3.7 GEOLOGY, SOILS, AND MINERAL RESOURCES

3.7.1 AFFECTED ENVIRONMENT

PHYSIOGRAPHIC SETTING

The project site is located in the Sacramento Valley, approximately 3 miles south of the American River, and lies centrally within the Great Valley geomorphic province of California. The Sacramento Valley forms the northern third of the Great Valley, which includes approximately 33,000 square miles and fills a northwest-trending structural depression bounded on the west by the Great Valley Fault Zone and the Coast Ranges, and on the east by the Sierra Nevada and the Foothills Fault zone. Relatively few faults in the Great Valley have been active during the last 10,000 years. Most of the surface of the Great Valley is covered with Holocene and Pleistocene-age alluvium, composed primarily of sediments from the Sierra Nevada and the Coast Range that were carried by water and deposited on the valley floor. Siltstone, claystone, and sandstone are the primary types of sedimentary deposits. Older Tertiary deposits underlie the Quaternary alluvium. (Hackel 1966, Page 1974, Cherven and Graham 1983.)

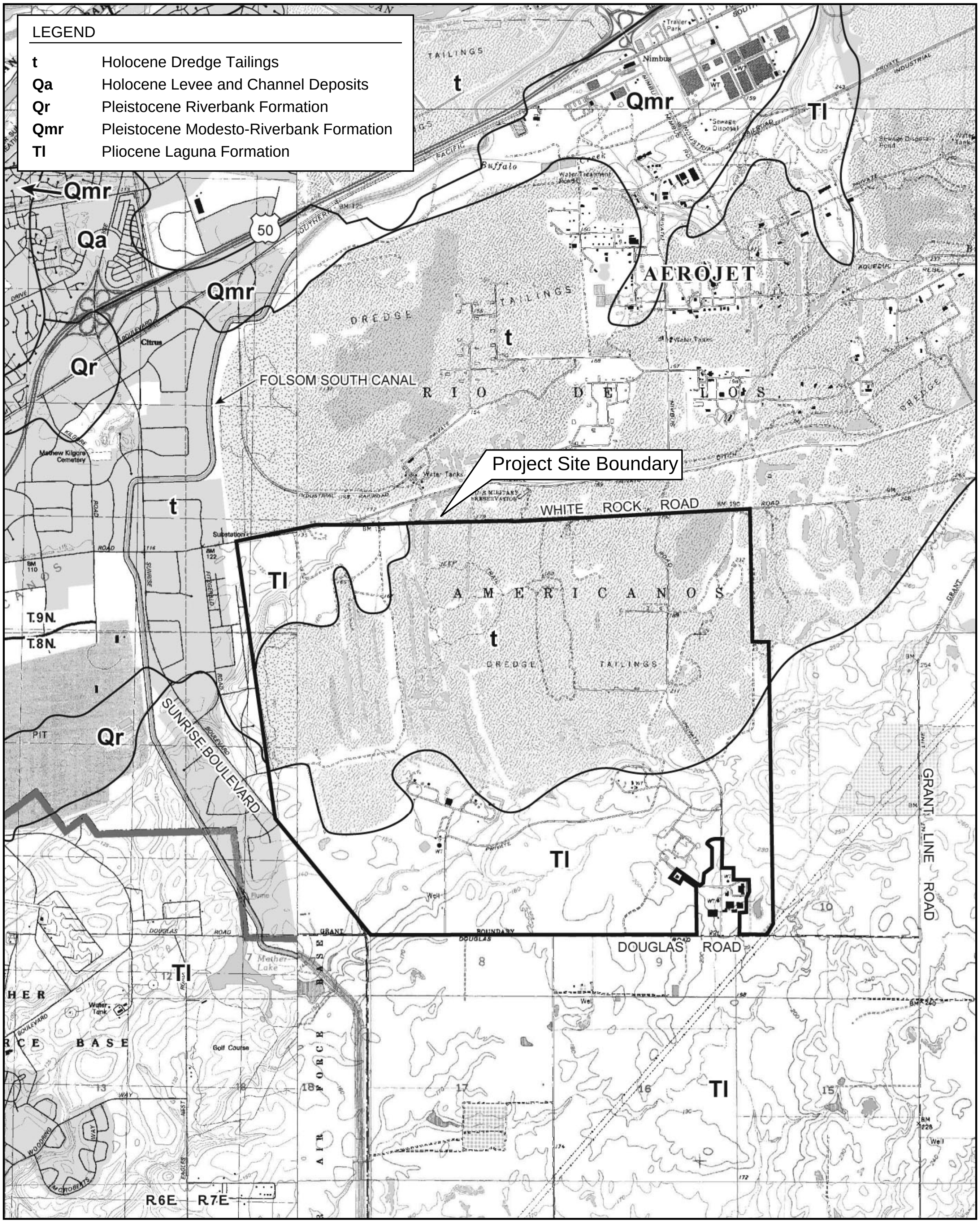
The project site is located in the U.S. Geological Survey (USGS) Buffalo Creek 7.5-Minute Quadrangle and is approximately 3,800 acres in size. The topography is relatively flat over approximately 30% of the site; the remaining portion is covered with piles of dredge tailings up to 20 feet high, giving the site a gently rolling appearance. Elevation at the project site ranges from 150 to 200 feet above mean sea level.

LOCAL GEOLOGY

Because the Sierra Nevada continues to be uplifted relative to the basin floor, rivers are continually cutting channels downward, thus leaving older rocks exposed at the surface, particularly in the eastern portions of the valley. Ancient stream terraces, which represent time periods of progressive downcutting of rivers (the American River in the project vicinity), are preserved at the project site and in the surrounding study area. Among the stream terrace debris were gold-bearing (auriferous) rocks carried by glacial meltwaters from high in the Sierra Nevada where they merged with the American River.

The southern and eastern portions of the project site are underlain by the Laguna Formation, which is of Pliocene age (approximately 5 million years Before Present [B.P.]) (Wagner et al. 1987, ERM 2003). These areas are delineated as “Tl” in Exhibit 3.7-1. 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. (Bartow and Helley 1979.)

The northern, central, and western portions of the project site are covered by dredge tailings derived from mining activities conducted during the last 100 years. Dredging operations conducted in this area resulted in piles of cobbles and silt that have been piled up to 20 feet above the original ground surface, and extend 80–120 feet below the ground surface. Those portions of the project site that are adjacent to Morrison Creek (trending northeast to southwest across the project site) are composed of undifferentiated Holocene-age surficial deposits (Bartow and Helley 1979). These deposits include sand, silt, and clay that have been deposited by Morrison Creek. The Laguna Formation underlies these deposits, followed by igneous basement rocks at depth.



