6.5	1.5	B
Green Valley	65	Coast Range	6.2	5.0	B
Greenville Fault Zone (includes Clayton and Marsh Creek sections)	65	Coast Range	6.6	2.0	B
Concord	70	Coast Range	6.2	4.0	B
West Tahoe/Dollar Point Fault Zone	60	Lake Tahoe	7.2	N/A	NA
North Tahoe/Incline Village Fault Zone	60	Lake Tahoe	7.0	0.2 – 1.0	B

Notes: NA = not available or not known; mm/yr = millimeters per year

1 The moment magnitude scale is used by seismologists to compare the energy released by earthquakes. Unlike other magnitude scales, it does not saturate at the upper end, meaning that there is no particular value beyond which all earthquakes have about the same magnitude, which makes this scale a particularly valuable tool for assessing large earthquakes.

2 Faults with an “A” classification are capable of producing large magnitude (M) events (M greater than 7.0), have a high rate of seismic activity (e.g., slip rates greater than 5 millimeters per year), and have well-constrained paleoseismic data (e.g., evidence of displacement within the last 700,000 years). Class “B” faults are those that lack paleoseismic data necessary to constrain the recurrence intervals of large-scale events. Faults with a “B” classification are capable of producing an event of M 6.5 or greater.

Sources: Cao 2003, Jennings 1994, Mualchin 1996, Ichinose et al. 1999, Sawyer 1999, Sawyer and Haller 2000; data compiled by AECOM in 2011

Seismic Seiches/Tsunamis/Mudflows

Earthquakes may affect open bodies of water by creating seismic sea waves and seiches. Seismic sea waves (often called “tidal waves” or “tsunamis”) are caused by abrupt ground movements (usually vertical) on the ocean floor in connection with a major earthquake. A seiche is a sloshing of water in an enclosed or restricted water body, such as a basin, river, or lake, which is caused by earthquake motion; the sloshing can occur for a few minutes or several hours. Although an 1868 earthquake along the Hayward fault in the San Francisco Bay Area is known to have generated a seiche along the Sacramento River, the affected area was located in the Sacramento–San Joaquin River Delta (Delta). A mudflow is downhill movement of soft, wet, unconsolidated earth and debris, made fluid by rain or melted snow and often building up great speed.

Because of the long distance of the SPA from the Pacific Ocean and the Delta, and lack of enclosed water bodies at the SPA, seiches and tsunamis would not represent a hazard for project implementation. Because the SPA is located on level terrain, mudflows would not represent a hazard for project implementation.

Ground Failure/Liquefaction

Soil liquefaction occurs when ground shaking from an earthquake causes a sediment layer saturated with groundwater to lose strength and take on the characteristics of a fluid, thus becoming similar to quicksand. Factors determining the liquefaction potential are soil type, the level and duration of seismic ground motions, the type and consistency of soils, and the depth to groundwater. Loose sands and peat deposits, along with recent Holocene-age deposits, are more susceptible to liquefaction, while older deposits of clayey silts, silty clays, and clays deposited in freshwater environments are generally stable under the influence of seismic ground shaking.

Liquefaction poses a hazard to engineered structures. The loss of soil strength can result in bearing capacity insufficient to support foundation loads, increased lateral pressure on retaining or basement walls, and slope instability.

Based on a review of geologic maps and Natural Resources Conservation Service (NRCS) soil data, it is unlikely that soils on the SPA would be subject to liquefaction in the event of an earthquake because the SPA is underlain by relatively stable Pleistocene-age soils, the potential seismic sources are a relatively long distance away, and the groundwater table is at least 100 feet below the ground surface.

Subsidence, Settlement, and Soil Bearing Capacity

Subsidence of the land surface can be induced by both natural and human phenomena. Natural phenomena that can cause subsidence can result from tectonic deformations and seismically induced settlements; from consolidation, hydrocompaction, or rapid sedimentation; from oxidation or dewatering of organic-rich soils; and from subsurface cavities. Subsidence related to human activity can result from withdrawal of subsurface fluids or sediment. Pumping of water for residential, commercial, and agricultural uses from subsurface water tables causes more than 80% of the identified subsidence in the United States (Galloway et al. 1999). Lateral spreading is the horizontal movement or spreading of soil toward an open face, such as a streambank, the open side of fill embankments, or the sides of levees. The potential for failure from subsidence and lateral spreading is highest in areas where the groundwater table is high, where relatively soft and recent alluvial deposits exist, and where creek banks are relatively high. Soil bearing capacity is the ability of soil to support the loads applied to the ground; where the bearing capacity is too low to support proposed structures, subsidence and settlement may occur.

The SPA contains creek banks, and areas of low soil bearing strength (see Table 3.7-2); however, since a geotechnical investigation has not been performed for the SPA, it is not possible to determine with certainty whether or not any areas of unstable soils are present at the SPA that would represent a construction and/or development hazard.

Slope Stability

A landslide is the downhill movement of masses of earth material under the force of gravity. The factors contributing to landslide potential are steep slopes, unstable terrain, and proximity to earthquake faults. This process typically involves the surface soil and an upper portion of the underlying bedrock. Movement may be very rapid, or so slow that a change of position can be noted only over a period of weeks or years (creep). The size of a landslide can range from several square feet to several square miles.

The topography at the SPA and the surrounding vicinity is relatively flat, therefore landslides are not expected to represent a hazard.

Naturally Occurring Asbestos

Asbestos is a term applied to several types of naturally occurring fibrous materials found in rock formations in various locations throughout California. Exposure and disturbance of rock and soil that contains asbestos can result in the release of fibers to the air and consequent exposure to the public. All types of asbestos are now considered hazardous and pose public health risks. Naturally occurring asbestos is commonly found in ultramafic rock, including serpentine. The SPA is underlain by the Laguna Formation, which does not contain ultramafic rock. Thus, naturally occurring asbestos is not present at the SPA.

