

This section of the General Plan EIR discusses the geologic, soil, and mineral resources conditions of the Planning Area and identifies the related potential environmental impacts and development constraints if the proposed General Plan were implemented. This analysis is based on a review of statutory law, local planning documents, the United States Department of Agriculture (USDA) Soil Survey of Sacramento County, and publications by the California Department of Conservation, California Geological Survey (formerly the Division of Mines and Geology) and the Division of Oil, Gas, and Geothermal Resources.

4.8.1 ENVIRONMENTAL SETTING

REGIONAL GEOLOGIC SETTING

The Rancho Cordova General Plan Planning Area is located within the Great Valley geomorphic province of California. The geology of the Great Valley (Valley) is characterized by thick, Jurassic through Holocene aged sedimentary deposits. The California Geological Survey (CGS) and the United States Geological Survey (USGS) have mapped a large portion of the valley as being underlain by Quaternary-aged Riverbank formation. The Riverbank formation represents alluvial fans, or fan-shaped areas of sediment carried by a watercourse. These geological deposits are generally composed of alluvial gravel, sand, and silt derived from the western slopes of the Sierra Nevada Range. The valley province is bounded by the Klamath and Cascade mountain ranges to the north, the Sierra Nevada Mountains to the east, and the California Coast Mountain Range to the west. The Valley is generally considered to be an elongated sedimentary trough, approximately 450 miles long and 50 miles wide, which has been filled by a thick sequence of Jurassic to Holocene continental and marine sediments. The Valley province is further divided into four geomorphic subunits: the Delta, River Floodplain, Alluvial Floodplain, and Low Foothills. Surface elevations within the Great Valley generally range from several feet below mean sea level (msl) to more than 1,000 feet above sea level. The major topographical feature in the Sacramento Valley is the Sutter Buttes (a volcanic remnant), which rises approximately 1,980 feet above the surrounding valley floor.

The geological formations underlying the majority of the Planning Area consist mostly of Cenozoic Quaternary gravelly alluvial and glacial deposits from the ancestral channel of the American River, which date back to the mid Pleistocene age or approximately 600,000 years. These formations are typically found north of Douglas Road and east of Sunrise Boulevard. The geologic structure east of Grant Line Road consists primarily of Cenozoic Tertiary Mehrten formations of andesitic conglomerate, sandstone, and breccia. The youngest geomorphic features in the Planning Area are low floodplains, which are found primarily along the American River and Cosumnes River. These features include natural levees, alluvial plains, and many smaller channels along both river corridors. Bar and channel topography is evident on the low floodplains adjacent to these river corridors. The floodplains along the Cosumnes River are not protected by levees or dams and are frequently inundated during the rainy season. For a discussion on the Cosumnes River floodplains, the reader is referred to Section 4.9, Hydrology and Water Quality, of this EIR.

SOIL CONDITIONS AND TOPOGRAPHY

The majority of the soils in the Planning Area are the result of alluvial deposits, or river and lake deposits on various geomorphic surfaces. The U.S. Department of Agriculture Soil Conservation Service produces maps classifying soil groups based on physical, hydrologic, and chemical properties. According to the *USDA Soil Survey of Sacramento County* (Soil Survey), the Planning Area contains 59 separate soil types as described in **Table 4.8-1**, below.

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Table 4.8-1 also identifies the approximate acres within the Planning Area per soil type, as well as characteristics related to topography and permeability. The majority of these soil units generally have low to moderate water holding capacities. The soil groups displaying high water capacity characteristics are the Hicksville gravelly and Red Bluff loam groups and the Americanos and Rossmoor Urban Land complexes. The Americanos and Rossmoor soil groups are generally associated with existing urban land uses.

**TABLE 4.8-1
SOIL TYPES WITHIN THE RANCHO CORDOVA PLANNING AREA**

Map Unit Name	Total Approximate Acres	Slopes	Subsoil Permeability (inches)	Water Holding Capacity	Erosion Potential	Runoff
(101) Amador-Gillender complex	18	2 to 15%	4 to 20	Very low to low	Slight to moderate	Very slow to medium
(102) Americanos-Urban land complex	271	0 to 2%	60+	High	Slight	Slow
(112) Bruella sandy loam	1	2 to 5%	60+	High	Slight	Slow
(118) Columbia sandy loam	18	0 to 2%	60+	Moderate	Slight	Very slow to slow
(125) Corning complex	45	0 to 8%	60+	Low to moderate	Slight to moderate	Very slow to medium
(126) Corning-Redding complex	65	8 to 30%	20 to 60+	Low to moderate	Moderate to severe	Medium to rapid
(132) Creviscreek sandy loam	26	0 to 3%	40+	Moderate	Slight	Slow
(135) Dierssen clay loam	1	0 to 2%	40 to 60	Moderate	Slight to none	Very slow
(137) Durixeralfs	4	0 to 1%	10 to 30	Very low to low	Slight to none	Very slow
(145) Fiddymment fine sandy loam	113	1 to 8%	20 to 40	Low	Slight	Slow to medium
(156) Hadselvillee-Pentz complex	106.16	2 to 30%	4 to 20	Very low to low	Slight to moderate	Very slow to medium
(157) Hedge loam	190	0 to 2%	20 to 40	Low to moderate	Slight	Slow
(158) Hicksville loam	18	0 to 2%	60+	Very high	Slight	Slow
(159) Hicksville gravelly loam	56	0 to 2%	60+	High	Slight	Slow
(160) Hicksville sandy clay loam	25	0 to 2%	40 to 60	Moderate	Slight	Slow
(162) Kaseberg-Fiddymment-Urban land complex	< 1	2 to 15%	14 to 40	Low	Slight to moderate	Slow to medium
(163) Keyes sandy loam	34	2 to 15%	13 to 20	Very low	Slight to moderate	Slow to medium
(164) Kimball silt loam	47	0 to 2%	60+	Moderate	Slight	Slow
(165) Kimball silt loam	1	2 to 8%	60+	Moderate	Moderate	Medium
(166) Kimball-Urban land complex	35	0 to 2%	60+	Moderate	Slight	Slow

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Map Unit Name	Total Approximate Acres	Slopes	Subsoil Permeability (inches)	Water Holding Capacity	Erosion Potential	Runoff
(175) Madera loam	2	2 to 8%	20 to 40	Low	Moderate	Medium
(181) Natomas loam	109	0 to 2%	60+	Very high	Slight	Slow
(182) Natomas-Xerorthents, Dredge tailings complex	34	0 to 50%	60+	Very low to very high	Slight to none	Very slow to slow
(187) Pardee-Ranchoseco complex	44	3 to 15%	4 to 20	Very low	Slight to moderate	Very slow to medium
(188) Pentz-Lithic xerorthents complex	15	30 to 50%	1 to 20	Very low to low	Severe	Rapid
(189) Peter's Clay	9	1 to 8%	10 to 20	Low	Slight	Very slow to medium
(190) PITS	52	1 to 8%	--	--	--	--
(191) Red Bluff loam	275	0 to 2%	60+	High	Slight	Slow
(192) Red Bluff loam	214	2 to 5%	60+	High	Slight to moderate	Slow to medium
(193) Red Bluff-Redding complex	513	0 to 5%	20 to 60+	Low to high	Slight to moderate	Very slow to medium
(194) Red Bluff-Urban land complex	53	0 to 5%	60+	Moderate to high	Slight to moderate	Slow to medium
(195) Red Bluff-Xerarents complex	120	0 to 2%	60+	Moderate to high	Slight	Slow
(196) Red Bluff-Xerorthents, Dredge tailings complex	58	2 to 50%	60+	Very low to high	Slight to moderate	Very slow to medium
(197) Redding loam	60	2 to 8%	23 to 40	Low	Slight to moderate	Slow to medium
(198) Redding gravelly loam	762	0 to 8%	20 to 40	Low	Slight to moderate	Very slow to medium
(199) Reiff fine sandy loam	2	0 to 2%	60+	High	Slight	Slow
(203) Riverwash	9	--	--	--	--	--
(204) Rossmoor-Fine sandy loam	51	0 to 2%	60+	High	Slight	Slow
(205) Rossmoor-Urban land complex	69	0 to 2%	60+	High	Slight	Slow
(213) San Joaquin silt loam	86	0 to 1%	23 to 40	Low	Slight to none	Very slow
(214) San Joaquin silt loam	136	0 to 3%	23 to 40	Low	Slight	Slow
(215) San Joaquin silt loam	13	3 to 8%	23 to 40	Low	Moderate	Medium
(216) San Joaquin-Durixeralfs complex	3	0 to 1%	10 to 40	Very low to low	Slight to none	Very slow