Source: USGS Citrus Heights/Carmichael Quads 1992, USGS Folsom/Buffalo Creek Quads 1980, ERM 2003, Wagner et. al. 1987

Geologic Formations

EXHIBIT 3.7-1

Rio del Oro Specific Plan Project DEIR/DEIS
City of Rancho Cordova and USACE
P 3T089.01 06/05

0 2000 4000 FEET

NORTH

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REGIONAL SEISMICITY AND FAULT ZONES

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 10,000 years. Faults closest to the project site with known or estimated activity during the Holocene are generally located in the San Francisco Bay Area (Bay Area) at least 45 miles to the west and lie within the Coast Range geomorphic province, as shown in Table 3.7-1.

Table 3.7-1
Faults Active in Holocene Time in the Vicinity of the Project Site

Fault	Distance from Project Site (miles)	Location
Dunnigan Hills	35	Sacramento Valley, Woodland
Great Valley Thrust Zone	45	Coast Range, western San Joaquin Valley
Green Valley	50	Coast Range, Bay Area
Concord	55	Coast Range, Bay Area
Clayton	55	Coast Range, Bay Area
Marsh Creek	60	Coast Range, Bay Area
Greenville	65	Coast Range, Bay Area

Sources: Harwood and Helley 1987, Jennings 1994

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.

Surface Faulting

Surface ground rupture along faults is generally limited to a linear zone a few meters wide. Because no active faults have been mapped across the project site by the California Geological Survey or USGS, nor is the project site located within an Alquist-Priolo Earthquake Fault Zone, fault ground rupture does not represent a hazard at the project site (California Geological Survey 1999, Hart and Bryant 1999).

Seismic Ground Shaking

The most important geologic hazard that could affect the project is the risk to life and property from an earthquake generated by active and potentially active faults in the Bay Area and along the western margin of the San Joaquin Valley.

Seismic ground shaking is the most likely seismic hazard to affect the project site. According to the California Building Standards Code (CBC), 1998 edition, the site is located in Seismic Zone 3. This location implies a minimum horizontal acceleration of 0.3g (where "g" is the acceleration of gravity) for use in earthquake resistant design.

Ground motion can be estimated by probabilistic method at specified hazard levels. 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 characteristic of the source. The *Probabilistic Seismic Hazard Assessment for the State of California* (Petersen et al. 1996), published by USGS and the California Division of Mines and Geology (CDMG), identifies the seismic hazard based on a review of these characteristics and historical seismicity throughout California. The results of these studies suggest that there is a 10% probability that the peak horizontal acceleration experienced at the site would exceed 0.2g in 50 years. Damage to a single-family dwelling typically begins at 0.2g (Risk Prediction Initiative 1996, Rogers et al. 1996).

The CBC specifies more stringent design guidelines where a project would be located adjacent to a Class "A" or "B" fault as designed by the California Probabilistic Seismic Hazard Maps. 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. A review of the available geologic data indicates that there are no Class A or B faults within the vicinity of the project site.

Ground Failure/Liquefaction

Liquefaction is a process by which water-saturated materials (including soil, sediment, and certain types of volcanic deposits) lose strength and may fail during strong ground shaking. Liquefaction is the transformation of a granular material from a solid state into a liquefied state as a consequence of increased pore-water pressure. This behavior is most commonly induced by strong ground shaking associated with earthquakes. In some cases, a complete loss of strength occurs and catastrophic ground failure may result. However, liquefaction may happen where only limited strains develop, and ground surface deformations are much less serious.

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 are susceptible to liquefaction, while clayey silts, silty clays, and clays deposited in freshwater environments are generally stable under the influence of seismic ground shaking.

Groundwater maps prepared by the Sacramento County Public Works Agency (fall 2002) indicate a groundwater elevation at the project site of approximately 40–50 feet relative to mean sea level (Sacramento County Public Works Agency 2002). Because elevation at the project site ranges from 150 to 200 feet above mean sea level, this would place the groundwater level at approximately 110–150 feet beneath the surface.

Because the project site has a relatively deep groundwater table, soils at the project site are relatively stable, and potential sources of seismic activity are a relatively long distance away, sediments underlying the project site can be expected to have a low liquefaction potential.

There are four types of ground failure or collapse of soil structures that commonly result from liquefaction: lateral spread, flow failure, ground oscillation, and loss of bearing strength. However, because the liquefaction potential is considered low, additional details on these types of ground failure are not discussed further in this DEIR/DEIS.

Subsidence and Settlement

Land surface subsidence can be induced by both natural phenomena and human activity. Natural phenomena include subsidence resulting from tectonic deformations and seismically induced settlements; soil subsidence because of consolidation, hydrocompaction, or rapid sedimentation; subsidence because of oxidation or dewatering of organically rich soils; and subsidence related to subsurface cavities. Subsidence related to human activity includes subsurface fluid or sediment withdrawal. Pumping of water for residential, commercial, and agricultural uses from subsurface water tables causes the greatest amount of subsidence in Sacramento County. According to the *County of Sacramento General Plan* (County General Plan) (County of Sacramento 1993) and the *Rancho Cordova General Plan* (City General Plan), the project site is located within a potential groundwater-basin subsidence area.

Seismic Seiches

Earthquakes may affect open bodies of water by creating seismic sea waves and seiches. Seismic sea waves (often called “tidal waves”) are caused by abrupt ground movements (usually vertical) on the ocean floor in connection with a major earthquake. Because of the distance of the project site from the ocean, seismic sea waves would not be a factor at the project site. A seiche is a sloshing of water in an enclosed or restricted water body such as a basin, river, or lake. It 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 Bay Area is known to have generated a seiche along the Sacramento River, the affected area was located in the Sacramento–San Joaquin Delta, where levees are subject to overtopping and subsequent failure. Seiches are not likely to occur in the vicinity of the project site.

RECREATIONAL GEOLOGIC FEATURES

Recreational geologic resources typically include rock or mineral collections, volcanoes, surface hydrothermal features, or surface expression of geologic features unique enough to generate public recreational interest (e.g., natural bridges, caves, features associated with glaciation, and geomorphic features such as waterfalls, cliffs, canyons, and badlands). Because the piles of dredge tailings on the project site have been thoroughly investigated for the presence of gold, they are not likely to be of interest to recreational collectors. Furthermore, the dredge tailings are expected to be removed under separate mining permits before Rio del Oro construction. Based on a field visit and review of the geological literature and topographic maps, there are no other known recreational geologic resources associated with the project site.

SOIL RESOURCES

The project site lies on the eastern side of the Sacramento Valley, approximately 5 miles from the metamorphic and igneous rocks that form the beginning of the Sierra Nevada foothills. Surface soils on the project site and in the surrounding area consist, in general, of two geomorphic surfaces: low-lying, late Pleistocene–age terraces that are often referred to as alluvial plain or old alluvial fan; and intermediate terraces of mid-Pleistocene age (NRCS 1993).