Table 3.7-2
Soil Characteristics

Soil Map Unit Name	Shrink-Swell Potential[1]	Permeability[2]	Water Erosion Hazard[3]	Wind Erosion Hazard[4]	Drainage	Concrete Corrosivity	Steel Corrosivity	Limitations for Buildings and Roads
Corning complex, 0-8% slopes	Moderate	Moderately high	Low	4	Well drained	High	High	Slopes from 4-8%; shrink-swell potential
Corning-Redding complex, 8-30% slopes	Moderate	Moderately high	Low	4	Well drained	High	High	Slopes greater than 15%; shrink-swell potential
Fiddyment fine sandy loam, 1-8% slopes	Low	Moderately high	Moderate	3	Well drained	Moderate	High	Shrink-swell potential; low soil strength
Hedge loam, 0-2% slopes	Low	Moderately high	Moderate	5	Moderately well drained	Low	High	Occasional flooding; soil saturation at depth less than 18 inches
Hicksville loam, 0-2% slopes, occasionally flooded	Moderate	Moderately high	Moderate	5	Moderately well drained	Low	Moderate	Shrink-swell potential; occasional flooding; soil saturation at depth less than 18 inches
Hicksville gravelly loam, 0-2% slopes, occasionally flooded	Moderate	Moderately high	Low	6	Moderately well drained	Low	Moderate	Shrink-swell potential; occasional flooding; soil saturation at depth less than 18 inches; low soil strength
Madera loam, 2-8% slopes	Moderate	Moderately high	Moderate	5	Moderately well drained	Low	High	Shrink-swell potential; low soil strength
Peters clay, 1-8% slopes	High	Moderately high	Moderate	5	Well drained	Low	Moderate	Shrink-swell potential; soft bedrock at depth less than 20 inches; low soil strength
Red Bluff-Redding complex, 0-5% slopes	Moderate	Moderately high	Moderate	5	Well drained	High	High	Shrink-swell potential
Redding loam, 2-8% slopes	Moderate	Moderately high	Moderate	5	Moderately well drained	Moderate	High	Shrink-swell potential
Redding gravelly loam, 0-8% slopes	Moderate	Moderately high	Moderate	6	Moderately well drained	Moderate	High	Shrink-swell potential
San Joaquin silt loam, 0-3% slopes	Low	Moderately high	Moderate	5	Moderately well drained	Moderate	Moderate	None
San Joaquin silt loam, 3-8% slopes	Low	Moderately high	Moderate	5	Moderately well drained	Moderate	Moderate	None

Notes:

[1] Based on percentage of linear extensibility. Shrink-swell potential ratings of “moderate” to “very high” can result in damage to buildings, roads, and other structures.

[2] Based on standard U.S. Department of Agriculture (USDA) saturated hydraulic conductivity (Ksat) class limits; Ksat refers to the ease with which pores in a saturated soil transmit water.

[3] Based on the USDA erosion factor “Kw whole soil,” which is a measurement of relative soil susceptibility to sheet and rill erosion by water.

[4] Based on the USDA wind erodibility group. The soils assigned to group 1 are the most susceptible to wind erosion, and those assigned to group 8 are the least susceptible.

Source: NRCS 2009

SOIL RESOURCES

Exhibit 3.7-1 shows the locations of the soil types present on the SPA and Table 3.7-2 summarizes the relevant soil characteristics.

MINERAL RESOURCES

Under the Surface Mining and Reclamation Act (SMARA), the State Mining and Geology Board may designate certain mineral deposits as being regionally significant to satisfy future needs. The Board's decision to designate an area is based on a classification report prepared by CGS and on input from agencies and the public. The SPA lies within the designated Sacramento-Fairfield Production-Consumption Region for Portland cement concrete aggregate, which includes all designated lands within the marketing area of the active aggregate operations supplying the Sacramento-Fairfield urban center.

In compliance with SMARA, the California Division of Mines and Geology (CDMG) has established the classification system shown in Table 3.7-3 to denote both the location and significance of key extractive resources.

Table 3.7-3
California Division of Mines and Geology Mineral Land Classification System

Classification	Description
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
MRZ-3	Areas containing mineral deposits, the significance of which cannot be evaluated from existing data
MRZ-4	Areas where available data are inadequate for placement in any other mineral resource zone