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Map Unit Name	Total Approximate Acres	Slopes	Subsoil Permeability (inches)	Water Holding Capacity	Erosion Potential	Runoff
(218) San Joaquin-Galt complex	< 1	0 to 3%	20 to 40	Low	Slight to none	Slow to ponded
(219) San Joaquin-Urban land complex	15	0 to 2%	23 to 40	Low	Slight	Slow
(221) San Joaquin-Xerarents complex	6	0 to 1%	23 to 60+	Low to high	Slight to none	Very slow
(223) Slickens	38	0 to 3%	--	Very high to high	Slight	Slow to ponded
(227) Urban Land	140	--	--	--	--	--
(228) Urban land-Natomas	183	0 to 2%	60+	Very high	Slight	Slow
(229) Urban Land-Xerarents-Fiddymont complex	26	0 to 8%	20 to 80	Low to high	Slight to moderate	Slow to medium
(234) Vina fine sandy loam	< 1	0 to 2%	60+	High	Slight	Slow
(235) Vleck gravelly loam	13	2 to 15%	20 to 40	Low	Slight to moderate	Slow to medium
(238) Xerarents-Redding complex	32	0 to 1%	23 to 60+	Low to high	Slight to none	Very slow to slow
(239) Xerarents-Redding complex	24	0 to 2%	23 to 60+	Low to high	Slight	Very slow to slow
(240) Xerarents-Urban land-San Joaquin complex	102	0 to 5%	23 to 60+	Low to high	Slight	Very slow to slow
(242) Xerofluvents	46	0 to 2%	60+	Very low to low	Slight to moderate	Very slow to slow
(243) Xerolls	< 1	30 to 70%	10 to 80+	Very low to high	Severe	Rapid to very rapid
(245) Xerothents, Dredge tailings	997	2 to 50%	60+	Very low to low	Slight to none	Very slow to slow
(246) Xerorthents, Dredge tailings-Urban land complex	262	0 to 2%	60+	Very low to low	Slight	Very slow

Source: Soil Survey of Sacramento County, California, 1993

In general, the topography of the Planning Area is characterized by flat to gently rolling terrain. Elevations within the Planning Area range from approximately 30 feet near the American River and Cosumnes River to nearly 300 feet in the Sunrise Douglas Community Plan Area, and proposed Rio del Oro, Glenborough and Westborough Planning Areas. Slopes within the Rancho Cordova Planning Area generally range from 0% to 8%. Higher slopes are associated with the Natomas-Xerorthents, Xerothents, and dredge tailings in the northeastern portion of the Planning Area (i.e., Rio del Oro, Westborough, and Glenborough).

In terms of soil characteristics, surface runoff, soil erosion, and expansive soils can create potential problems for engineering designs and land use activities. The majority of the Planning Area consists of soils characterized by slight to moderate erosion potential, and very low to medium runoff rates. The shrink-swell potential (refers to the potential of soils to expand during wet seasons and shrink during dry seasons) of the Planning Area soils range from low to high, with

the majority of the soils having high shrink-swell characteristics. Erosion can affect all land uses. Substantial runoff can erode land and siltation of local drainages can adversely affect water quality. Shrink-swell soil properties can affect pavement and building foundation designs.

SEISMIC HAZARDS

Faults

Earthquakes are generally expressed in terms of *intensity* and *magnitude*. Intensity is based on the observed effects of ground shaking on people, buildings, and natural features. An earthquake's intensity varies from region to region, depending on the location of the observer with respect to the earthquake epicenter. **Table 4.8-2** provides a description and a comparison of *intensity* and *magnitude*.

TABLE 4.8-2
MAGNITUDE AND INTENSITY COMPARISON

Magnitude	Typical Maximum Modified Mercalli Intensity
1.0 to 3.0	I
3.0 to 3.9	II - III
4.0 to 4.9	IV – V
5.0 to 5.9	VI – VII
6.0 to 6.9	VII - IX
7.0 and higher	VIII or higher

Source: USGS

The Modified Mercalli (MM) Intensity Scale is used in the United States to evaluate earthquake movements. The MM scale is composed of 12 increasing levels of intensity designated by Roman numerals. The *intensity* scale consists of a series of certain key responses such as people awakening, movement of furniture, damage to chimneys, and, finally, total destruction. The levels range from imperceptible shaking to catastrophic destruction. The MM scale does not have a mathematical basis; instead, it is an arbitrary ranking based on observed effects. The lower numbers of the intensity scale generally deal with the manner in which the earthquake is felt by people. The higher numbers of the scale are based on observed structural damage. **Table 4.8-3** describes the typical effects observed at locations near the epicenter of earthquakes of different magnitudes.

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**TABLE 4.8-3
TYPICAL EFFECTS OF EARTHQUAKE ACTIVITY**

Typical Maximum Modified Mercalli Intensity	Typical Effects of Earthquake Activity*
I	Not felt except by a very few under especially favorable conditions.
II	Felt only by a few persons at rest, especially on upper floors of buildings.
III	Felt quite noticeably by persons indoors, especially on upper floors of buildings. Many people do not recognize it as an earthquake. Standing motor cars may rock slightly. Vibrations similar to the passing of a truck.
IV	Felt indoors by many, outdoors by few during the day. At night, some awakened. Dishes, windows, doors disturbed; walls make cracking sound. Sensation like heavy truck striking building. Standing motor cars rocked noticeably.
V	Felt by nearly everyone; many awakened. Some dishes, windows broken. Unstable objects overturned. Pendulum clocks may stop.
VI	Felt by all, many frightened. Some heavy furniture moved; a few instances of fallen plaster. Damage slight.
VII	Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable damage in poorly built or badly designed structures; some chimneys broken.
VIII	Damage slight in specially designed structures; considerable damage in ordinary substantial buildings with partial collapse. Damage great in poorly built structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned.
IX	Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb. Damage great in substantial buildings, with partial collapse. Buildings shifted off foundations.
X	Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations. Rails bent.
XI	Few, if any (masonry) structures remain standing. Bridges destroyed. Rails bent greatly.
XII	Damage total. Lines of sight and level are distorted. Objects thrown into the air.

Source: USGS

Notes: *Abbreviated Modified Mercalli Intensity Scale.

By comparison, an earthquake's *magnitude* is related to the amount of seismic energy released at the hypocenter of the earthquake. *Magnitude* is based on the amplitude of the earthquake waves recorded on instruments, which have a common calibration. The magnitude or strength of earth movement associated with seismic activity is typically quantified using the Richter scale. This scale is a measure of the strength of an earthquake or strain energy released by it, as determined by seismographic observations. This is a logarithmic value originally defined by Charles Richter (1935). An increase of one unit of magnitude (for example, from 4.6 to 5.6) represents a 10-fold increase in wave amplitude on a seismogram, or approximately a 30-fold increase in the energy released. In other words, a magnitude 6.7 earthquake releases over 900 times (30 times 30) the energy of a 4.7 earthquake.

The California Geological Survey (CGS) identifies low, medium, and high severity zones within the state of California. The Planning Area is located within Seismic Zone 3. A Seismic Zone 3 is an area that can expect to experience ground motion of low severity. Based upon seismologic and geologic conditions, the maximum level of ground motion potentially experienced in the

Planning Area would occur as a result of a 6.5 magnitude earthquake on the Foothills Fault zone or Great Valley fault. Minor ground shaking can result in partial collapse of buildings, and extensive damage in poorly built or sub-standard structures.

In accordance with the severity zones, the CGS also defines the following:

- *Fault* – a fracture or zone of closely associated fractures along which rocks on one side have been displaced with respect to those on the other side;
- *Fault Zone* – a zone of related faults, which commonly are braided, and sub parallel, but may be branching and divergent. A fault zone has a significant width (with respect to the scale at which the fault is being considered, portrayed, or investigated), ranging from a few feet to several miles;
- *Potentially Active Fault* – a fault that showed evidence of surface displacement during Quaternary time (last 1.6 million years). The purpose of this designation indicates the evaluation of possible zonation. No longer used;
- *Sufficiently Active Fault* – a fault that has evidence of Holocene (10,000 years) surface displacement along one or more of its segments or branches; and,
- *Well-Defined Fault* – a fault whose trace is clearly detectable by a trained geologist as a physical feature at or just below the ground surface. The geologist should be able to locate the fault in the field with sufficient precision and confidence to indicate that the required site-specific investigations would meet with some success.

“Sufficiently Active Faults” and “Well Defined Faults” are the two criteria used by the State of California in order to determine if a fault should be zoned under the Alquist-Priolo Act, further discussed in Section 4.8.2, Regulatory Framework. No known active faults or Alquist-Priolo earthquake hazard zones (formerly known as special study zones) occur in Sacramento County. However, there are active fault zones just outside of the County and several inactive subsurface faults are identified in the Delta region. There are also pre-quaternary fault zones located near the Rancho Cordova Planning Area. **Table 4.8-4**, below, lists the fault zones within the region, and their approximate location to the Rancho Cordova Planning Area.