The low terraces consist of three levels: a main level at the surface, a lower level in beveled areas descending toward a drainageway, and a high level (Natomas soils) associated with an older, major channel deposit of the American River that is located near the surface in Rancho Cordova. Parent material of soils on the low terraces is primarily fine grained, fluvial and glacial alluvium derived from mixed rock sources, including granite in most areas (NRCS 1993). Zones of sedimentary and metamorphic rocks are mixed with the granitic rocks. The presence of Natomas soil, in the northwest corner of the project site (development Phase 1), is noteworthy because of its red subsurface layer, which is caused by a high iron content from the parent material—dark, metamorphosed igneous rocks.

Portions of the project site also form part of an intermediate terrace remnant associated with channel deposits; however, most of the soils of this terrace were removed by gold-dredging activities. Soils in this terrace are dominated by the well-drained Red Bluff series, whose parent material consists of gravelly alluvium derived from fluvial and glacial sources laid down by an ancestral channel of the American River (NRCS 1993). Red Bluff soils consist of rounded pebbles and cobbles derived from dark metamorphic, quartzitic, and andesitic rocks in a granitic sand matrix.

Soils on the project site are part of the Pliocene-age Laguna Formation. Certain soil types, particularly the Redding series, that are part of this formation tend to capture and hold water during winter and spring rains because of the presence of claypans and hardpans, which are generally impervious to water penetration. Where depressions occur on these soils, rainwater tends to pond, forming vernal pools.

Beginning in the 1920s, most of the land in the project study area was acquired by the Natomas Company for bucket-line dredging of gold-bearing gravel deposits. This dredging continued in the project vicinity through the early 1960s. Piles of dredge tailings (soil type 245) mixed with slickens (soil type 223) cover approximately 70% of the surface area of the project site.

According to the Natural Resources Conservation Service (NRCS) (1993) and CDMG (Wagner et al. 1987, Churchill and Hill 2000), the project site does not contain any soil types or rock formations that would be a source of naturally occurring asbestos.

Identification of soil types and their distribution was accomplished primarily through a review of maps provided by the U.S. Soil Conservation Service (now called NRCS). The soil map units associated with the project site are listed in Table 3.7-2. Exhibit 3.7-2 provides a detailed map of the surficial soils on the project site. Table 3.7-3 provides a detailed summary of the physical and chemical characteristics of each soil type identified from the project site. A discussion of soil characteristics follows Table 3.7-3.

Table 3.7-2
Soil Mapping Unit Identified by Project Development Phase

Project Development Phase	Soil Mapping Unit
Phase 1	159—Hicksville gravelly loam, 0–2% slopes
	181—Natomas loam, 0–2% slopes
	191—Red Bluff loam, 0–2% slopes
	192—Red Bluff loam, 2–5% slopes
	193—Red Bluff-Redding gravelly loam, 0–5% slopes
	223—slickens
	245—Xerorthents, dredge tailings
Phase 2	196—Red Bluff-Xerorthents
	245—Xerorthents, dredge tailings
Phase 3	191—Red Bluff loam, 0–2% slopes
	192—Red Bluff loam, 2–5% slopes
	198—Redding gravelly loam, 0–7% slopes
	245—Xerorthents, dredge tailings
Phase 4	192—Red Bluff loam, 2–5% slopes
	223—slickens
	245—Xerorthents, dredge tailings
Phase 5	145—Fiddyment fine sandy loam, 0–8% slopes
	159—Hicksville gravelly loam, 0–2% slopes
	192—Red Bluff loam, 2–5% slopes
	193—Red Bluff-Redding gravelly loam, 0–5% slopes
	198—Redding gravelly loam, 0–7% slopes
	245—Xerorthents, dredge tailings

Source: NRCS 1993

Source: U.S. Department of Agriculture, Soil Conservation Service, Carmichael and Buffalo Creek Quadrangles

Project Site Soil Types

EXHIBIT 3.7-2

0 1000 2000 FEET

NORTH

EDAW

Table 3.7-3
Soil Mapping Unit Descriptions

Map[1]	Soil Series Name	Depth (inches)	USDA texture	Shrink-Swell Potential	Perme-ability (in/hr)	Drainage	Erosion Hazard	Erosion Factors[2] K	Erosion Factors[2] T	Land Capability[3]	pH	Plasticity Index[4]
145	Fiddyment	0–8	Fine sandy loam	Low	0.6–2.0	Well drained	Moderate for excavation; high on steep slopes with cut and fill	0.37	2	IVe Nonirrigated Irrigated	5.6–7.3	NP–10
		8–15	Loam	Low	0.6–2.0			0.43			5.6–7.3	5–10
		15–28	Sandy clay loam, clay loam	Moderate	<0.06			0.32			6.1–7.8	15–25
		28–40	Indurated	—	—			—			—	—
		40	Weathered bedrock	—	—			—			—	—
159	Hicksville	0–13	Gravelly loam	Low	0.6–2.0	Moderately well drained	Slight	0.17	5	IIw-Irrigated IIIw Nonirrigated	5.6–6.5	5–10
		13–43	Gravelly clay loam, gravelly sandy clay loam	Moderate	0.2–0.6			0.15			6.1–7.8	10–20
		43–65	Stratified very gravelly loamy sand to clay loam	Low	0.2–0.6			0.10			6.6–7.8	NP–10
181	Natomas	0–17	Loam	Low	0.6–2.0	Well drained	Slight	0.32	5	I-Irrigated IIIc Nonirrigated	6.1–7.3	5–15
		17–33	Loam, clay loam	Low	0.6–2.0			0.32			5.6–7.3	10–20
		33–78	Clay loam	Moderate	0.2–0.6			0.28			5.1–6.5	15–25
		78–84	Stratified gravelly coarse sandy loam to sandy loam	Low	0.6–2.0			0.24			6.1–7.3	5–10
191	Red Bluff	0–8	Loam	Low	0.6–2.0	Well drained	Slight	0.32	5	IIs-Irrigated IIIs Nonirrigated	5.1–6.5	5–15
		8–25	Clay loam	Moderate	0.2–0.6			0.32			6.1–7.3	10–20
		25–68	Clay loam, gravelly clay loam, clay	Moderate	0.2–0.6			0.24			6.1–7.3	15–30
192	Red Bluff	0–8	Loam	Low	0.6–2.0	Well drained	Slight to moderate	0.32	5	IIIe Nonirrigated	5.1–6.0	5–15
		8–25	Clay loam, gravelly clay loam	Moderate	0.2–0.6			0.24			5.1–6.5	10–20
		25–43	Clay loam, gravelly clay loam, gravelly clay	Moderate	0.2–0.6			0.24			5.6–6.5	15–30
		43–68	Gravelly clay loam, very gravelly clay loam, very gravelly clay	Moderate	0.2–0.6			0.24			5.6–6.5	10–20