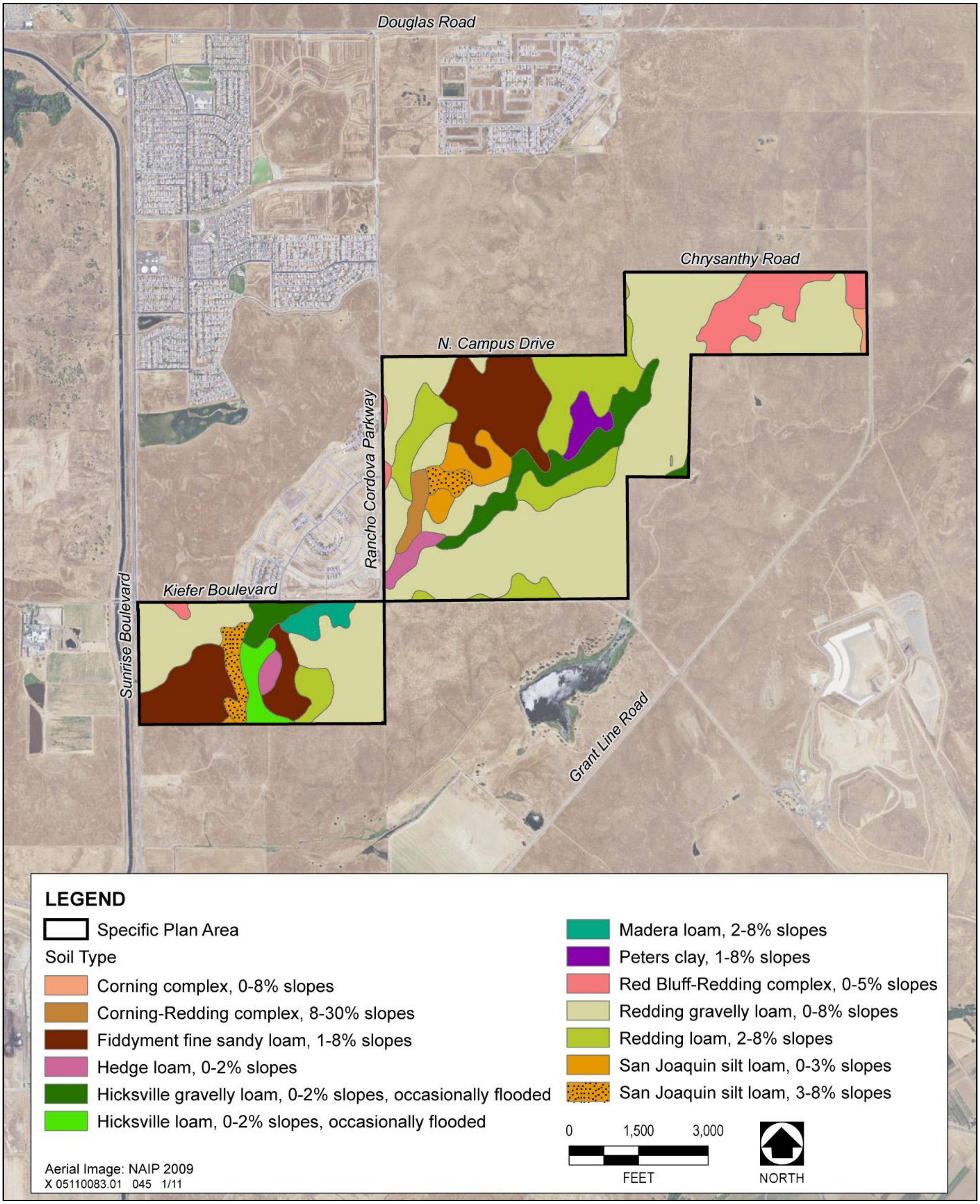
Note: MRZ = Mineral Resource Zone
Source: Dupras 1988

The SPA is classified as MRZ-3 for Portland Cement-grade aggregate—an area where the significance of mineral deposits cannot be evaluated from existing data (Dupras 1988, 1999). Lloyd (1984) indicates that the SPA is classified as either MRZ-3 or MRZ-4 for Placer gold, copper, zinc, and industrial minerals (i.e., carbonate rock, clay, sand, lignite, talc, asbestos). The SPA is zoned MRZ-1 (no known deposits) of chromite.

According to the City of Rancho Cordova General Plan (2006), and the Sacramento County General Plan Update (2009), the SPA is not listed as a locally-important mineral resource recovery site.

PALEONTOLOGICAL RESOURCES

Geologic maps prepared by Wagner et al. (1987) and Bartow and Helley (1979) indicate that the SPA is underlain by the Pliocene-age (approximately 5 million years B.P.) Laguna Formation. A search of published literature indicates only one reference to a Pliocene-age vertebrate fossil specimen from the Laguna Formation in Northern California: Stirton (1939) refers to a Pliocene-age fossil specimen of a horse tooth found in clayey silt, probably of the Laguna Formation although not definitely identified as such, in a well near the town of Galt, in Sacramento County. Results of a paleontological records search at the University of California Museum of Paleontology (2009) indicate no recorded fossil sites within a 5-mile radius of the SPA. Therefore, sediments at the SPA are considered to be of low paleontological sensitivity.



Source: SSURGO 2007

Soil Types in the SPA **Exhibit 3.7-1**

3.7.2 REGULATORY FRAMEWORK

FEDERAL PLANS, POLICIES, REGULATIONS, AND LAWS

Earthquake Hazards Reduction Act

In October 1977, the U.S. Congress passed the Earthquake Hazards Reduction Act to reduce the risks to life and property from future earthquakes in the United States through the establishment and maintenance of an effective earthquake hazards reduction program. To accomplish this goal, the act established the National Earthquake Hazards Reduction Program (NEHRP). This program was substantially amended in November 1990 by the National Earthquake Hazards Reduction Program Act (NEHRPA), which refined the description of agency responsibilities, program goals, and objectives.

The mission of NEHRP includes improved understanding, characterization, and prediction of hazards and vulnerabilities; improved building codes and land use practices; risk reduction through post earthquake investigations and education; development and improvement of design and construction techniques; improved mitigation capacity; and accelerated application of research results. The NEHRPA designates the Federal Emergency Management Agency as the lead agency of the program and assigns several planning, coordinating, and reporting responsibilities. Other NEHRPA agencies include the National Institute of Standards and Technology, National Science Foundation, and USGS.

STATE PLANS, POLICIES, REGULATIONS, AND LAWS

Alquist-Priolo Earthquake Fault Zoning Act

The Alquist-Priolo Act (California Public Resources Code [PRC] Sections 2621–2630) was passed in 1972 to mitigate the hazard of surface faulting to structures designed for human occupancy. The main purpose of the law is to prevent the construction of buildings used for human occupancy on the surface trace of active faults. The law addresses only the hazard of surface fault rupture and is not directed toward other earthquake hazards. The Alquist-Priolo Act requires the State Geologist to establish regulatory zones known as Earthquake Fault Zones around the surface traces of active faults and to issue appropriate maps. The maps are distributed to all affected cities, counties, and state agencies for their use in planning efforts. Before a project can be permitted in a designated Alquist-Priolo Earthquake Fault Zone, cities and counties must require a geologic investigation to demonstrate that proposed buildings would not be constructed across active faults.