**TABLE 4.8-4
PROXIMITY OF FAULT ZONES TO THE RANCHO CORDOVA PLANNING AREA**

Fault	Activity	Location
Midland	Some activity in 1897; however, no appreciable movement in the last 24 to 36 million years	35 miles west of the Planning Area between the cities of Vacaville and Winters
Bear Mountain	1.6 million years	24 miles northeast of the Planning Area
Great Valley	currently active	58 miles west of the Planning Area
Melones	more than 2 million years	30 miles east of the Planning Area
Dunnigan Hills or Zamora	10,000 years	38 miles northwest of the Planning Area

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Fault	Activity	Location
Green Valley	portions active within the past 200 years	54 miles southwest of the Planning Area
Hunting Creek	Not reported	66 miles west of the Planning Area
Healdsburg-Rodgers Creek	Not reported	56 miles southwest of the Planning Area
West Napa	Not reported	49 miles southwest of the Planning Area
Greenville	portions active within the past 200 years	53 miles southwest of the Planning Area
Calaveras	portions active within the past 200 years	60 miles southwest of the Planning Area
Las Positas	portions active within the past 200 years	65 miles south of the Planning Area

The Midland fault and the Bear Mountain fault zones, considered the faults of greatest concern in Sacramento County due to their location and size, are older than 1.6 million years old. The Midland fault zone is considered to be a deep pre-Oligocene subsurface feature extending nearly 50 miles along the west side of the Sacramento Valley. Subsurface data indicate that there has been no appreciable movement on the Midland fault in the last 24 to 36 million years, and no evidence of surface expression has been found.

The Bear Mountain fault zone is the nearest fault to the Planning Area, the closest segment being approximately 24 miles northeast of the Planning Area. The Bear Mountain fault is the westerly-most fault within the Foothills fault zone, which consists of numerous northwesterly trending faults along the western edge of the Sierra Nevada range.

In the north Central Valley, the width of the Great Valley Fault zone extends from the eastern flanks of the Coast Ranges as far easterly as Dunnigan. This zone of potential faulting may be connected to the Vacaville-Winters earthquakes of 1892 and the Coalinga earthquake of 1983. Earthquake activity within the Great Valley fault zone often occurs on "blind thrusts", in reference to their lack of surface expression and the direction of fault offset.

Secondary Hazards

Tectonic activity can produce a variety of secondary hazards affecting structures and/or adversely affecting human safety. The most common secondary seismic hazards result from ground shaking, liquefaction, and the settlement of underlying soils.

Ground Shaking

Ground shaking is the motion that occurs as energy is released during fault related activity and is considered the most damaging of all seismic activities. In the developed and more populated portions of the Planning Area, the greatest geologic potential for loss of life and property damage is the result of ground shaking from a nearby earthquake. The degree of damage depends on many interrelated factors. Among these factors are the Richter Magnitude, focal depth, distance from the causative fault, source mechanism, duration of shaking, high rock accelerations, type of surficial deposits or bedrock, degree of consolidation of surficial deposits,

presence of high groundwater, topography, and design, type, and quality of building construction.

The risk of damage to manmade structures may be caused by primary ("P") waves or secondary ("S") waves as the ground oscillates back and forth, or side-to-side, and as the P or S waves travel through the earth's subsurface layers in response to a seismic event. The Planning Area is considered to be in a relatively moderate ground shaking zone due to the distance of active faults.

Liquefaction Potential

Liquefaction is the process in which water is combined with unconsolidated soils, generally from ground motion and pressure, which causes the soils to behave like quicksand. Liquefaction potential is determined from a variety of factors, including: soil type, soil density, depth to the groundwater table, and the duration and intensity of ground shaking. Liquefaction is most likely to occur in deposits of water saturated alluvium or areas of considerable artificial fill. Although the Rancho Cordova Planning Area is geologically characterized by alluvial Riverbank deposits, fewer than 28 percent of the soil types within the Planning Area are considered unconsolidated soils. In addition, the depth to the groundwater table and aquifer system is generally greater than 50 feet. Therefore, the potential for liquefaction is considered low.

The potential for other secondary hazards (i.e., ground lurching, differential settlement, or lateral spreading) occurring during or after seismic events in the Planning Area is also considered to be low due to the distance of active faults.

Subsidence

Subsidence is the gradual settling or sinking of surface soil deposits with little or no horizontal motion. Sacramento County is affected by five causes of land subsidence: 1) compaction of unconsolidated soils from earthquakes; 2) compaction by heavy structures; 3) erosion of peat soils; 4) peat oxidation; and 5) groundwater withdrawal. Minor land subsidence was observed and recorded in the County between 1912 and the mid-1960's for all groundwater basins underlying the County. However, subsidence did not exceed 0.40-feet during this time frame. Due to the soils characteristics within the Planning Area, the likeliness of subsidence is considered very low.

Historical Seismic Activity

As indicated previously, no known active faults or Alquist-Priolo earthquake hazard zones occur in Sacramento County. Accurate seismic activity records for Sacramento County have been kept for the past 150 years, which indicate that significant regional seismic activity was recorded in 1869, 1892, 1954, and 1966. Records indicate that the 1869, 1954, and 1966 events were centered in western Nevada and did not result in ground shaking or structural damage in the Sacramento area.

In 1892, an earthquake measuring VI on the Modified Mercalli Scale occurred in the Vacaville and Winters areas and resulted in structural damage in downtown Sacramento, including, but not limited to: toppled chimneys, cracked plaster, and moderate masonry damage on several buildings. Other than the 1892 earthquake, no seismic activity of significant magnitude has occurred in Sacramento County resulting in structural damage or human related injuries or deaths.

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Mineral Resources

Historic mineral production in the region has included construction aggregate, kaolin clay, common clay, pumice, and gold. Construction aggregate consists of sand, gravel, and crushed stone. Existing mineral extraction activities that occur in and around the Rancho Cordova Planning Area primarily consist of fine sand and coarse gravel construction aggregates, as well as clay. Construction aggregates come from two different sources: hardbed rock sources and river channel (alluvial) sources. Generally, sand, gravel, and clay are used as fill and for the construction of highways and roads, streets, urban and suburban development, canals, aqueducts, and pond linings, among other uses.

There are two permitted mining operations in the City of Rancho Cordova, both owned by Aerojet and leased to Teichert Aggregates. The Grantline West Mining Site is located adjacent to the Rio del Oro Planning Area. The Aerojet Mining Site is located north of the Sunridge Specific Plan Area. Five additional mining operations occur within the southeastern section of the Planning Area, and a continuation of the Teichert Aggregates operations occur in the northeastern portion of the Planning Area outside of the current City limits. Teichert Aggregates and Granite Construction Materials both own and operate active aggregate extraction and crushing operations on-site. The locations of these mining operations are illustrated in **Figure 4.8-1**.

There are no oil and gas resources within the Rancho Cordova Planning Area. The Florin Gas Field and the Sacramento Airport Gas Field are located within the County but outside of the Planning Area.

The Surface Mining and Reclamation Act (SMARA) (Cal. Pub. Res. Code §§ 2710 et seq.) directs the State Geologist to identify and map the non-fuel mineral resources of the State in order to show where economically significant mineral deposits occur and where they are likely to occur based upon the best available scientific data. As such, the California Geological Survey and the State Mining and Geology Board are the state agencies responsible for the classification and designation of areas containing, or potentially containing, significant mineral resources. Areas known as Mineral Resource Zones (MRZs) are classified on the basis of geologic factors, without regard to existing land use and land ownership. The primary objective of the process is to provide local agencies with information on the location, need, and importance of minerals within their respective jurisdictions. The areas are categorized into four general classifications (MRZ-1 through MRZ-4) and are defined as follows:

- 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 available data.
- MRZ-4** Areas where available data is inadequate for assignment to any other MRZ.

Of the four, the MRZ-2 classification is recognized in land use planning because the likelihood for occurrence of significant mineral deposits is high, and the classification may be a factor in the

discovery and development of mineral deposits that would tend to be economically beneficial to society. Approximately 6,076 acres within the City and 8,229 acres within the proposed Planning Area, generally located west of Sunrise Boulevard, are classified as MRZ-2 and considered to encompass primarily aggregate deposits (see **Figure 4.8-1**). In addition, approximately 38 acres of clay deposits included in MRZ-3 are located along Prairie City Road, in the northeastern corner of the Planning Area.

4.8.2 REGULATORY FRAMEWORK

STATE

California Geological Survey

The Alquist-Priolo Earthquake Fault Zoning Act of 1972 (prior to January 1, 1994 known as the Alquist-Priolo Special Studies Zones Act – CCR, Title 14, Section 3600) sets forth the policies and criteria of the State of California in regards to building within active fault zones. The Alquist-Priolo Earthquake Fault Zoning Act outlines cities and counties' responsibilities in prohibiting the location of developments and structures for human occupancy across the trace of active faults. The policies and criteria are limited to potential hazards resulting from surface faulting or fault creep within Earthquake Fault Zones delineated on maps officially issued by the State Geologist.