Table 3.7-3 (Continued)
Soil Mapping Unit Descriptions

Map[1]	Soil Series Name		Depth (inches)	USDA texture	Shrink-Swell Potential	Perme-ability (in/hr)	Drainage	Erosion Hazard	Erosion Factors[2]		Land Capability[3]	pH	Plasticity Index[4]
									K	T			
193	Red Bluff		0–8	Loam	Low	0.6–2.0			0.32			5.1–6.0	5–15
	45%		8–25	Clay loam, gravelly clay loam	Moderate	0.2–0.6			0.24			5.1–6.5	10–20
			25–43	Clay loam, gravelly clay loam, gravelly clay	Moderate	0.2–0.6	Moderately well drained	Slight to moderate	0.24	5	IVe Nonirrigated	5.6–6.5	15–30
		Complex	43–68	gravelly clay loam, very gravelly clay loam, very gravelly clay	Moderate	0.2–0.6			0.24			5.6–6.5	10–20
	Redding		0–7	Gravelly loam	Low	0.6–2.0			0.24			5.1–6.5	5–15
	40%		7–20	Gravelly loam, gravelly clay loam	Moderate	0.2–0.6	Moderately well drained	Slight to moderate	0.24	2	IVe Nonirrigated	5.1–6.5	5–15
			20–28	Gravelly clay loam, gravelly clay	High	<0.06			0.20			5.6–6.5	15–30
			28–66	Indurated	—	—			—			—	—
196	Red Bluff		0–8	Loam	Low	0.6–2.0			0.32			5.1–6.0	5–15
	45%		8–25	Clay loam, gravelly clay loam	Moderate	0.2–0.6			0.24			5.1–6.5	10–20
		Complex	25–43	Clay loam, gravelly clay loam, gravelly clay	Moderate	0.2–0.6	Well drained	Slight	0.24	5	VIIs Nonirrigated	5.6–6.5	15–30
			43–68	Gravelly clay loam, very gravelly clay loam, very gravelly clay	Moderate	0.2–0.6			0.24			5.6–6.5	10–20
	Xerorthents		variable	Gravel and cobbles (dredge tailings)	—-	Very rapid	Excessive		—	—		—	—

Table 3.7-3 (Continued)
Soil Mapping Unit Descriptions

Map[1]	Soil Series Name	Depth (inches)	USDA texture	Shrink-Swell Potential	Perme-ability (in/hr)	Drainage	Erosion Hazard	Erosion Factors[2] K	Erosion Factors[2] T	Land Capability[3]	pH	Plasticity Index[4]
198	Redding	0–7	Gravelly loam	Low	0.6–2.0	Moderately well drained	Slight to moderate	0.24	2	IVe Nonirrigated Irrigated	5.1–6.5	5–15
		7–20	Gravelly loam, gravelly clay loam	Moderate	0.2–0.6			0.24			5.1–6.5	5–15
		20–28	Gravelly clay loam, gravelly clay	High	<0.06			0.20			5.6–6.5	15–30
		28–66	Indurated	—	—			—			—	—
223	Slickens	variable	Fine textured materials separated during gold-dredging activities	—	Slow	Poor	Slight	—	—	— (Soil properties variable)	—	—
245	Xerorthents	variable	Gravel and cobbles (dredge tailings)	—	Very rapid	Excessive	None	—	—	VIIIs Nonirrigated	—	—

1 Soil map numbers refer to numbers shown in Exhibit 3.7-2.

2 K is a measurement of relative susceptibility to sheet and rill erosion by water. It ranges from 0.10 to 0.64, with lower values representing a lower susceptibility to erosion.
T represents soil loss tolerance, which is defined as the maximum rate of soil erosion (wind and water) without reducing crop production or environmental quality. Values range from 1 to 5 tons of soil loss per acre per year, with 5 representing soils less sensitive to erosion.

3 An indication of the suitability of soils for most kinds of field crops. Land capability classes are I through VIII, with VIII being unsuitable for most crop production. Subclasses denoting limiting factors are designated by letters e (erosion), w (water), s (shallow or stony), or c (climate).

4 Soils with a high plasticity index have a wide range of moisture content in which the soil performs as a plastic material. Larger PI values (e.g., 20–40) indicate highly plastic soils.

in/hr = inches per hour; NP = Not plastic.

Salinity is not a factor in any of the soils listed above.

—: Either not measured or not applicable.

Source: NRCS 1993

145 Fiddyment Fine Sandy Loam, 1–8% Slopes

This soil covers the extreme southeastern corner of the project site, next to the existing Security Park. Fiddyment is a well drained soil formed from weathered sandstone or siltstone. Native vegetation consists primarily of annual grasses, forbs, and scattered oak trees. Permeability is very slow, and soils above the claypan tend to become waterlogged for short periods after heavy rainfall. Limitations affecting this site for urban development are shallow depth to hardpan and bedrock (which limits trenching activities and landscaping plants), low strength (instability affects road and street design), and very slow permeability (which increases erosion hazards for roads and building pads, especially steep slopes with cut and fill).

159 Hicksville Gravelly Loan, 0–2% Slopes, Occasionally Flooded

Hicksville gravelly loam is found along the southeastern (development Phase 5) and western (development Phase 1) edges of the project site adjacent to Morrison Creek—a low stream terrace. The parent material is alluvium from mixed rock sources. Native vegetation is primarily annual grasses and forbs. Permeability is moderately slow, and channeling and deposition are common along streambanks. The soil is occasionally flooded for brief periods during prolonged, high-intensity storms.

181 Natomas Loam, 0–2% Slopes

This soil type covers the extreme northwestern portion of the project site, slated to be developed first within Phase 1. Natomas loam is deep, well drained, and formed from alluvium on the high level of low terraces. Native vegetation is primarily annual grasses, forbs, and scattered oak trees. As a Capability Class I soil, this unit is ideally suited for most types of field crops, as well as urban and recreational development. Limitations affecting urban uses are low strength and a moderate shrink-swell potential, which can be compensated for by proper design.

191 Red Bluff Loam, 0–2% Slopes

Red Bluff soil covers the western portion of the project site adjacent to Sunrise Boulevard (development Phase 1), as well as a portion of the project site west of Morrison Creek (development Phase 3). Red Bluff unit 191 is very deep, well drained, and formed from alluvium on intermediate terraces—in this instance, part of the ancient channel of the American River. Native vegetation is primarily annual grasses and forbs. Limitations affecting urban uses are low strength and a moderate shrink-swell potential, which can be compensated for by proper design.

192 Red Bluff Loam, 2–5% Slopes

Soil characteristics for Red Bluff 192 are similar to those described for Red Bluff 191 above, except that it is rated as Capability Class III because of the slightly steeper slopes. Red Bluff 192 is found in the southern portion of the project site adjacent to Douglas Road (development Phase 1), adjacent to Morrison Creek and Douglas Road (development Phase 3), and in the southeastern portion of the project site adjacent to and north of Morrison Creek (development Phase 5). The majority of this soil type is located with the area designated as Wetland Preserve.