Seismic Hazards Mapping Act

The Seismic Hazards Mapping Act of 1990 (California PRC Sections 2690–2699.6) addresses earthquake hazards from nonsurface fault rupture, including liquefaction and seismically induced landslides. The act established a mapping program for areas that have the potential for liquefaction, landslide, strong ground shaking, or other earthquake and geologic hazards. The act also 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.

National Pollutant Discharge Elimination System Permit

In California, the State Water Resources Control Board (SWRCB) administers regulations promulgated by the U.S. Environmental Protection Agency (55 Code of Federal Regulations [CFR] 47990) requiring the permitting of stormwater-generated pollution under the National Pollutant Discharge Elimination System (NPDES). In turn, the SWRCB's jurisdiction is administered through nine regional water quality control boards. Under these Federal regulations, an operator must obtain a general permit through the NPDES Stormwater Program for all construction activities with ground disturbance of 1 acre or more. The general permit requires the implementation of best management practices (BMPs) to reduce sedimentation into surface waters and to control erosion. One element of compliance with the NPDES permit is preparation of a storm water pollution prevention plan (SWPPP) that addresses control of water pollution, including sediment, in runoff during construction. (See Section 3.9, “Hydrology and Water Quality,” for more information about the NPDES and SWPPPs.)

California Building Standards Code

The California Building Standards Commission is responsible for coordinating, managing, adopting, and approving building codes in California. The State of California provides minimum standards for building design through the 2010 CBC (CCR, Title 24). Where no other building codes apply, Chapter 29 of the 2010 CBC regulates excavation, foundations, and retaining walls. The CBC applies to building design and construction in the state and is based on the Federal Uniform Building Code (UBC) used widely throughout the country (generally adopted on a state-by-state or district-by-district basis). The CBC has been modified for California conditions with numerous more detailed or more stringent regulations.

The state earthquake protection law (California Health and Safety Code Section 19100 et seq.) requires that structures be designed to resist stresses produced by lateral forces caused by wind and earthquakes. The 2010 CBC requires an evaluation of seismic design that falls into Categories A through F (where F requires the most earthquake-resistant design) for structures designed for a project site. The CBC philosophy focuses on “collapse prevention,” meaning that structures are designed for prevention of collapse for the maximum level of ground shaking that could reasonably be expected to occur at a site. Chapter 16 of the CBC specifies exactly how each seismic design category is to be determined on a site-specific basis through the site-specific soil characteristics and proximity to potential seismic hazards.

Chapter 18 of the CBC regulates the excavation of foundations and retaining walls. This chapter regulates the preparation of a preliminary soil report, engineering geologic report, geotechnical report, and supplemental ground-response report. Chapter 18 also regulates analysis of expansive soils and the determination of the depth to groundwater table. For Seismic Design Category C, Chapter 18 requires analysis of slope instability, liquefaction, and surface rupture attributable to faulting or lateral spreading. For Seismic Design Categories D, E, and F, Chapter 18 requires these same analyses plus an evaluation of lateral pressures on basement and retaining walls, liquefaction and soil strength loss, and lateral movement or reduction in foundation soil-bearing capacity. It also requires addressing mitigation measures to be considered in structural design. Mitigation measures may include ground stabilization, selection of appropriate foundation type and depths, selection of appropriate structural systems to accommodate anticipated displacements, or any combination of these measures. The potential for liquefaction and soil strength loss must be evaluated for site-specific peak ground acceleration magnitudes and source characteristics consistent with the design earthquake ground motions. Peak ground acceleration must be determined from a site-specific study, the contents of which are specified in CBC Chapter 18.

Finally, Appendix J of the 2010 CBC regulates grading activities, including drainage and erosion control and construction on unstable soils, such as expansive soils and areas subject to liquefaction.

California Surface Mining and Reclamation Act

SMARA (California PRC Section 2710 et seq.) was enacted by the California Legislature in 1975 to regulate activities related to mineral resource extraction. The act requires the prevention of adverse environmental effects caused by mining, the reclamation of mined lands for alternative land uses, and the elimination of hazards to public health and safety from the effects of mining activities. At the same time, SMARA encourages both the conservation and the production of extractive mineral resources, requiring the State Geologist to identify and attach levels of significance to the state’s varied extractive resource deposits. Under SMARA, the mining industry in California must plan adequately for the reclamation of mined sites for beneficial uses and provide financial assurances to guarantee that the approved reclamation will actually be implemented. The requirements of SMARA must be implemented by the local lead agency with permitting responsibility for the proposed mining project.

REGIONAL AND LOCAL PLANS, POLICIES, REGULATIONS, AND ORDINANCES

Rancho Cordova General Plan

Goals and policies from the *City of Rancho Cordova General Plan* (City General Plan 2006) relating to geology and soils that are applicable to the Proposed Project and alternatives under consideration are listed in Appendix K.

Sacramento County Zoning Code Title II, Article 4, Surface Mining

The County has adopted its own SMARA ordinance, which is modeled after the state's SMARA guidelines (see above). The County's SMARA ordinance is designed to protect mineral resources from incompatible land uses, to manage the mineral resources, to assure the County of an adequate supply of these resources with due consideration for the environment, and to provide for the restoration of mined lands for future use. A Conditional Use Permit is required for surface-mining operations in Sacramento County.

City of Rancho Cordova/Sacramento County Grading Ordinance

The Sacramento County Land Grading and Erosion Control Ordinance (County Code, Title 16, Chapter 16.44), adopted by the City of Rancho Cordova in 2003, was enacted for the purpose of minimizing damage to surrounding properties and public rights-of-way; limiting degradation of the water quality of watercourses; and curbing the disruption of drainage system flow caused by the activities of clearing, grubbing, grading, filing, and excavating land. The ordinance includes administrative procedures, minimum standards of review, and implementation and enforcement procedures for the control of erosion and sedimentation that are directly related to land-grading activities.