SURFACE MINING AND RECLAMATION ACT OF 1975

The California Department of Conservation Reclamation Surface Mining and Reclamation Act of 1975 (§ 2710), also known as SMARA, provides a comprehensive surface mining and reclamation policy that permits the continued mining of minerals, as well as the protection and subsequent beneficial use of the mined and reclaimed land. The purpose of SMARA is to ensure that adverse environmental effects are prevented or minimized and that mined lands are reclaimed to a usable condition and readily adaptable for alternative land uses. The production and conservation of minerals are encouraged, while giving consideration to values relating to recreation, wildlife, range and forage, as well as aesthetic enjoyment. Residual hazards to the public health and safety are eliminated. These goals are achieved through land use planning by allowing a jurisdiction to balance the economic benefits of resource reclamation with the need to provide other land uses.

If a use is proposed that might threaten the potential recovery of minerals from an area that has been classified MRZ-2, SMARA would require the City to prepare a statement specifying its reasons for permitting the proposed use, provide public notice of these reasons, and forward a copy of the statement to the State Geologist and the State Mining and Geology Board (Cal. Pub. Res. Code Section 2762).

LOCAL

Sacramento County General Plan

The County of Sacramento General Plan was adopted by the County Board of Supervisors in December 1993 and is currently undergoing an update. The County General Plan policies and implementation measures apply to development within the Rancho Cordova Planning Area that are outside of the City limits, until such time those areas are annexed into the City of Rancho Cordova. The Conservation Element within the County General Plan includes policies and implementation measures relevant to soils and mineral resource impacts within Sacramento

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County. County General Plan Policies and associated implementation measures that are of particular note include: Policies CO-41 and CO-42 pertaining to the protection of mineral resources; Policies CO-43, CO-44, CO-45, CO-46, and CO-47, pertaining to the extraction of minerals and subsequent reclamation of mined areas, as well as impacts to aquifers, streams, scenic values, and surrounding residential uses; and CO-49, pertaining to the recycling of building materials so as to reduce the demand for aggregate materials. The reader is referred to **Figure 4.8-2**, below, which illustrates the County of Sacramento Mineral Overlay Zones within the City of Rancho Cordova and the Planning Area.

Cordova Community Plan

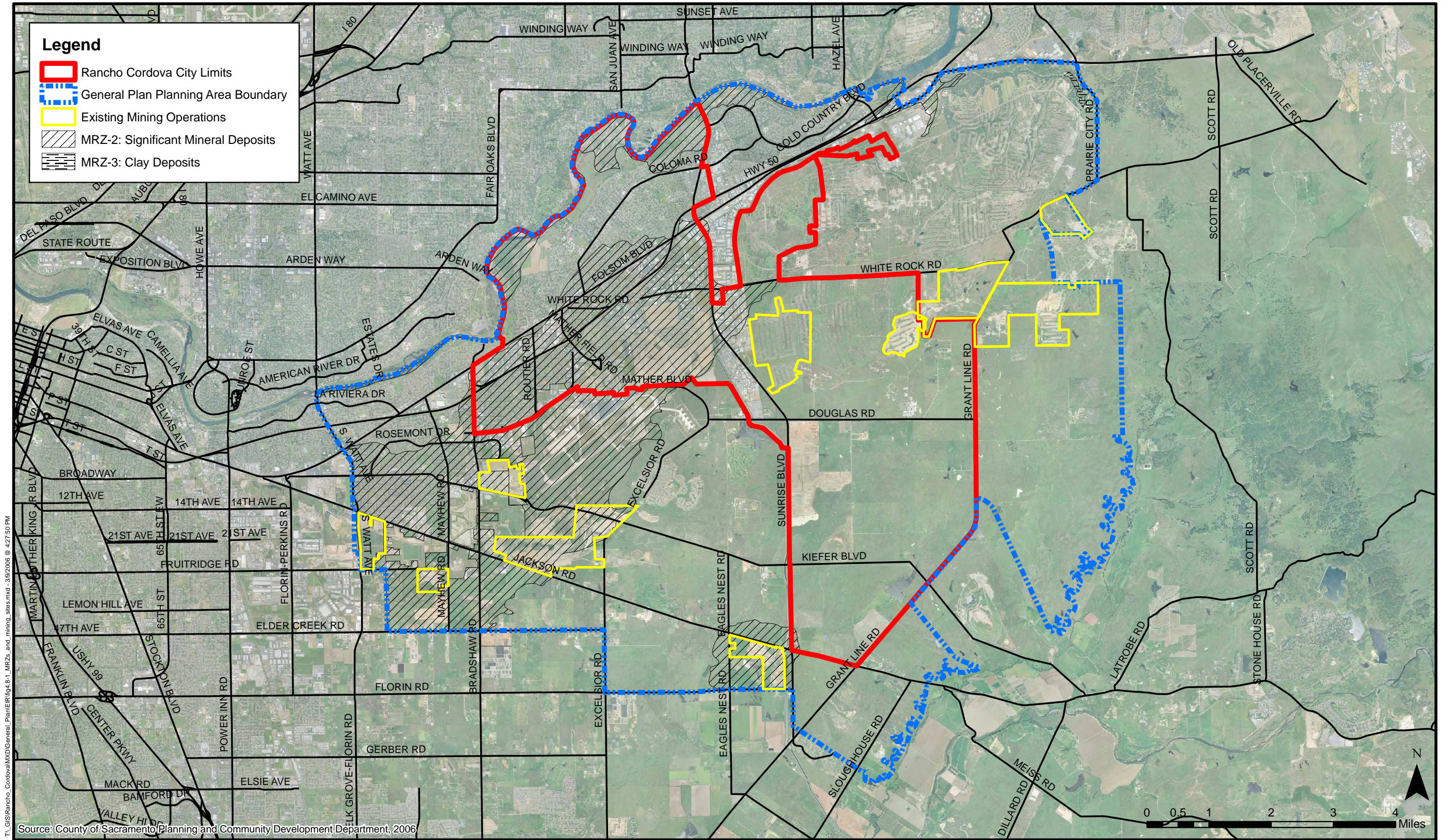
The Sacramento County Board of Supervisors adopted the Cordova Community Plan on May 21, 2003 (Resolution No 2003-0551) in order to further refine land use policies for the Rancho Cordova Community. The Community Plan does not include specific recommendations relative to the geological or mineral resources within the Planning Area and is not further discussed in this chapter.

City of Rancho Cordova Erosion Control Ordinance

Upon incorporation, the City of Rancho Cordova adopted the Sacramento County Department of Water Resources (DWR) Grading and Erosion Control Ordinance (Chapter 16.44 of the existing County Code) which establishes administrative procedures, a minimum standard of review, and implementation and enforcement procedures for controlling erosion, sedimentation, and other pollutant runoff from new development projects. The ordinance also addresses grading, filling, land excavation, construction activities, and drainage as they relate to a particular project. The ordinance applies to any development project resulting in the excavation of 350 cubic yards of soil or more. Grading and erosion control permits, and amendments thereto, are subject to the requirements of the California Environmental Quality Act (CEQA) if they have not been addressed in a previous environmental document. Individual project applicants are required to furnish a copy of the permit application to the City for review and approval. The City reviews all grading and erosion control permits and geotechnical studies and reports in accordance with the Ordinance to ensure geologic and soil stability have been properly addressed.