193 Red Bluff-Redding Complex, 0–5% Slopes

The Red Bluff-Redding complex is located in the northwestern portion of the project site within development Phase 1, and in the southern portion of development Phase 5 adjacent to Morrison Creek (within the area designated as Wetland Preserve). This well-drained soil complex is composed of approximately 45% Red Bluff and 40% Redding soils, and is located on high terraces formed from alluvium. Native vegetation is primarily annual grasses and forbs. This soil is limited for urban development by a cemented pan and low strength, which can be compensated for by proper design.

196 Red Bluff-Xerorthents, Dredge Tailings Complex, 2–50% Slopes

The Red Bluff-Xerorthents soil complex is located in the north central portion of the project site within development Phase 2, and consists of a high terrace that was disturbed during mining activities. This complex consists of approximately 45% Red Bluff soil (undisturbed areas on terraces) and 40% Xerorthents (dredge tailings with slopes of 2–50%). Native vegetation is primarily annual grasses, forbs, and scattered blue oak trees. Soil uses are limited by a high erosion hazard, low strength, and a moderate shrink-swell potential.

198 Redding Gravelly Loam, 0–8% Slopes

This soil covers a portion of the southern project site below Morrison Creek (development Phases 3 and 5 within the area designated as Wetland Preserve) and consists of high terrace and terrace remnants formed from gravelly and cobbly alluvium. Native vegetation is primarily annual grasses and forbs. Permeability is very slow, and soils above the claypan tend to become waterlogged for short periods after heavy rainfall. Soil uses are limited by the high water-erosion hazard, moderate shrink-swell potential, low strength, shallow depth to hardpan, shallow depth to claypan, and very slow permeability.

223 Slickens

Slickens consists of moderately fine and fine textured materials separated from Red Bluff, Redding, and other soil types during gold-dredging activities. This soil type is located in a small area of the southwestern portion of the project site (development Phase 1) as well as another small area in the central portion of development Phase 4. Vegetation consists primarily of scattered, sparse stands of annual grasses, forbs, and chaparral. Permeability is slow, and the surface is frequently flooded during rainy periods in winter and spring. Surface-water ponding requires management for urban uses.

245 Xerorthents, Dredge Tailings, 2–50% Slopes

Approximately 70% of the project site is covered by Xerorthents; therefore, this soil unit would be encountered during all phases of construction. Xerorthents has a high content of gravel and cobbles that were deposited as tailings after most of the fine textured material was washed away during gold-dredging activities. On the project site, dredge tailings form tall piles with steep slopes. Vegetation consists primarily of sparse stands of annual grasses and forbs, and scattered hardwoods. Younger deposits may be bare. In Sacramento, this soil type is used primarily for wildlife habitat, for which it is poorly suited because of the very low available water capacity and the high content of gravel and cobbles that limit plant growth. In some areas of the county it is used for recreational development; it may be used for urban development if the tailing piles are leveled (consistent with the City General Plan).

MINERAL RESOURCES

As discussed above, the project site and the surrounding vicinity are located in an ancient channel of the American River. Over many thousands of years, weathering eroded various auriferous (gold-bearing) formations in the Sierra Nevada, thus allowing gold flakes, nuggets, and gold-bearing rocks to be carried along in glacial meltwater and in river channels. Depending on the volume of water and the rate of flow, the gold was eventually deposited on the surfaces of ancient river channels. Auriferous rocks eventually became deposited at the mouths of rivers as alluvial fans. Areas around the town of Folsom, Prairie City, and Rancho Cordova, where the American River emptied into the Sacramento Valley, eventually became well known locations for gold miners.

Within weeks after gold was found at Sutter's Mill on the South Fork of the American River in 1848, Mormon Island (now buried underneath Folsom Lake) was being mined. Subsequent gold discoveries and mining operations developed at Beal's Bar, Rattlesnake Bar, Negro Bar, Whiskey Bar, and Prairie City. When the Natomas Water and Mining Company began supplying water to the area around Prairie City in 1853, miners began staking claims along the company's canal. When those claims were exhausted, the Natomas Company (as it was later called) begin dredging the nearby ancient American River deposits. Dredging operations on the project site occurred between 1915 and 1962. Today, as mentioned above, dredge tailings cover approximately 70% of the project site. (See Section 3.9, "Cultural Resources," for a more detailed discussion of historical mining operations.)

The piles of cobbles deposited during dredging operations have proved to be a valuable source of sand and gravel. These aggregate deposits were addressed in the County General Plan as the county's "primary remaining aggregate deposits," and were also foreseen as being actively mined by 2004. The City General Plan also accounts for these areas as being actively mined before development. Currently, Teichert Aggregates, Inc. (Teichert) holds a County Conditional Use Permit (No. 98-UPB-0503) for surface mining of this resource on 180 acres of the eastern portion of the project site (City of Rancho Cordova 2004) (Exhibit 2-18). In June 2005, the City of Rancho Cordova (City) approved a second Conditional Use Permit application by Teichert to remove portions of the dredge tailings on the western portion of the project site in the proposed Phase 1 development area. In the future, the City expects to receive an individual Implementation Permit application from Granite Construction Company to remove additional dredge tailings from the central portion of the Rio del Oro project site. The proposed removal of additional dredge tailings will be subject to separate environmental review (not part of this project).

Sand and gravel mined in Sacramento County and in Rancho Cordova is used for construction. Construction aggregates are an important building material used in Portland cement concrete, asphalt concrete, plaster, and stucco, and as a road base material. In terms of volume and price, there is no economically feasible substitute for aggregate products in the construction industry. However, the City and County General Plans also recognize that aggregate mining is an interim land use rather than a final use, and recognizes the importance of balancing aggregate-mining needs with those of urban development.

In compliance with the California Surface Mining and Reclamation Act (SMARA), CDMG has established the classification system shown in Table 3.7-4 to denote both the location and significance of key extractive resources.

Table 3.7-4
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

Under 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 CDMG and on input from agencies and the public. The project site lies within the designated Sacramento-Fairfield Production-Consumption Region, which includes all designated lands within the marketing area of the active aggregate operations supplying the Sacramento-Fairfield urban center. The project site is classified as MRZ-2, an area containing significant mineral deposits, including Portland Cement concrete–grade aggregate (sand and gravel) (Dupras 1988).

3.7.2 REGULATORY FRAMEWORK

FEDERAL PLANS, POLICIES, REGULATIONS, AND LAWS

Federal Earthquake Hazards Reduction Act

In October 1997, 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 and reduction program.” To accomplish this, the act established the National Earthquake Hazards Reduction Program (NEHRP). This program was significantly amended in November 1990 by the National Earthquake Hazards Reduction Program Act (NEHRPA), which refined the description of agency responsibilities, program goals, and objectives.

