4.6 GEOLOGY AND SOILS, MINERAL RESOURCES, AND PALEONTOLOGICAL RESOURCES

4.6.1 INTRODUCTION

The Geology and Soils, Mineral Resources, and Paleontological Resources chapter of the EIR describes the geologic and soil characteristics of the project site and evaluates the extent to which implementation of the project could expose people and structures to the following geologic and seismic hazards: rupture of a known earthquake fault; strong seismic ground shaking; seismic-related ground failure, including liquefaction; soil erosion; soil stability; and expansive soils. In addition, the mineral and paleontological resources within the County are discussed. Information for the chapter has been drawn primarily from the Yolo County General Plan[1] and associated EIR,[2] the Cache Creek Area Plan (CCAP) Update FEIR,[3] and the following project-specific reports: the Slope Stability Evaluation[4] Local Geology Memorandum,[5] and Technical Memorandum related to dewatering and pit capture[6] prepared for the proposed project by Geocon Consultants, Inc. (see Appendix H) and a Custom Soil Resource Report[7] prepared for the project by the United States Department of Agriculture (USDA) Natural Resources Conservation Service.

In response to the NOP, the County received comments related to Geology and Soils, Mineral Resources, and Paleontological Resources from a number of residents in the area. These commenters expressed that the Draft EIR should consider the following:

- The depletion of minerals and natural resources (Resident);
- Risk of soil erosion during mining operations (Resident);
- Potential impacts to the relocation of the Moore Canal (Resident);
- The erosion of Cache Creek from gravel mining and bank disturbances (Resident); and
- Potential impacts from the removal of topsoil and soil compaction (Resident).

The CEQA Guidelines note that comments received during the NOP scoping process can be helpful in "identifying the range of actions, alternatives, mitigation measures, and significant effects to be analyzed in depth in an EIR and in eliminating from detailed study issues found not to be important." (CEQA Guidelines Section 15083.) Neither the CEQA Guidelines nor Statutes require a lead agency to respond directly to comments received in response to the NOP, but they do require that the comments be considered. Consistent with these requirements, these

1 Yolo County. *2030 Countywide General Plan.* November 10, 2009.
2 Yolo County. *Yolo County 2030 Countywide General Plan Environmental Impact Report. SCH# 2008102034.* April 2009.
3 Yolo County. *Cache Creek Area Plan Update Project, Final Environmental Impact Report. SCH# 2017052069.* December 2019.
4 Geocon Consultants, Inc. *Slope Stability Evaluation Teichert Shifler Mining and Reclamation Project Yolo County, California.* May 2016.
5 Geocon Consultants, Inc. *Technical Memorandum – Local Geology, Shifler Mining and Reclamation Project, Yolo County, California.* November 27, 2019.
6 Geocon Consultants, Inc. *Technical Memorandum: Dewatering Shifler Mining and Reclamation Project Yolo County, California.* August 11, 2020.
7 U.S. Department of Agriculture Natural Resources Conservation Service. *Custom Soil Resource Report for Yolo County, California Shifler Mining and Reclamation Project.* June 12, 2019.

comments have been carefully reviewed and considered by Yolo County and are reflected in the analysis of impacts in this chapter. Appendix B includes all NOP comments received.

Concepts and Terminology

The following definitions are common terms used to discuss issues related to geology and soils, mineral resources, and paleontological resources:

The following terms are used in this chapter to refer to soil types: silty sand (SM), silt (ML), silty clay (CL-ML), sandy clay (CL), clay (CL), and clayey sand (SC).

"Shrink-swell potential" is used in this chapter to describe the potential for expansive soils to increase in volume when they absorb water and shrink when they dry out.

The Mineral Resources Zone (MRZ) system, developed by the California State Mining and Geology Board, used in this chapter to discuss the presence of significant aggregate deposits. MRZs are defined as follows:

- MRZ-1. Areas where adequate information indicates that significant mineral deposits are not present or where a low likelihood for the presence of mineral deposits exists;
- MRZ-2. Areas where adequate information indicates significant mineral deposits are present or where a high likelihood for the presence of mineral deposits exists;
- MRZ-3. Areas containing mineral deposits, the significance of which cannot be evaluated from available data; and
- MRZ-4. Areas where available information is inadequate for assignment to any other MRZ.