3.7.3 ENVIRONMENTAL CONSEQUENCES AND MITIGATION MEASURES

THRESHOLDS OF SIGNIFICANCE

Geology, Soils, and Minerals

The thresholds for determining the significance of impacts for this analysis are based on the environmental checklist in Appendix G of the State CEQA Guidelines, as amended. These thresholds also encompass the factors taken into account under NEPA to determine the significance of an action in terms of its context and the intensity of its impacts. The Proposed Project or alternatives under consideration were determined to result in a significant impact related to geology, soils, or mineral resources if they would do any of the following:

- expose people, property, or structures to potential substantial adverse impacts, 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 or based on other substantial evidence of a known fault;
  - strong seismic ground shaking;
  - seismic-related ground failure, including liquefaction; or
  - 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 18-1-B of the UBC (1994), creating substantial risks to life or property;

- have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water;

- 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 a locally important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan; or

- result in inundation by seiche, tsunami, or mudflow.

Paleontological Resources

Based on the environmental checklist in Appendix G of the State CEQA Guidelines, as amended. a project would have a significant impact on paleontological resources if it would directly or indirectly destroy a unique paleontological resource or site. For the purposes of this EIR/EIS, this threshold also encompasses the factors taken into account under NEPA to determine the significance of an action in terms of its context and the intensity of its impacts and applies to the Proposed Project and alternatives under consideration. A "unique paleontological resource or site" is one that is considered significant under the professional paleontological standards described below.

An individual vertebrate fossil specimen may be considered unique or significant if it is identifiable and well preserved, and it meets one of the following criteria:

- a type specimen (i.e., the individual from which a species or subspecies has been described);

- a member of a rare species;

- a species that is part of a diverse assemblage (i.e., a site where more than one fossil has been discovered) wherein other species are also identifiable, and important information regarding life history of individuals can be drawn;

- a skeletal element different from, or a specimen more complete than, those now available for its species; or

- a complete specimen (i.e., all or substantially all of the entire skeleton is present).

The value or importance of different fossil groups varies depending on the age and depositional environment of the rock unit that contains the fossils, their rarity, the extent to which they have already been identified and documented, and the ability to recover similar materials under more controlled conditions (such as for a research project). Marine invertebrates are generally common; the fossil record is well developed and well documented, and they would generally not be considered a unique paleontological resource. Identifiable vertebrate marine and terrestrial fossils are generally considered scientifically important because they are relatively rare.

Analysis Methodology

The analysis prepared for this EIR/EIS relied on published geologic literature and maps, and NRCS soil survey data ("Web Soil Survey"). The information obtained from these sources was reviewed and summarized to present the existing conditions and to identify potential environmental impacts, based on the thresholds of significance presented in this section. Impacts associated with geology, soils, and mineral resources that could result from project construction and operational activities were evaluated qualitatively based on site conditions; expected construction practices; materials, locations, and duration of project construction and related activities; and a field visit. A conceptual grading exhibit for the SPA (MacKay & Somps 2010) was also used to evaluate potential impacts.

In its standard guidelines for assessment and mitigation of adverse impacts on paleontological resources, the Society of Vertebrate Paleontology (1995) established three categories of sensitivity for paleontological resources: high, low, and undetermined. Areas where fossils have been previously found are considered to have a high sensitivity and a high potential to produce fossils. Areas that are not sedimentary in origin and that have not been known to produce fossils in the past typically are considered to have low sensitivity. Areas that have not had any previous paleontological resource surveys or fossil finds are considered to be of undetermined sensitivity until surveys and mapping are performed to determine their sensitivity. After reconnaissance surveys, observation of exposed cuts, and possibly subsurface testing, a qualified paleontologist can determine whether the area should be categorized as having high or low sensitivity. In keeping with the significance criteria of the Society of Vertebrate Paleontology (1995), all vertebrate fossils are generally categorized as being of potentially significant scientific value.

ISSUES NOT DISCUSSED FURTHER IN THIS EIR/EIS

Risks to People or Structures Caused by Surface Fault Rupture—The SPA is located approximately 50 miles from the nearest Alquist-Priolo Earthquake Fault Zone, and the SPA is not underlain by or adjacent to any known faults. Because the damage from surface fault rupture is generally limited to a linear zone a few yards wide, the potential for surface fault rupture to cause damage to proposed structures is negligible and this impact is not evaluated further in this EIR/EIS.

Soil Suitability for Use with Septic Systems—Sewer service at the SPA would be provided via connection with regional facilities and treatment by Sacramento Regional County Sanitation District. Since project soils would not be used for septic systems or alternative means of waste disposal, there would be no impact, and this issue is not evaluated further in this EIR/EIS.

Inundation by Seiche, Tsunami, or Mudflow—Because of the long distance of the SPA from the Pacific Ocean and the Delta, and the lack of enclosed water bodies at the SPA, seiches would not represent a hazard at the SPA. Because the SPA is located on level terrain, mudflows would also not represent a hazard. Therefore, this issue is not evaluated further in this EIR/EIS.

Damage or Destruction of Unique Paleontological Resources—The SPA is underlain by the Laguna Formation, which, as described above, is not a paleontonlogically sensitive rock formation. Therefore, there would be no impact related to damage or destruction of unique paleontological resources, and this issue is not evaluated further in this EIR/EIS.

IMPACT ANALYSIS

Impacts that would occur under each alternative development scenario are identified as follows: NP (No Project), NCP (No USACE permit), PP (Proposed Project), BIM (Biological Impact Minimization), CS (Conceptual Strategy), and ID (Increased Development). The impacts for each alternative are compared relative to the PP at the end of each impact conclusion (i.e., similar, greater, lesser).