NEHRP’s mission includes improved understanding, characterization, and prediction of hazards and vulnerabilities; improvement of building codes and land use practices; risk reduction through postearthquake investigations and education; development and improvement of design and construction techniques; improvement of mitigation capacity; and accelerated application of research results. The NEHRPA designates the Federal Emergency Management Agency (FEMA) as the lead agency of the program and assigns it 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

California Building Standards Code

The State of California provides minimum standard for building design through the California Building Standards Code (California Code of Regulations, Title 24). Where no other building codes apply, Chapter 29 regulates excavation, foundations, and retaining walls. The CBC also 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 and/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. Specific minimum seismic safety and structural design requirements are set forth in Chapter 16 of the CBC. The CBC identifies seismic factors that must be considered in structural design.

Chapter 18 of the CBC regulates the excavation of foundations and retaining walls, and Appendix Chapter A33 regulates grading activities, including drainage and erosion control, and construction on unstable soils, such as expansive soils and liquefaction areas.

California Seismic Hazards Mapping Act

The California Seismic Hazards Mapping Act of 1990 (Public Resources Code Sections 2690–2699.6) addresses seismic hazards other than surface rupture, such as liquefaction and induced landslides. The Seismic Hazards Mapping Act specifies that the lead agency for a project may withhold development permits until geologic or soils investigations are conducted for specific sites and mitigation measures are incorporated into plans to reduce hazards associated with seismicity and unstable soils.

Alquist-Priolo Earthquake Fault Zoning Act

The Alquist-Priolo Earthquake Fault Zoning Act (Public Resources Code Sections 2621–2630) was passed by the California Legislature in 1972 to mitigate the hazard of surface faulting to structures. The act's main purpose is to prevent the construction of buildings used for human occupancy on the surface trace of active faults. The act addresses only the hazard of surface fault rupture and is not directed toward other earthquake hazards. Local agencies must regulate most development in fault zones established by the State Geologist. 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.

California Surface Mining and Reclamation Act

SMARA (Public Resources Code 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 of the City General Plan relating to geology, soils, and mineral resources that the City has found to be applicable to the proposed project and alternatives under consideration are provided in Appendix F.

Sacramento County Zoning Code Title II, Article 4, Surface Mining (Adopted by the City of Rancho Cordova)

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. The City adopted this ordinance upon incorporation in 2003.

Sacramento County Grading Ordinance (Adopted by the City of Rancho Cordova)

The County has enacted a Land Grading and Erosion Control Ordinance (County Code, Title 16, Chapter 16.44) 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. The City adopted this ordinance upon incorporation in 2003.

3.7.3 ENVIRONMENTAL CONSEQUENCES

THRESHOLDS OF SIGNIFICANCE

Based on Appendix G of the State CEQA Guidelines, a geology, soils, or mineral resources impact is considered significant if implementation of the proposed project or alternatives under consideration would do any of the following:

- result in substantial erosion or unstable soil conditions from excavation grading or fill;
- expose people or property to seismic hazards including fault rupture on active faults, seismic ground shaking, or seismically induced ground failure, including liquefaction;
- expose persons or property to geologic hazards such as landslides, land subsidence, or expansive soils; or
- result in the loss of availability of known mineral resources that would be of future value to the region.

ANALYSIS METHODOLOGY

Effects associated with geology, soils, and mineral resources that could result from project construction and operational activities were evaluated qualitatively based on expected construction practices; materials, locations, and duration of project construction and related activities; a field visit; and a review of published geologic literature including maps, books, and journal articles.

IMPACT ANALYSIS

Program Level Impacts and Mitigation Measures

Effects that would occur under each alternative development scenario are identified as follows: PP (Proposed Project), HD (High Density), IM (Impact Minimization), NF (No Federal Action), and NP (No Project). 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 Potential Temporary, Short-Term Construction-Related Erosion. *Construction activities during project implementation would involve extensive grading and movement of earth, which could expose soils to erosion and result in the loss of topsoil.*

PP, HD Project implementation would include substantial construction activity over approximately 3,300 acres, including soil removal, trenching, pipe installation, fabrication of concrete channels, grading, and revegetation. Construction activities would result in the temporary disturbance of soil and would expose disturbed areas to winter storm events. Rain of sufficient intensity could dislodge soil particles from the soil surface. Once particles are dislodged and the storm is large enough to generate runoff, localized erosion could occur. In addition, soil disturbance during the summer months could result in loss of topsoil because of wind erosion. A **direct, potentially significant** impact from soil erosion could result from construction activities associated with the project. **No indirect** impacts would result. ***[Similar]***

IM Impacts under the Impact Minimization Alternative would be less than those under the Proposed Project Alternative because approximately 500 fewer acres would be disturbed. However, the same type of construction-related erosion impacts would occur, leading to a **direct, potentially significant** impact. **No indirect** impacts would result. ***[Lesser]***

NF Impacts under the No Federal Action Alternative would be less than those under the Proposed Project Alternative because approximately 365 fewer acres would be disturbed. However, the same type of construction-related erosion impacts would occur, leading to a **direct, potentially significant** impact. **No indirect** impacts would result. ***[Lesser]***

NP Under the No Project Alternative, mining activities at the project site, which are not part of the Rio del Oro project, would continue under existing Conditional Use Permits—one originally issued by the County, and the other issued by the City—and possibly under one or more future individual Implementation Permits expected to be issued by the City. Reclamation activities associated with closure of mining operations would result in less-than-significant impacts on erosion because these activities would be subject to the City Grading and Erosion Control Ordinance.

Because no new construction would occur under the No Project Alternative, **no direct** or **indirect** project-related impacts would occur. ***[Lesser]***

Mitigation Measure 3.7-1: Prepare and Implement a Grading and Erosion Control Plan.

PP, HD, IM, NF A grading and erosion control plan shall be prepared by a California Registered Civil Engineer retained by the project applicant(s) for all project phases. The grading and erosion control plan shall be submitted to the City Public Works Department before issuance of grading permits for all new development within the project site. The plan shall be consistent with the City's Land Grading and Erosion Control Ordinance as well as the City's National Pollutant Discharge Elimination System (NPDES) permit and shall include the site-specific grading associated with development for all project phases. The plan 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. 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 applicant(s) shall ensure that the construction contractor is responsible for securing a source of transportation and deposition of excavated materials.

Implementation of Mitigation Measure 3.4-3 (discussed in Section 3.4, "Drainage, Hydrology, and Water Quality") will help reduce erosion-related impacts.

Timing: Before the issuance of grading permits for all project phases, and throughout project construction.

Enforcement: City of Rancho Cordova Public Works, Building and Safety, and Planning Departments.

NP No mitigation measures are required.

Implementation of Mitigation Measure 3.7-1 listed above along with Mitigation Measure 3.4-3 (discussed in Section 3.4, "Drainage, Hydrology, and Water Quality"), would reduce potentially significant temporary and short-term construction-related erosion impacts under the Proposed Project, High Density, Impact Minimization, and No Federal Action Alternatives to a **less-than-significant** level.