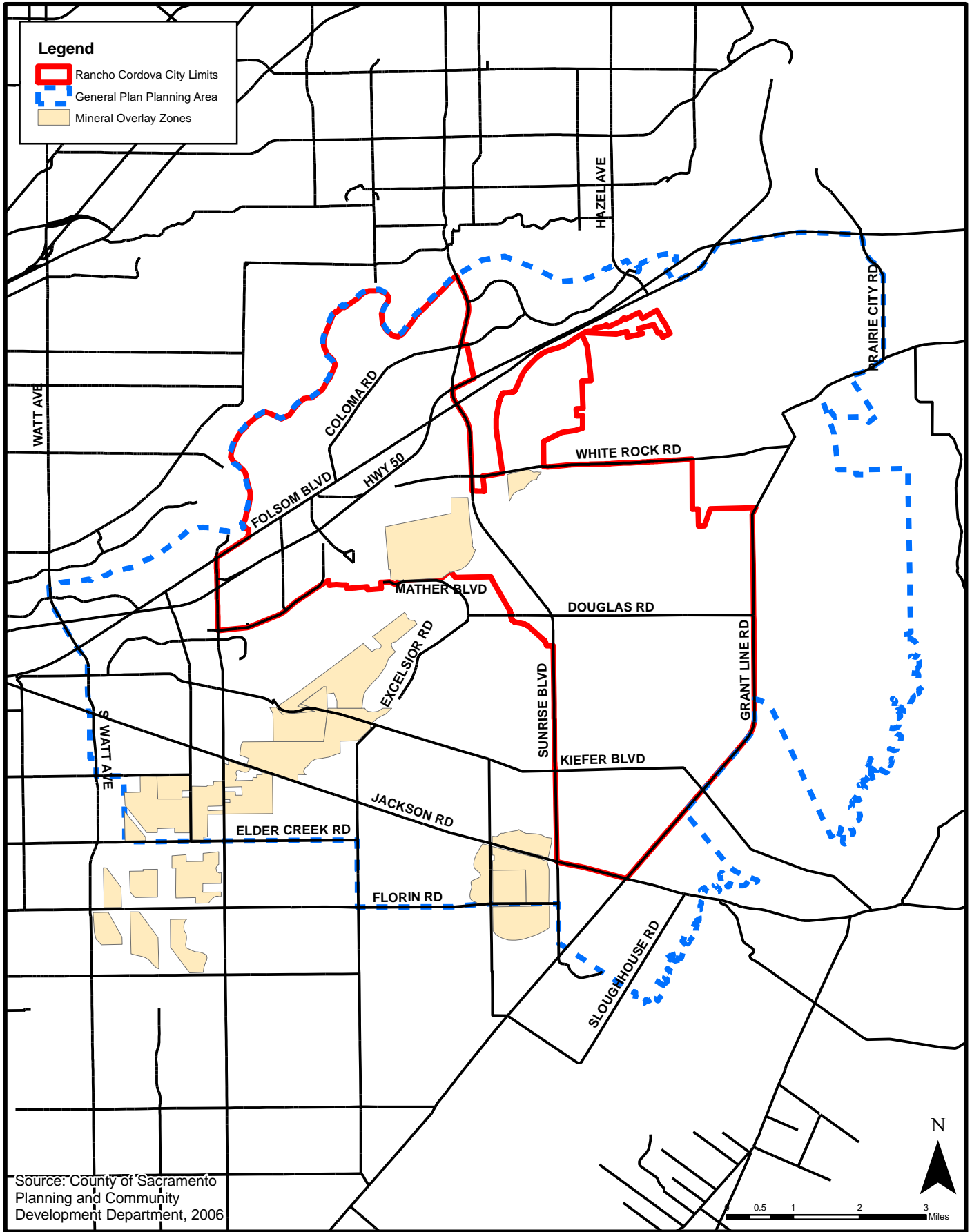
City of Rancho Cordova NPDES Permit

The City of Rancho Cordova, along with the cities of Citrus Heights, Folsom, and Galt, and the County of Sacramento, operate under a National Pollutant Discharge Elimination System (NPDES) renewed in December 2002 to discharge urban runoff from Municipal Separate Storm Sewer Systems (MS4s) in their municipal jurisdictions (NPDES No. CAS082597). The permit requires that the City impose water quality and watershed protection measures for all development projects. The intent of the waste discharge requirements in the NPDES Permit is to attain water quality standards and protection of beneficial uses consistent with the Basin Plan. The NPDES permit prohibits discharges from causing violations of applicable water quality standards or result in conditions that create a nuisance or water quality impairment in receiving waters.



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Figure 4.8-1
Mineral Resource Zones and Aggregate Operations
Within the General Plan Planning Area



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City of Rancho Cordova
Planning Department

Figure 4.8-2
County of Sacramento Mineral Overlay Zones
Within the General Plan Planning Area

A key component of the NPDES permit is the implementation of the Stormwater Quality Improvement Plan (SQIP) for the City, which consists of six Minimum Control elements (public education and outreach, public involvement and participation, detection and elimination of illicit discharges, construction stormwater control, postconstruction stormwater control for new development and redevelopment, and pollution prevention/good housekeeping for municipal operations). The City has identified a range of Best Management Practices (BMPs) and measurable goals to address the stormwater discharges in the City. As part of the SQIP, there are several regulations/procedures in place that implement the SQIP that include the Grading and Erosion Control Ordinance (Chapter 16.44 of the existing County Code) and construction standards. A key component of this compliance is implementation of the SQIP new development element that requires stormwater quality treatment and/or BMPs in project design for both construction and operation.

Postconstruction stormwater quality controls for new development requires use of control measures set forth in the Guidance Manual for On-Site Stormwater Quality Control Measures (City of Sacramento and County of Sacramento, 2000). This includes use of regional water quality control features (e.g., detention basins) for large developments (over 100 acres), use of treatment-control measures (swales, filter strips, media filters and infiltration), housing keeping practices (e.g., spill prevention, proper storage measures and clean-up procedures).

Grading and Erosion Control Ordinance

As discussed above, the City of Rancho Cordova adopted the existing Sacramento County General Plan to guide development in the city. The City also adopted the Sacramento County Department of Water Resources (DWR) Grading and Erosion Control Ordinance (Chapter 16.44 of the existing County code), which establishes administrative procedures, minimum standard of review, and implementation and enforcement procedures for controlling erosion, sedimentation and other pollutant runoff from new development projects. The ordinance also addresses grading, filling, land excavation, construction activities and drainage as they relate to a particular project. The ordinance applies to any development project resulting in the excavation of 350 cubic yards of soil or more. The ordinance also ensures compliance with the City's National Pollutant Discharge Elimination System (NPDES) Permit, which is issued by the California Regional Water Quality Control Board (CRWQCB). The City of Rancho Cordova is co-permittee on a NPDES Permit along with Sacramento County and the cities of Sacramento, Folsom, Galt, and Citrus Heights, and Elk Grove. The ordinance requires a separate permit for work on each site unless sites are contiguous, have the same ownership, and are included in the approved plan. The ordinance sets forth performance standards and a permit can be denied, based on the following findings:

- a) The applicant has failed to provide sufficient or adequate plans, information or other data necessary to allow determinations respecting compliance with the provisions of Chapter 16.44 or Sacramento County Specifications;
- b) The environmental review has not been completed, or other provisions of this code or of state law pertaining to environmental review have not been satisfied, or the activity will have significant adverse environmental impacts, which cannot be substantially mitigated. Where the activity will have significant adverse impacts, the Administrator may approve the permit in accordance with Chapter 16.44, Title 20, and CEQA (1970).
- c) The proposed activity will violate provisions of Chapter 16.44, Sacramento County Specifications, or state or federal laws, and such violation cannot be resolved by the imposition of conditions pursuant to Section 16.44.170.

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- d) The proposed activity will adversely affect surrounding properties and public rights-of-way, the water quality of watercourses, and existing drainage (SCC 102 Section 3, 1995; SCC Section 2, 1993).

City of Rancho Cordova Adoption of the UBC and CBC

The City of Rancho Cordova adopted the 1997 edition of the Uniform Building Code (UBC) upon incorporation. The purpose of the Uniform Building Code (UBC) is to provide minimum standards to preserve the public peace, health, and safety by regulating the design, construction, quality of materials, certain equipment, location, grading, use, occupancy, and maintenance of all buildings and structures. UBC standards address foundation design, shear wall strength, and other structural related conditions.

In addition, upon incorporation, the City of Rancho Cordova adopted the 2001 California Code of Regulations, Title 24, also known as the California Building Standards Code or California Building Code (CBC). The State of California provides minimum standards for building design through the CBC. The CBC, based on the federal Uniform Building Codes, applies to building design and construction in the state of California. The CBC modified UBC regulations for specific conditions found in California and included a large number of more detailed and/or more restrictive regulations. For example, CBC includes common engineering practices requiring special design and construction methods that reduce or eliminate potential expansive soil related impacts. The CBC requires structures to be built to withstand ground shaking in areas of high earthquake hazards, and the placement of strong motion instruments in larger buildings to monitor and record the response of the structure and the site of seismic activity. Compliance with CBC regulations ensures the adequate design and construction of building foundations to resist soil movement. In addition, the CBC also contains drainage related requirements in order to control surface drainage and reduce seasonal fluctuations in soil moisture content.

All development projects associated with the proposed General Plan are subject to UBC and CBC standards, which require a seismic evaluation and particular seismic design criteria to reduce ground shaking effects.

4.8.3 IMPACTS AND MITIGATION MEASURES

THRESHOLDS OF SIGNIFICANCE

Based on Appendix G of the CEQA Guidelines, a geology, soils, or mineral resources impact is considered significant if project implementation would result in any of the following:

- 1) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury or death involving:
 - i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence or other substantial evidence of a known fault. (Refer to Division of Mines and Geology Special Publication 42);
 - ii) Strong seismic ground shaking;
 - iii) Seismic-related ground failure, including liquefaction; or

iv) Landslides;

- 2) Result in substantial soil erosion or the loss of topsoil;
- 3) 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;
- 4) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property; or
- 5) Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater.

A project's mineral resources impacts are considered significant if project implementation would result in any of the following:

- 1) 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,
- 2) Result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan.

It should be noted that this analysis does not discuss significance standard "2" under mineral resource impacts because there are no resource recovery sites delineated on any local general plan, specific plan, or land use plan. Therefore, the issue of important mineral resource recovery sites is not discussed in this EIR.