IMPACT 3.7-1 **Possible Risks to People and Structures Caused by Strong Seismic Ground Shaking.** *The SPA is located in an area of generally low seismic activity; however, infrastructure on the SPA could be subject to seismic ground shaking from an earthquake along active faults in Lake Tahoe.*

NP

Because no project-related development would occur, there would be no project-related risks to new people or structures from strong seismic ground shaking. Therefore, **no direct** or **indirect** impacts would occur. ***[Lesser]***

NCP, PP, BIM, CS, ID

The SPA is not located within a known fault zone, or within any faults known to be active during Holocene time. The West Branch of the Bear Mountains Fault is located approximately 6 miles east of the eastern property boundary (Jennings 1994); however, Jennings (1994) does not indicate that fault activity has occurred within the last 11,000 years, and the slip rate of the Foothills fault system is extremely low (0.05 millimeters per year), which is well below the planning threshold for major earthquakes (USGS 2000). As shown in Table 3.7-1, the Dunnigan Hills fault in Woodland, approximately 40 miles west of the SPA, is the nearest fault that is known to have been active within the last 11,000 years (Holocene time). Other faults that have been zoned as "active" by the CGS are located in the Coast Range (approximately 60 miles west of the SPA) or in the vicinity of Lake Tahoe (approximately 60 miles east of the SPA). Because infrastructure at the SPA could be subject to seismic ground shaking and because geotechnical reports have not been prepared for the entire SPA, the potential for damage from strong seismic ground shaking is considered a **direct, potentially significant** impact. **No indirect** impacts would occur. ***[Similar]***

Mitigation Measure 3.7-1a: Prepare Site-Specific Geotechnical Report per CBC Requirements and Implement Appropriate Recommendations.

Before building permits are issued and construction activities begin any project development phase, the project applicants for any particular discretionary development application shall hire a licensed geotechnical engineer to prepare a final geotechnical subsurface investigation report, which shall be submitted for review and approval to the City of Rancho Cordova Planning Department. The final geotechnical engineering report shall address and make recommendations on the following:

- site preparation;
- soil bearing capacity;
- appropriate sources and types of fill;
- potential need for soil amendments;
- road, pavement, and parking areas;
- structural foundations, including retaining-wall design;
- grading practices;
- soil corrosion of concrete and steel;
- erosion/winterization;
- seismic ground shaking;
- liquefaction; and
- expansive/unstable soils.

In addition to the recommendations for the conditions listed above, the geotechnical investigation shall include subsurface testing of soil and groundwater conditions, and shall determine appropriate foundation designs that are consistent with the version of the CBC that is applicable at the time building and grading permits are applied for. All recommendations contained in the final geotechnical engineering report shall be implemented by the project applicants of each project phase. Special recommendations contained in the geotechnical engineering report shall be noted on the grading plans and implemented as appropriate before construction begins. Design and construction of all new project development shall be in accordance with the CBC. The project applicants shall provide for engineering inspection and certification that earthwork has been performed in conformity with recommendations contained in the geotechnical report.

Mitigation Measure 3.7-1b: Monitor Earthwork during Earthmoving Activities.

All earthwork shall be monitored by a qualified geotechnical or soils engineer retained by the project applicants for any particular discretionary development application. The geotechnical or soils engineer shall provide oversight during all excavation, placement of fill, and disposal of materials removed from and deposited on both on- and off-site construction areas.

Implementation: Project applicants for any particular discretionary development application.

Timing: Before issuance of building permits and ground-disturbing activities.

Enforcement: City of Rancho Cordova Planning Department

Implementation of Mitigation Measures 3.7-1a and 3.7-1b would reduce the potentially significant impact of possible damage to people and structures from strong seismic ground shaking under the No USACE Permit, Proposed Project, Biological Impact Minimization, Conceptual Strategy, and Increased Development Alternatives to a **less-than-significant** level by requiring that the design recommendations of a geotechnical engineer to reduce damage from seismic events be incorporated into buildings, structures, and infrastructure as required by the CBC, and that a geotechnical or soils engineer provide on-site monitoring to ensure that earthwork is being performed as specified in the plans.

IMPACT 3.7-2 **Possible Seismically-Induced Risks to People and Structures Caused by Liquefaction.** *Construction activities would not occur in areas subject to liquefaction; therefore, people and structures would not be at risk from liquefaction.*

NP, NCP, PP, BIM, CS, ID

Based on a review of published geological maps and literature it is unlikely that soils on the SPA would be subject to liquefaction in the event of an earthquake, for the following reasons:

- the SPA is underlain by relatively stable Pleistocene-age alluvial deposits;
- the SPA is underlain by a moderately deep groundwater table that is at least 100 feet below the ground surface; and
- the potential sources of seismic activity are a relatively long distance away (approximately 60 miles).

Therefore, **direct** impacts related to potential damage to structures and possible risks to people from seismically-induced liquefaction under the No Project, No USACE Permit, Proposed Project, Biological Impact Minimization, Conceptual Strategy, and Increased Development Alternatives are considered **less than significant**. **No indirect** impacts would occur. ***[Similar]***

Mitigation Measure: No mitigation measures are required.