IMPACT 3.7-2

Potential Damage to Structures from Seismic Activity and Related Geologic Hazards. *The project site is located in an area of low seismic activity and structures at the site would be designed in accordance with CBC standards.*

PP, HD, IM, NF

The project site is not located in a known fault zone, no faults known to be active within Holocene time are located within 30 miles of the project site; therefore, the potential for surface rupture to cause damage to proposed structures is negligible. Although potential damage to people or structures from seismic ground shaking could be a concern, compliance with the CBC would require the site's seismic-design response spectrum to be established and incorporated into the design of all new residences and buildings. Roadways, utilities, and structures would be designed to withstand seismic forces per CBC requirements for Seismic Zone 3. Furthermore, potential hazards associated with liquefaction would be negligible because the project site has a fairly deep groundwater table, soils at the project site are relatively stable, and potential sources of seismic activity are a relatively long distance away. The project site would have a relatively flat topography after the dredge tailings were removed, and it is not located in or near a landslide hazard area. Potential damage to structures from seismic activity and related geologic hazards would be a **less-than-significant, direct** impact. **No indirect** impacts would result. ***[Similar]***

NP

Under the No Project Alternative, mining activities at the project site, which are not part of the Rio del Oro project, would continue under existing Conditional Use Permits—one originally issued by the County, and the other issued by the City—and possibly under one or more future individual Implementation Permits expected to be issued by the City. Because sources of seismic activity are a relatively long distance away, potential impacts on mining operations would be less than significant.

Because no new development-related construction would occur under the No Project Alternative, **no direct** or **indirect** project-related impacts would occur. ***[Lesser]***

Mitigation Measure: No mitigation measures are required.

IMPACT 3.7-3

Potential Damage to Structures from Construction on Unstable Soils. *Portions of the project site are underlain by soils that have a moderate to high potential for expansion when wet, or are underlain by piles of unstable cobbles and slickens soils from dredge mining activities. Construction in any of these soils may cause foundation movements that can cause damage to overlying structures.*

PP

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 if they are not designed and constructed appropriately to resist the 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. Placement of buildings on unstable soils can result in structural failure.

Portions of the project site are underlain by clayey soils with a plasticity index of 15–30%, which indicates a moderate to high expansion potential. Soil expansion could pose problems for foundation design. Furthermore, these soils could be subjected to volume changes during seasonal fluctuations in moisture content, which could adversely affect interior slabs-on-grade and landscaping hardscapes.

In addition, approximately 70% of the project site is underlain by cobbles and slickens soils from dredge mining activities. Although the aboveground portions of these dredge tailings would be removed as part of mining activities (not part of this project) or as part of project grading activities, the belowground portions of these soils would remain. Cobbles and slickens soils are generally unstable; therefore, construction in these areas could result in structural failure.

This would be a **potentially significant, indirect** impact. **No direct** impacts would result.

HD Construction of buildings and roadways would occur on the same amount of land under the High Density Alternative as under the Proposed Project Alternative, with a higher density of dwelling units constructed on that same acreage. Impacts would likely occur at a higher level than under the Proposed Project Alternative because more structures would be constructed on soils with moderate to high expansion potential. This would be a **potentially significant, indirect** impact. **No direct** impacts would result. ***[Greater]***

IM Impacts under the Impact Minimization Alternative would be less than those under the Proposed Project Alternative because building and roadway construction would occur on approximately 500 fewer acres. However, development would still occur in areas with potentially expansive soils; thus, this would be a **potentially significant, indirect** impact. **No direct** impacts would result. ***[Lesser]***

NF Impacts under the No Federal Action Alternative would be less than those under the Proposed Project Alternative because building and roadway construction would occur on approximately 365 fewer acres. However, development would still occur in areas with potentially expansive soils; thus, this would be a **potentially significant, indirect** impact. **No direct** impacts would result. ***[Lesser]***

NP Under the No Project Alternative, mining activities at the project site, which are not part of the Rio del Oro project, would continue under existing Conditional Use Permits—one originally issued by the County, and the other issued by the City—and possibly under one or more future individual Implementation Permits expected to be issued by the City. Because mining activities would not involve construction of buildings, there would be no impact from the effects of expansive soil.

Because no new development-related construction would take place under the No Project Alternative, no structures would be subject to effects from expansive soils; thus, **no direct** or **indirect** project-related impacts would result. ***[Lesser]***

Mitigation Measure 3.7-3a: Prepare a Geotechnical Study and Implement All Applicable Recommendations.

PP, HD, IM, NF Before the approval of grading plans for all project phases, a final geotechnical subsurface investigation report shall be prepared by the project applicant(s) for the proposed development and shall be submitted to the City. The final geotechnical engineering report shall address and make recommendations on the following:

- site preparation;
- appropriate sources and types of fill;
- potential need for soil amendments;
- road, pavement, and parking areas;
- structural foundations, including retaining wall design;
- grading practices;
- erosion/winterization;
- special problems discovered on-site (e.g., groundwater and expansive/unstable soils); and
- slope stability.

The geotechnical investigation shall include subsurface testing of soil and groundwater conditions and determine appropriate foundation designs that are consistent with the CBC. If the soils report indicates the presence of critically expansive soils or other soil problems that would lead to structural defect if not corrected, additional investigations may be required for subdivisions before building permits are issued. This shall be so noted on the project grading plans. Recommendations contained in the geotechnical engineering report shall be noted on the grading plans and implemented as appropriate before the issuance of building permits. Design and construction of all new development in all phases of the project shall be in accordance with the CBC and the City Land Grading and Erosion Control Ordinance. It is the responsibility of the project applicant(s) to provide for engineering inspection and certification that earthwork has been performed in conformity with recommendations contained in the report.

Timing: Before the approval of grading plans for all project phases.

Enforcement: City of Rancho Cordova Public Works Department.

NP No mitigation measures are required.

Mitigation Measure 3.7-3b: Ensure On-Site Monitoring by a Geotechnical Engineer.

PP, HD, IM, NF All earthwork shall be monitored by a geotechnical engineer retained by the project applicant(s) for all project phases. The geotechnical engineer shall provide oversight during all excavation, placement of fill, and disposal of materials removed from and deposited on the subject site and other sites. Before export/import of any soil to/from an off-site location, the project applicant(s) shall obtain a grading permit from the City Public Works Department.

Timing: Before issuance of grading permit and during construction activities for all project phases.

Enforcement: City of Rancho Cordova Public Works Department.

NP No mitigation measures are required.

With implementation of Mitigation Measures 3.7-3a and 3.7-3b, buildings and structures would incorporate design recommendations of a geotechnical engineer and on-site monitoring by a geotechnical engineer would provide for appropriate correction in grading activities if unexpected pockets of expansive soils were encountered. Therefore, implementation of these mitigation measures would reduce the potentially significant impact of possible damage to structures from construction on expansive soils under the Proposed Project, High Density, Impact Minimization, and No Federal Action Alternatives to a **less-than-significant** level.