METHODOLOGY

The geology and soils analysis is based on a review of published information, surveys, and reports regarding regional geology, soils, and mineral resources. Information was obtained from private and governmental agencies and Internet web sites, including: the USDA Natural Resources Conservation Service, the California Geological Survey, and the United States Geological Survey.

PROJECT IMPACTS AND MITIGATION MEASURES

Seismic Events

Impact 4.8.1 Implementation of the proposed General Plan, and the resulting increase in population, employment, and development activity within the Planning Area, may expose people, structures, and development to ground shaking and seismic hazards as a result of fault activity. This is considered a **less than significant** impact.

Ground shaking can result in significant structural damage or structural failure in the absence of appropriate seismic design. However, as previously discussed, the Planning Area is not located within an Alquist-Priolo earthquake hazard zone and there are no known active faults occurring within Sacramento County. The Planning Area, as with virtually all sites within the State of California, is, however, subject to minor ground shaking and potential secondary hazards (i.e.,

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liquefaction and subsidence) as a result of earthquakes. The Planning Area is in the area of Seismic Zone 3, which is considered an area of relatively low ground shaking potential, as defined by the California Department of Mines and Geology on the Preliminary Map of Maximum Expectable Earthquake Intensity in California, and the Sacramento County General Plan Safety Element. A Seismic Zone 3 is an area that can expect to experience ground motion of low severity. Based upon the seismologic and geologic conditions discussed above, the maximum level of ground motion potentially experienced in the Planning Area would occur as a result of a 6.5 magnitude earthquake on the Foothills Fault zone or Great Valley fault. Minor ground shaking can result in partial collapse of buildings, and extensive damage in poorly built or sub-standard structures.

The potential for soil liquefaction due to earthquakes and ground shaking is considered minimal, because of the site-specific characteristics of the Planning Area, and also because development would have to comply with the UBC and CBC. As discussed above, liquefaction is the process in which water is combined with unconsolidated soils as a result of seismic activities involving ground motions and pressure. The depth to groundwater beneath the Planning Area is generally greater than 50 feet, rendering the potential for liquefaction low. In addition, the potential for liquefaction is considered low due to the nature of on-site soils underlying the Planning Area. As indicated in **Table 4.8-1**, the majority of these soil units generally have low to moderate water holding capacities.

The low risk to liquefaction due to the depth of groundwater and the nature of soils underlying the Planning Area would be further reduced by proper design of all proposed structures in conformance with the UBC and CBC. As discussed above, the City adopted the UBC and CBC upon incorporation. The CBC requires structures to be built to withstand ground shaking in areas of high earthquake hazards, and the placement of strong motion instruments in larger buildings to monitor and record the response of the structure and the site of seismic activity. Compliance with CBC regulations ensures the adequate design and construction of building foundations to resist soil movement. In addition, the CBC also contains drainage related requirements in order to control surface drainage and reduce seasonal fluctuations in soil moisture content. All development projects associated with the proposed General Plan are subject to UBC and CBC standards, which require a seismic evaluation and particular seismic design criteria to reduce ground shaking effects.

The combination of the Planning Area characteristics and compliance with the UBC and CBC would be sufficient to prevent significant damage from ground shaking during seismic events resulting from movement on any of the faults or fault systems described within this EIR.

Proposed General Plan Policies and Action Items That Provide Mitigation

The following General Plan policies and action items are identified in the General Plan Safety Element that address seismic hazards:

- Policy S.3.1 The City supports efforts by Federal, State, and other local jurisdictions to investigate local seismic and geological hazards and supports those programs that effectively mitigate these hazards.*
- Action S.3.1.1 Continue to implement the Uniform Building Code to ensure that structures meet all applicable seismic standards.*
- Policy S.3.2 The City shall ensure that new structures are protected from damage caused by geologic and/or soil conditions to the greatest extent feasible.*

- Action S.3.2.1 Continue to require that all new construction projects complete a geotechnical report or conduct other appropriate analysis to determine the soils characteristics and associated development constraints.*
- Action S.3.2.2 Impose the appropriate mitigation measures for new development located in seismic and geologically sensitive areas.*

Implementation of the above General Plan policies and associated action items, in addition to adherence to the Uniform Building Code and the California Building Code, as well as Mitigation Measure MM 4.8.3 would reduce to a minimum the exposure of people and structures to potential substantial adverse effects, including the risk of loss, injury or death, resulting from earthquakes, ground shaking, liquefaction, and other secondary hazards within the Planning Area, and are considered to be **less than significant**.

Mitigation Measures

None required.

Soil Erosion

Impact 4.8.2 Implementation of the proposed General Plan would include substantial construction and site preparation activities. These activities increase soil erosion, especially from wind and water, and siltation of local drainages during construction, excavation and grading activities. Implementation of the proposed General Plan policies and future development's compliance with the City's NPDES Permit and the City's Erosion Control Ordinance would reduce these impacts to **less than significant**.

Implementation of the proposed General Plan would include new roadways, improvements to existing roadways, substantial infrastructure (water and sanitary sewer facilities), and varying densities of commercial, residential, and industrial development. Approximately 18,142 acres within the City and 47,074 acres of the entire Planning Area (including the City) are anticipated to be disturbed and altered with urban levels of development at buildout under this General Plan.

The grading and site preparation activities associated with the proposed development would remove topsoil, disturbing and potentially exposing the underlying soils to erosion from a variety of sources, including wind and water. In addition, construction activities generally involve the use of water, which may further erode the topsoil as the water moves across the ground. The proposed development would involve paving and other site improvements, substantially increasing the amount of impervious surfaces (incapable of being penetrated by water). These impervious surfaces generate higher levels of urban runoff (i.e., erosion from site preparation, sediment deposition from storm water runoff, and automobile fluids). The increased urbanized runoff has the potential to adversely affect surface and groundwater quality in the area. If not properly managed, the runoff could greatly affect the quality of wetlands and vernal pools, which are located throughout the Planning Area. The Reader is referred to Section 4.9, Hydrology and Water Quality, for a further discussion regarding erosion and water quality.

Certain soil types within the Planning Area are especially susceptible to erosion, and thus increase the potential to siltation of local drainages. The following soil types within the Planning Area are characteristic of moderate to severe soil erosion potential: Corning-Redding complex, Kimball silt loam, Madera loam, Pentz-lithic xerothents complex, and San Joaquin silt loam. Of

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these, the Corning-Redding complex, the Kimball silt loam, the Madera loam, and the San Joaquin silt loam soil types are found within the Rancho Cordova City limits, and the Corning-Redding complex, Kimball silt loam, Pentz-lithic xerothents complex, and the San Joaquin silt loam soil types are found within the Planning Area, outside of the City limits.

Construction activities involving clearing, grading, or excavation that causes soil disturbance on one or more acres (or any project involving less than one acre that is part of a larger development plan and includes clearing, grading, or excavation) would be subject to coverage under the State's National Pollutant Discharge Elimination System (NPDES) General Construction Storm Water Permit. Project applicants are required to prepare and comply with a Storm Water Pollution Prevention Plan (SWPPP) that specifies Best Management Practices (BMPs) to avoid soil erosion and associated pollution of waterways and are also required to report any water pollution and remediate the pollution occurrence.

As previously discussed, the City adopted the Sacramento County Grading and Erosion Control Ordinance (Chapter 16.44 of the existing County Code), which establishes administrative procedures, minimum standards of review, and implementation and enforcement procedures for controlling erosion, sedimentation, and other pollutant runoff from new development projects. The ordinance also addresses grading, filling, land excavation, construction activities, and drainage as they relate to a particular project site or development project. The ordinance applies to any new or redevelopment project resulting in the excavation of 350 cubic yards of soil or more. Individual project applicants are required to furnish a copy of the permit application to the City for review and approval. The City reviews all grading and erosion control permits and geotechnical studies and reports in accordance with the Ordinance to ensure geologic and soil stability have been properly addressed.

The Grading and Erosion Control Ordinance also ensures compliance with the City's NPDES Permit, issued by the RWQCB. As discussed above, the City of Rancho Cordova is co-permittee on a NPDES Permit along with Sacramento County and the cities of Sacramento, Folsom, Galt, and Citrus Heights. The joint NPDES permit regulates all wet and dry weather runoff discharge in the County, including the City of Rancho Cordova. Management of compliance is conducted by the Sacramento County Water Agency. The joint permit requires implementation of a storm water management program, including the use of BMPs.

Proposed General Plan Policies and Action Items That Provide Mitigation

The following General Plan policies and action items are identified in the General Plan Natural Resources Element that address soil erosion:

Policy NR.5.5 Minimize erosion to stream channels resulting from new development in urban areas.

Action NR.5.5.1 Require community and specific plans to contain urban runoff control strategies and requirements that are consistent with Master Drainage Plans and the City's urban runoff management program.

Action NR.5.5.2 Require development within newly urbanizing areas to incorporate runoff control measures into their site design or to participate in an area-wide runoff control management effort consistent with standards developed by the Public Works Department.