IMPACT 3.7-3 **Temporary and Short-term Construction-Related Erosion.** *Construction activities during project implementation would involve grading and movement of earth in soils subject to temporary and short-term wind and water erosion hazard.*

NP

Under the No Project Alternative, no project-related construction activities would occur. Therefore, there would be **no direct** or **indirect** project-related impacts associated with construction-related erosion**.** ***[Lesser]***

NCP, PP, BIM, CS, ID

Project implementation would involve intensive grading and construction activities for infrastructure and building and road foundations over 800 - 1,000 acres of land. Construction activities would occur in soils that have moderate to high wind and water erosion hazard potential. Conducting these activities would result in the temporary and short-term disturbance of soil and would expose disturbed areas to winter storm events. Rain of sufficient intensity could dislodge soil particles from the soil surface. If the storm is large enough to generate runoff, localized erosion could occur. In addition, soil disturbance during the summer as a result of construction activities could result in soil loss because of wind erosion. Therefore, temporary and short-term **direct** impacts associated with construction-related erosion are **potentially significant.** Temporary and short-term **indirect** impacts from soil erosion, such as sediment transport and potential loss of aquatic habitat, are evaluated in Section 3.9, "Hydrology and Water Quality," and Section 3.3, "Biological Resources," respectively. ***[Similar]***

Mitigation Measure 3.7-3: Prepare and Implement a Grading and Erosion Control Plan.

Before grading permits are issued, the project applicants for any particular discretionary development application shall retain a California Registered Civil Engineer to prepare a grading and erosion control plan. The grading and erosion control plan shall be submitted to the City Planning Department before issuance of grading permits for all new development. The plan shall be consistent with the City's Grading Ordinance and the state's NPDES permit, and shall include the site-specific grading associated with development for each project phases.

The plans referenced above shall include the location, implementation schedule, and maintenance schedule of all erosion and sediment control measures, a description of measures designed to control dust and stabilize the construction-site road and entrance, and a description of the location and methods of storage and disposal of construction materials. Erosion and sediment control measures could include the use of detention basins, berms, swales, wattles, and silt fencing, and covering or watering of stockpiled soils to reduce wind erosion. Soil stabilization measures could include construction of retaining walls and reseeding with vegetation after construction. Stabilization of construction entrances to minimize trackout (control dust) is commonly achieved by installing filter fabric and crushed rock to a depth of approximately 1 foot. The project applicants shall ensure that the construction contractor is responsible for securing a source of transportation and deposition of excavated materials.

Implementation of Mitigation Measure 3.9-1 (discussed in Section 3.9, "Hydrology and Water Quality") would also help reduce temporary and short-term erosion-related impacts by requiring preparation and implementation of a Storm Water Pollution Prevention Plan with appropriate Best Management Practices.

Implementation: Project applicants for any particular discretionary development application.

Timing: Before the start of construction activities.

Enforcement: City of Rancho Cordova Planning Department

Implementation of Mitigation Measure 3.7-3 along with Mitigation Measure 3.9-1 (discussed in Section 3.9, “Hydrology and Water Quality”), would reduce potentially significant temporary and short-term construction-related erosion impacts under the No USACE Permit, Proposed Project, Biological Impact Minimization, Conceptual Strategy, and Increased Development Alternatives to a **less-than-significant** level because grading and erosion control plans with specific erosion and sediment control measures such as those suggested above or listed in Mitigation Measure 3.9-1 would be prepared, approved by the City, and implemented.

IMPACT 3.7-4 **Potential Geologic Hazards Related to Construction in Unstable Soils.** *Project elements could be constructed in areas of the SPA that contain unstable soils.*

NP

Under the No Project Alternative, no project-related development would occur. Therefore, there would be **no direct** or **indirect** project-related impacts from construction in unstable soils. ***[Lesser]***

NCP, PP, BIM, CS, ID

The SPA is relatively flat, and therefore hazards related to landslides are not expected. However, without a geotechnical report, it is not possible to determine whether or not pockets of unstable soils, commonly located along streambanks or in areas composed of uncompacted fill dirt, are present at the SPA. Therefore, potential geologic hazards from construction in unstable soils is considered a **direct, potentially significant** impact. **No indirect** impacts would occur. ***[Similar]***

Mitigation Measure: Implement Mitigation Measures 3.7-1a and 3.7-1b.

Implementation of Mitigation Measures 3.7-1a and 3.7-1b would reduce potential geologic hazards from construction in unstable soils under the No USACE Permit, Proposed Project, Biological Impact Minimization, Conceptual Strategy, and Increased Development Alternatives to a **less-than-significant** level because a geotechnical engineer report would be prepared that identifies areas of unstable soils (if any are present) and incorporates requirements to remediate unstable soils, and all earthwork would be monitored by a soils or geotechnical engineer to ensure compliance with project plans and specifications.

IMPACT 3.7-5 **Potential Damage to Structures and Infrastructure from Construction in Expansive Soils.** *Portions of the SPA are underlain by soils that have a moderate to high potential for expansion when wet and may result damage to structures.*

NP

Under the No Project Alternative, no project-related development would occur. Therefore, there would be **no direct** or **indirect** project-related impacts from construction in expansive soils. ***[Lesser]***

NCP, PP, BIM, CS, ID

Expansive soils shrink and swell as a result of moisture change. These volume changes can result in damage over time to building foundations, underground utilities, and other subsurface facilities and infrastructure if they are not designed and constructed appropriately to resist the damage associated with changing soil conditions. Volume changes of expansive soils also can result in the consolidation of soft clays following the lowering of the water table or the placement of fill. Placing buildings or constructing infrastructure on or in unstable soils can result in structural failure. Based on a review of NRCS soil survey data as shown in Table 3.7-2, portions of the SPA consist of soils with a moderate to high shrink-swell potential, indicating the soils are expansive. Soil expansion, including volume changes during seasonal fluctuations in moisture content, could adversely affect road surfaces, interior slabs-on-grade, landscaping hardscapes, and underground pipelines. Therefore, this **direct** impact is considered **potentially significant**. **No indirect** impacts would occur. ***[Similar]***

Mitigation Measure: Implement Mitigation Measures 3.7-1a and 3.7-1b.