IMPACT 3.7-4

Loss of Mineral Resources. *The project site is located within the Sacramento-Fairfield Production-Consumption Region designated by CDMG and is classified as MRZ-2, an area containing significant mineral deposits (including Portland Cement concrete–grade aggregate).*

PP, HD, IM, NF The project site is located within the Sacramento-Fairfield Production-Consumption Region, a mineral resources area designated by CDMG as regionally significant to satisfy future needs. Approximately 70% of the surface area at the project site is covered with aggregate mineral resources, including Portland Cement concrete–grade aggregate. As discussed in Section 3.0, “Approach to the Environmental Analysis,” mining activities are currently being conducted by Teichert on the eastern portion of the project site. A Mitigated Negative Declaration was prepared by the City in May 2004 on Teichert’s request to expand its existing Conditional Use Permit (No. 98-UPB-0503) to include an additional 180 acres on the Rio del Oro project site

(Exhibit 2-18). In June 2005, the City approved Teichert's request for a second Conditional Use Permit (Grantline West Mining Plan) in the western portion of the project site. This Conditional Use Permit would remove a portion of the dredge tailings on approximately 583 acres in the central portion of development Phase 1 (Exhibit 2-18). An Implementation Permit application to remove the dredge tailings in the central portion of the project site is expected in the future (Exhibit 2-18). The City would prepare another, separate environmental document to assess potential impacts from this third application. This analysis assumes that this Implementation Permit application would be approved by the City, and that much of the dredge tailings would be removed before project-related construction activities begin. At the completion of project buildout, aggregate resources below the ground surface would no longer be available for mining activities. However, the City General Plan provides for a balance of land uses that includes both mining and mixed-use development. Because a substantial amount of the site's aggregate resources would be recovered and utilized, project implementation would not result in a significant loss of mineral resources, and thus would result in a **less-than-significant, direct** impact. **No indirect** impacts would occur. ***[Similar]***

NP Under the No Project Alternative, mining activities at the project site, which are not part of the Rio del Oro project, would continue under existing Conditional Use Permits—one originally issued by the County, and the other issued by the City—and possibly under one or more future individual Implementation Permits expected to be issued by the City.

Under the No Project Alternative, mineral resources would continue to be removed as a result of the mining activities at the project site, resulting in an **indirect, beneficial** impact. **No direct** or **indirect** impacts would occur. ***[Similar]***

Mitigation Measure: No mitigation measures are required.

Project Level (Phase 1) Impacts and Mitigation Measures

IMPACT 3.7-5

Potential Temporary Short-Term Construction-Related Erosion. *Construction activities during development Phase 1 would involve extensive grading and movement of earth, which could expose soils to erosion and result in the loss of topsoil.*

Impacts would be the same under Phase 1 as under the program (entire project site) level analysis for all alternatives. Refer to Impact 3.7-1 for further discussion of this impact.

Mitigation Measure 3.7-1 and Mitigation Measure 3.4-3 (contained in Section 3.4, "Drainage, Hydrology, and Water Quality"), would require the construction contractor to install erosion and sediment control measures. Therefore, implementation of these mitigation measures would reduce the significant impact associated with potential temporary, short-term construction-related erosion under the Proposed Project, High Density, Impact Minimization, and No Federal Action Alternatives to a **less-than-significant** level.

IMPACT 3.7-6

Potential Damage to Structures from Seismic Activity and Related Ground Failure. *The Phase 1 development area is located in an area of low seismic activity and structures at the site would be designed in accordance with CBC standards.*

Impacts would be the same under Phase 1 as under the program (entire project site) level analysis for all alternatives. Refer to Impact 3.7-2 for further discussion of this impact.

IMPACT 3.7-7

Potential Damage to Structures from Construction on Expansive Soils. *The Phase 1 development area is underlain by soils that have a moderate to high potential for expansion when wet. Expansive soils may cause differential and cyclical foundation movements that can cause damage and/or distress to overlying structures.*

Impacts would be the same under Phase 1 as under the program (entire project site) level analysis for all alternatives. Refer to Impact 3.7-3 for further discussion of this impact.

With implementation of Mitigation Measures 3.7-3a and 3.7-3b, buildings and structures would incorporate design recommendations of a geotechnical engineer and on-site monitoring by a geotechnical engineer would provide for appropriate correction in grading activities if unexpected pockets of expansive soils were encountered. Therefore, implementation of these mitigation measures would reduce the potentially significant impact of possible damage to structures from construction on expansive soils under the Proposed Project, High Density, Impact Minimization, and No Federal Action Alternatives to a **less-than-significant** level.

IMPACT 3.7-8

Loss of Mineral Resources. *The Phase 1 development area is within the Sacramento-Fairfield Production-Consumption Region designated by CDMG, and is classified as MRZ-2, an area containing significant mineral deposits (including Portland Cement concrete–grade aggregate).*

Impacts would be the same under Phase 1 as under the program (entire project site) level analysis for all alternatives. Refer to Impact 3.7-4 for further discussion of this impact.

CUMULATIVE IMPACTS

As discussed above, the Rio del Oro project site would be exposed to potentially significant impacts from construction-related soil erosion and construction on expansive soils. However, these impacts would be reduced to less-than-significant levels through completion of site-specific geotechnical studies, implementation of construction and design measures developed in response to the studies, and implementation of a SWPPP and BMPs under the statewide NPDES permit. Each of the related projects must individually meet building code requirements. Projects that disturb 1 acre of more of land must also file a Notice of Intent and prepare and implement a SWPPP and related BMPs pursuant to the statewide NPDES stormwater permit for general construction activity (discussed in Section 3.4, "Drainage, Hydrology, and Water Quality"). Therefore, no additive effect would result from the combination of the related projects and the Rio del Oro project. Implementation of the project, therefore, would not create additional facilities under increased risk of hazards and would not result in any cumulatively considerable incremental contributions to any significant cumulative impacts.

All of the related projects in the Easton Specific Plan area occur in areas of potential mineral aggregate deposits (dredge tailings) classified as MRZ-2 by CDMG. This area covers approximately 3,000 acres. Construction of buildings, roads, and parking areas in the Easton Specific Plan area could permanently remove access, or erect barriers to access, to the entire 3,000-acre mineable area. This is therefore considered a significant cumulative impact. Approximately 2,600 acres of the Rio del Oro project site are also classified as MRZ-2 and contain the same mineral resources (dredge tailings). However, most of the 2,600 acres of aggregate resources at the Rio del Oro project site will be recovered through mining operations, and therefore the project would not cumulatively contribute to a loss of regionally and locally valuable mineral resources.

3.7.4 RESIDUAL SIGNIFICANT IMPACTS

With implementation of the mitigation measures listed above, project implementation would not result in any residual significant impacts related to geology, seismicity, soils, or mineral resources.