Action NR.5.5.3 Encourage new development to incorporate features such as grassy swales, multi-use retention or detention basins, and integrated drainage systems to enhance water quality. Work with the Cordova Recreation and Park District to establish standards for integrating retention/detention basins into park sites and create examples of desirable and innovative natural drainage features.

Action NR.5.5.4 Establish and require the use of best management practices to protect receiving waters from the adverse effects of construction activities, sediment and urban runoff.

The Planning Area is subject to the NPDES Permit under which the City is a co-permittee. As such, projects are evaluated for potential soil erosion impacts on a site-by-site basis. Impacts due to soil erosion can vary, depending on the type of development, intensity of development, and amount of lot coverage of a particular project. However, compliance with the City's Erosion Control Ordinance and NPDES and SWPPP requirements, as well as implementation of the above General Plan policies and associated action items, would ensure that the proposed General Plan's soil erosion related impacts are **less than significant**.

Mitigation Measures

None required.

Soil Stability

Impact 4.8.3 Implementation of the proposed General Plan may place development in areas with unstable soils. This impact is considered a **less than significant** impact.

The majority of the soils in the Planning Area are characterized as having a high shrink/swell potential, which refers to the potential of soils to expand during wet seasons and shrink during dry seasons. In addition, soils with moderate to high shrink/swell potential generally have low plasticity levels, which affects a soils expansion potential. The following soil types possess characteristics of soils with moderate to high shrink/swell potential and are located within the Rancho Cordova City limits: Americanos-urban land complex, Hicksville loam, Hicksville gravelly loam, Kimball silt loam, Kimball urban land complex, Natomas loam, Red Bluff loam, Red Bluff-urban land complex, Red Bluff-Xeraents complex, Reiff fines sandy loam, Rossmoor-fine sand loam, Rossmoor-urban land complex, and the Slickens soil types. The following soil types possess characteristics of soils with moderate to high shrink/swell potential and are located within the Rancho Cordova Planning Area, outside of the City limits: Americanos-urban land complex, Bruella sandy loam, Columbia sandy loam, Creviscreek sandy loam, Dierssen clay loam, Hicksville loam, Hicksville gravelly loam, Hicksville sandy clay loam, Kimball silt loam, Kimball urban land complex, Natomas loam, Red Bluff loam, Red Bluff-urban land complex, Red Bluff-Xeraents complex, Reiff fines sandy loam, Rossmoor-fine sand loam, Rossmoor-urban land complex, and Slickens (see Figure 4.8-1). Such areas of the Planning Area could contain layers of highly expansive soils, which could pose development constraints as structures or improvements constructed on expansive soils could suffer severe damage from the expansion.

As discussed previously, the City of Rancho Cordova adopted the 1997 Uniform Building Code and the 2001 California Code of Regulations (CCR), Title 24, also known as the California Building Standards Code or California Building Code (CBC). The CBC includes common engineering practices requiring special design and construction methods that reduce or eliminate potential expansive soil related impacts. Compliance with CBC regulations ensures the adequate design

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and construction of building foundations to resist soil movement. In addition, the CBC also contains drainage related requirements in order to control surface drainage and reduce seasonal fluctuations in soil moisture content.

Geotechnical reports are a tool used by public agencies and developers to identify specific site conditions and to develop design and construction recommendations for infrastructure improvements, and commercial and residential development projects. Geotechnical reports generally contain a summary of all subsurface exploration data, including: a subsurface soil profile, exploration logs, laboratory or in situ test results, and groundwater information. The reports also interpret and analyze the subsurface data, recommend specific engineering design elements, provide a discussion of conditions for the solution of anticipated problems, and recommend special geotechnical provisions. As site-specific soil erosion and runoff hazards are dependent on terrain, elevations, slope changes, and amount of impervious surfaces, only property specific sub-surface investigations have been performed for development projects within the proposed Planning Area.

Proposed General Plan Policies and Action Items That Provide Mitigation

The following General Plan policies and action items are identified in the General Plan Safety Element address soil and geologic stability:

- Policy S.3.2 The City shall ensure that new structures are protected from damage caused by geologic and/or soil conditions to the greatest extent feasible.*
- Action S.3.2.1 Continue to require that all new construction projects complete a geotechnical report or conduct other appropriate analysis to determine the soils characteristics and associated development constraints.*
- Action S.3.2.2 Impose the appropriate mitigation measures for new development located in seismic and geologically sensitive areas.*

Compliance with the adopted Uniform Building Code and California Building Code requirements, as well as implementation of the above General Plan policies, action items would ensure that the expansive or unstable soil related impacts are **less than significant**.

Mitigation Measures

None required.

Septic System Operation

Impact 4.8.4 Implementation of the proposed General Plan could impact areas where soils are may be incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems. This would be a **less than significant** impact.

Although implementation of the General Plan would require all commercial and industrial developments, and all residential development with lots smaller than two acres, to connect to a public sewer system, septic systems or alternative wastewater disposal systems would be permitted on residential lots of two acres or more in size. Soils within rural residential areas that do not adequately support the use of septic systems or alternative wastewater disposal systems could lead to the contamination of groundwater. Impacts would be limited to those areas

along the Planning Area boundaries, which under the proposed General Plan, provide for densities (e.g. 0.1 to 0.5 dwelling units per acre) that could support the use of septic systems.

Currently, the Sacramento County Environmental Management Department is responsible for oversight of the design and installation of onsite sewage disposal systems throughout Sacramento County, pursuant to Chapter 6.32, Sanitary Sewage Systems. This includes any area within City limits or outside of City limits. The regulations for Sacramento County are dictated by the geology of the region where the system is installed. The type of system parcels require depends primarily on where the parcel is located. The most frequently installed system is the standard pit system. This type of system is used in areas where it has been determined that the system would be less likely to degrade the water table, and the soil conditions are such that effluent will be more readily absorbed into the pit area. If the parcel to be developed is in an area where the water table is high, or soil conditions are poor, a leach field or deep trench may be required.

In cases where it is not possible to install a standard pit system or a leach field system, an alternative system is required, but it must be approved for use in Sacramento County. Although the Sacramento County Environmental Management Department would have to approve any future proposed septic system, the following General Plan policies and action items would also reduce impacts.

Proposed General Plan Policies and Action Items That Provide Mitigation

The following General Plan policies and action items are identified in the General Plan Infrastructure, Services, and Finance Element that address septic and wastewater systems:

- Policy ISF.3.4* *Ensure that water supply and delivery systems are available in time to meet the demand created by new development, or are guaranteed to be built by bonds or sureties.*
- Policy ISF.4.2* *Ensure that sewage conveyance and treatment capacity are available in time to meet the demand created by new development, or are guaranteed to be built by bonds or other sureties.*
- Action ISF.2.6.1* *Require all subdivision developments to adhere to the following provisions, to the extent permitted by state law:*
- *Sewage/wastewater treatment capacity shall be available at the time of tentative map approval.*
 - *The agency providing sewer service to the subdivision shall demonstrate prior to the approval of the Final Map by the City that sufficient capacity shall be available to accommodate the subdivision plus existing development, and other proposed or approved projects which have received sewage treatment capacity commitment.*
 - *Onsite and offsite sewage conveyance systems required to serve the subdivision shall be in place prior to the approval of the Final Map, or their financing shall be assured to the satisfaction of the City, consistent with the requirements of the Subdivision Map Act.*

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- Sewage conveyance systems within the subdivision shall be in place and connected to the sewage disposal system prior to the issuance of any building permits. Model homes may be exempted from this policy as determined appropriate by the City, and subject to approval by the City.

Action ISF.2.6.2 Generally, the City shall not allow construction of independent community sewer systems to serve new development.

Action ISF.2.6.3 Require all commercial or industrial development, as well as all residential development with lots smaller than two acres, to connect to a public sewer system.

Compliance with the Sacramento County Environmental Management Department's requirements for the approval and installation of septic systems, including Chapter 6.32, Sanitary Sewage Systems, as well as implementation of the above General Plan policies and associated action items, would ensure that impacts due to soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems within the Planning Area are mitigated to **less than significant**.

Mitigation Measures

None required.

Mineral Resources

Impact 4.8.5 Implementation of the proposed General Plan would result in the loss of availability of aggregate resources, which are locally important due to their use by the construction community in development of the area. This is considered to be a **significant** impact.

The sand and gravel currently mined in the region is used primarily for construction according to the City of Rancho Cordova (pers. comm., Bill Campbell). Construction aggregates are an important, fundamental building material used extensively as a foundation and road base material. In terms of volume and price, there is presently no economically viable substitute for aggregate products. The demand for aggregate products in the region has increased with the region's population and corresponding physical growth. Under the proposed General Plan, demand is expected to increase, as population and physical growth continue to increase. Should known resources become depleted or unavailable, the aggregates industry will need to relocate or begin importing, at a much higher cost, from more distant areas.