Implementation of Mitigation Measures 3.7-1a and 3.7-1b would reduce the potentially significant impact of damage to people and structures from construction in expansive soils under the No USACE Permit, Proposed Project, Biological Impact Minimization, Conceptual Strategy, and Increased Development Alternatives to a **less-than-significant** level by requiring that the design recommendations of a geotechnical engineer to reduce damage from expansive soils be incorporated into buildings, structures, and infrastructure as required by the CBC, and that a geotechnical or soils engineer provide on-site monitoring to ensure that earthwork is being performed as specified in the plans.

IMPACT 3.7-6	**Potential Geologic Hazard from Construction in Corrosive Soils.** *Most of the soils within which the project components would be constructed are moderately to highly corrosive of concrete and steel, which could subject project facilities to a shorter useful lifespan.*

NP

Under the No Project Alternative, no project-related development would occur. Therefore, there would be **no direct** or **indirect** project-related impacts from construction in corrosive soils. ***[Lesser]***

NCP, PP, BIM, CS, ID

Soil corrosivity is an electrochemical process that results in corrosion of concrete and/or steel in contact with soil. Excessive corrosion can shorten the usable lifespan of the concrete or steel materials used in construction. As shown in Table 3.7-2, NRCS soil survey data indicates that most of the soil types within which project components would be constructed have a moderate to high corrosion potential of both concrete and steel. Excessive corrosion could shorten the useful lifespan of project facilities. Therefore, this **direct** impact is considered **potentially significant**. **No indirect** impacts would occur. ***[Similar]***

Mitigation Measure: Implement Mitigation Measure 3.7-1a.

Implementation of Mitigation Measure 3.7-1a would reduce the potentially significant impact of damage to infrastructure from construction in corrosive soils under the No USACE Permit, Proposed Project, Biological Impact Minimization, Conceptual Strategy, and Increased Development Alternatives to a **less-than-significant** level by requiring that a licensed geotechnical engineer perform a site-specific corrosivity evaluation, and requiring that the design recommendations of a geotechnical engineer to reduce damage from corrosive soils be incorporated into project-related infrastructure. Examples of the types of recommendations that could be made include, but are not limited to, the use of materials that are less subject to corrosion (for example, PVC pipe instead of steel).

IMPACT 3.7-7	**Potential Loss of Mineral Resources**. *The SPA is located within the Sacramento-Fairfield Production-Consumption Region designated by CDMG, but does not contain known deposits of mineral resources.*

NP, NCP, PP, BIM, CS, ID

The SPA is located within the Sacramento-Fairfield Production-Consumption Region, a mineral resources area designated by CDMG as containing “regionally significant” mineral deposits that may be needed to meet future demand. However, according to the City of Rancho Cordova General Plan (2006) and the Sacramento County General Plan Update (2009), the SPA is not listed as a locally-important mineral resource recovery site. Furthermore, the SPA is classified by CDMG as MRZ-3 (areas where significance cannot be determined) and MRZ-4 (areas where no data is available to determine significance) for construction aggregate, placer gold, copper, zinc, and industrial minerals (i.e., carbonate rock, clay, sand, lignite, talc, asbestos). The SPA is zoned MRZ-1 (no known deposits) for chromite.

Because the SPA does not contain any known deposits of regionally-important mineral resources, and is not designated as a local mineral resource recovery site, this **direct** impact would be **less than significant. No indirect** impacts would occur. ***[Similar]***

Mitigation Measure: No mitigation measures are required.

3.7.4 RESIDUAL SIGNIFICANT IMPACTS

Impacts related to liquefaction and loss of mineral resources are less than significant. With implementation of Mitigation Measures 3.7-1a, 3.7-1b, and 3.7-3, impacts related to strong seismic ground shaking, construction-related erosion, construction in unstable soils, construction in expansive soils, and construction in corrosive soils, would be reduced to less-than-significant levels. Therefore, no residually significant impacts would occur.

3.7.5 CUMULATIVE IMPACTS

Geology and Soils

The project and all of the related projects are located within the eastern portion of the Sacramento Valley. The geologic formations and soil types vary depending on project location, and therefore are site-specific. The SPA is not underlain by or adjacent to any known faults; however, infrastructure on the SPA could be subject to seismic ground shaking from an earthquake along active faults in Lake Tahoe. In addition, the SPA is underlain by expansive and corrosive soils, is subject to seasonal subsurface water flows from surface infiltration that could adversely affect development (i.e., unstable soils), and could result in erosion. Implementation of Mitigation Measures 3.7-1a, 3.7-1b, and 3.7-3 would reduce these impacts to less-than-significant levels through completion of site-specific geotechnical studies and implementation of construction and design measures developed in response to the studies, in addition to compliance with the CBC.

Implementation of the related projects could expose structures and people to seismic and soils hazards similar to those described above. However, each project considered in this cumulative analysis must individually meet building code requirements as well as the requirements of local policies (i.e., grading and erosion control plans), and therefore no additive effect would result and no cumulatively considerable impact related to seismic or soil hazards would occur. Thus, implementation of the project, when considered with the related projects, would not create additional facilities under increased risk of geologic hazards and would not result in a cumulatively considerable incremental contribution to a significant cumulative impact related to geology and soils.

Mineral Resources

The project and the related projects are located within the eastern side Sacramento Valley, south of U.S. 50. According to the CDMG, various locations within this geographic area contain known mineral resources. The western edge of the Arboretum project (south of the SPA), and the Rio del Oro project (north of the SPA) are zoned MRZ-2—areas where known aggregate mineral deposits are located. The SunCreek SPA, however, is zoned MRZ-3 for aggregate minerals, and is not designated as a locally-important mineral resource recovery site.

Implementation of the various related projects and other projects in the region could result in cumulative loss of aggregate mineral resources, unless the site-specific projects that contain known mineral resources agree to mine such resources prior to project development. However, because the SPA does not contain sources of known mineral resources, implementation of the project would not result in a cumulatively considerable incremental contribution to a significant cumulative impact related to loss of mineral resources.

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