Approximately one third of the Planning Area is designated MRZ-2 by the California Geological Survey and the State Mining and Geology Board. An MRZ-2 classification identifies areas in which significant mineral deposits are known to exist. There are approximately 6,076 acres within the City of Rancho Cordova identified as MRZ-2 and approximately 8,229 acres within the Planning Area outside the City limits identified as MRZ-2 (see **Figure 4.8-1**). Any development of the portions of the Planning Area that are identified as MRZ-2 could result in preventing mineral resources located in those areas from being mined. As illustrated in **Figure 4.8-2**, the proposed General Plan would conflict with the Mineral Overlay Designations that are currently designated under the Sacramento County General Plan.

The west-central portion of the Planning Area that is within the City limits and identified as MRZ-2 consists entirely of existing residential, commercial, and industrial development. This development was initiated prior to or shortly following incorporation of the City of Rancho Cordova. Implementation of the General Plan could cause additional resources to become unavailable as a result of the transition to urban land uses. In addition, land use conflicts between urban uses and mining operations could also result in the closure of existing mining operations, and therefore indirectly result in the loss of availability of aggregate resources.

Proposed General Plan Policies and Action Items That Provide Mitigation

The following General Plan policies and action items are identified in the General Plan Natural Resources Element and Land Use Element regarding land use compatibility:

- Policy NR.6.1 Ensure that the environmental effects of mining and reclamation on aquifers, streams, scenic values, and surrounding residential uses are prevented or minimized.*
- Action NR.6.1.1 Regulate surface mining operations as required by California's Surface Mining and Reclamation Act of 1975 ("SMARA"), Public Resources Code Section 2207 (relating to annual reporting requirements), and State Mining and Geology Board regulations for surface mining and reclamation practice.*
- Action NR.6.1.2 Coordinate mining operations and urban development to minimize conflicts between residents and mining, particularly where mining is required before urbanization.*
- Action NR.6.1.3 Require inactive mined lands to be reclaimed to a usable condition that is readily adaptable to the future, anticipated land uses.*
- Policy LU.1.4 Promote high quality, efficient, and cohesive land utilization that minimizes negative impacts (e.g., traffic congestion and visual blight) and environmental hazards (e.g. flood, soil instability) on adjacent neighborhoods and infrastructure and preserve existing and future residential neighborhoods from encroachment of incompatible activities and land uses.*

Mitigation Measures

MM 4.8.5 The following will be added under Goal NR.8 as a new policy:

While mining activities are anticipated to be phased out within the City, the City recognizes the right of these uses to continue, and will require setbacks, buffers, screening and other appropriate measures to allow for the continued operation of mining activities.

Implementation of the above General Plan policies and action items and Mitigation Measure MM 4.8.5 would minimize the loss of availability of important mineral resources in the Planning Area. However, buildout of the Planning Area (as set forth in the proposed General Plan) would still result in the ultimate loss of availability of mineral resources. Thus, this impact is considered **significant and unavoidable**.

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4.8.4 CUMULATIVE SETTING, IMPACTS, AND MITIGATION MEASURES

CUMULATIVE SETTING

Site-specific topography, soil conditions, and surrounding development generally determine geological, soil, and mineral resource related impacts, which generally are not considered cumulative in nature. However, surficial deposits, namely erosion and sediment deposition, can be cumulative in nature, depending on the type and the amount of development proposed in a given geographical area. Further, land uses that contribute to the prevention of mining mineral resources recovery can contribute to the cumulative loss of availability of such resources. Development pressures in the region are resulting in the consideration of the conversion of mineral resource and mining sites to urban uses (e.g., City of Rocklin has converted aggregate mining areas along Highway 65 to urban development over the past 10 years). The cumulative setting for soil erosion and mineral resources consists of existing, planned, proposed and reasonably foreseeable land use conditions in the region, as described in Section 4.0 of this document.

CUMULATIVE IMPACTS AND MITIGATION MEASURES

Cumulative Geologic and Soils Impacts

Impact 4.8.6 Implementation of the proposed General Plan, in combination with existing, planned, proposed and reasonably foreseeable development, would not contribute to cumulative geologic and soil impacts, as the impacts would be site-specific and not additive in character. Thus, the General Plan's contribution would be **less than cumulatively considerable**.

Geology and soil related impacts are generally site specific and are determined by a particular site's soil characteristics, topography, and proposed land uses. Impacts associated with geology and soils are generally site-specific in nature, based on conditions relating to the subsurface materials that underlie a project site. These inherent conditions are an end-result of natural historical events that have played out through vast periods of geologic time. Development projects are analyzed on an individual basis and must comply with established requirements of the City and the UBC as they pertain to protection against known geologic hazards and potential geologic and soil related impacts. Given that there are no active faults in Sacramento County, and low incidence of historical geologic activity in the vicinity, the General Plan's contribution to cumulative geology related impacts is considered less than cumulatively considerable.

Proposed General Plan Policies and Action Items That Provide Mitigation

The following General Plan policies and action items are identified regarding soil and geologic stability:

Policy NR.5.5 Minimize erosion to stream channels resulting from new development in urban areas.

Action NR.5.5.1 Require community and specific plans to contain urban runoff control strategies and requirements that are consistent with Master Drainage Plans and the City's urban runoff management program.

- Action NR.5.5.2* Require development within newly urbanizing areas to incorporate runoff control measures into their site design or to participate in an area-wide runoff control management effort consistent with standards developed by the Public Works Department.
- Action NR.5.5.3* Encourage new development to incorporate features such as grassy swales, multi-use retention or detention basins, and integrated drainage systems to enhance water quality. Work with the Cordova Recreation and Park District to establish standards for integrating retention/detention basins into park sites and create examples of desirable and innovative natural drainage features.
- Action NR.5.5.4* Establish and require the use of best management practices to protect receiving waters from the adverse effects of construction activities, sediment and urban runoff.
- Policy S.3.2* The City shall ensure that new structures are protected from damage caused by geologic and/or soil conditions to the greatest extent feasible.
- Action S.3.2.1* Continue to require that all new construction projects complete a geotechnical report or conduct other appropriate analysis to determine the soils characteristics and associated development constraints.
- Action S.3.2.2* Impose the appropriate mitigation measures for new development located in seismic and geologically sensitive areas.

Adherence to all federal, state, and local requirements, in addition to implementation of the above General Plan policies and their associated action items and Mitigation Measure MM 4.8.3 would further minimize soil related impacts and protect water quality. The reader is referred to Section 4.9, Hydrology and Water Quality, for additional information regarding soil erosion and water quality. The General Plan's contribution to cumulative geologic and soil impacts are **less than cumulatively considerable**.

Mitigation Measures

None required.

Cumulative Mineral Resources

Impact 4.8.7 Implementation of the proposed General Plan, together with past, present, and probable future projects in the area, would result in a cumulatively significant loss of mineral resources in the region. The General Plan's incremental contribution to the loss of mineral resources is **cumulatively considerable**.

As discussed under Impact 4.8.5, implementation of the proposed General Plan would result in the loss of land areas known to contain important mineral resources (i.e., zoned MRZ-2). Although General Plan policies would minimize loss of availability of such resources, this impact would remain incrementally significant. The proposed General Plan would add to cumulative development pressures to convert such land areas to urban uses.

4.8 GEOLOGY AND SOILS

Proposed General Plan Policies and Action Items That Provide Mitigation

The following General Plan policies and action items are identified in the General Plan Natural Resources Element and Land Use Element regarding land use compatibility:

- Policy NR.6.1 Ensure that the environmental effects of mining and reclamation on aquifers, streams, scenic values, and surrounding residential uses are prevented or minimized.*
- Action NR.6.1.1 Regulate surface mining operations as required by California's Surface Mining and Reclamation Act of 1975 ("SMARA"), Public Resources Code Section 2207 (relating to annual reporting requirements), and State Mining and Geology Board regulations for surface mining and reclamation practice.*
- Action NR.6.1.2 Coordinate mining operations and urban development to minimize conflicts between residents and mining, particularly where mining is required before urbanization.*
- Action NR.6.1.3 Require inactive mined lands to be reclaimed to a usable condition that is readily adaptable to the future, anticipated land uses.*
- Policy LU.1.4 Promote high quality, efficient, and cohesive land utilization that minimizes negative impacts (e.g., traffic congestion and visual blight) and environmental hazards (e.g. flood, soil instability) on adjacent neighborhoods and infrastructure and preserve existing and future residential neighborhoods from encroachment of incompatible activities and land uses.*

Mitigation Measures

Implementation of the above General Plan policies, associated action items and Mitigation Measure MM 4.8.5 would minimize local impacts to mineral resources. However, development of areas in MRZ-2 zones within the Planning Area, in combination with past, present, and reasonably foreseeable future growth in the region, creates significant impacts to mineral resources. Cumulative impacts to mineral resources are **cumulatively considerable** and are considered a **significant and unavoidable** impact.

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