"Factor of safety (FOS)" refers to the actual load-bearing capacity of a structure or component and the required margin of safety for a structure or component. A value of less than one means that the design of the component is not viable.

4.6.2 EXISTING ENVIRONMENTAL SETTING

The following setting information provides an overview of the existing conditions of the project site and surrounding area in relation to geology and soils, mineral resources, and paleontological resources.

Description of Regional Environment

The project region is characterized primarily by continuous agricultural lands within a broad, alluvial valley surrounded by distant rolling hills. Cache Creek generally meanders west to east and runs into the Sacramento Valley, ending in a settling basin east of Woodland, eventually flowing into the Sacramento River. Regional topography is generally flat. Vegetation, other than agricultural crops, is primarily limited to grasslands and ornamental landscaping.

The region is rural and sparsely populated, with urban development being primarily concentrated within small towns such as Capay, Esparto, and Madison. Rural residences, farm dwellings with various accessory and agricultural structures, and commercial uses sparsely dot the landscape. Roads provide interconnections between agricultural properties having various crops, such as row crops, orchards, and vineyards. Telephone and electricity poles frequently parallel the roadways throughout the region. Aggregate mining operations, inclusive of above-ground structures and equipment, are prevalent throughout the region, in particular, along the banks of Cache Creek, within the CCAP boundaries.

The proposed project site is located approximately three miles west of the City of Woodland, in unincorporated Yolo County. Approximately 70 percent of the County is located in the Great Valley geomorphic province of California, and consists of gently sloping to level alluvial plains. The remaining portion of the County is in the Coast Range geomorphic province. Geologic units in the Great Valley area generally consist of Quaternary alluvium or basin deposits, and the Quaternary Modesto and Riverbank Formations, both of which consist of somewhat older alluvium. According to geologic maps, the closest known active faults to the site are the Great Valley Fault System and a segment of the Dunnigan Hills Fault, located eight miles to the west and northwest, respectively.

Regional Seismicity

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

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

Regional faults surrounding the County include the Dunnigan Hills Fault, Capay Fault, West Valley Fault, Hunting Creek Fault, and Sweitzer Fault. However, the only fault in the County that has been identified by the California Geologic Survey (CGS) to be active, or potentially active, and subject to surface rupture is the Hunting Creek Fault. The fault is located in the northwestern corner of the County. The fault has caused Holocene displacement, but not during historic times.

Description of Local Environment

The central and southern portions of the project site consist primarily of actively managed agricultural land. Crops planted at the site over the past decade have included wheat, alfalfa, tomatoes, cucumbers, canola, sunflower, and safflower. The northeastern portion of the site previously contained a ranch headquarters (Stevens Ranch); however, the structures that comprised the headquarters were burned down as part of a fire department training exercise in the late 1970s or early 1980s. Currently, structures do not exist at the location and the area is currently overgrown by low-lying brush. The northern portion of the site consists of 52 scattered oak trees and ruderal grassland vegetation.

Moore Canal, a concrete-lined water conveyance structure owned and operated by the Yolo County Flood Control and Water Conservation District (YCFCWCD), bisects the central portion of the site from west to east. Magnolia Canal is an unlined water conveyance structure owned and operated by the YCFCWCD that intersects the Moore Canal on the northeastern portion of the project site. An existing groundwater well used for agricultural purposes is located along the

western site boundary. In addition, a domestic water supply well is located at the location of the former ranch headquarters. The northern portion of the site also includes an electric conveyor and associated gravel road formerly used to transport mined aggregate from the Teichert Woodland Storz mining site to the Woodland Plant located north of the project site. The natural environment of the immediate vicinity is similarly characterized by agricultural lands, but also includes Cache Creek, immediately north of the project site. Riparian woodland vegetation is located along portions of the banks of Cache Creek.

The environment of the immediate vicinity is dominated by aggregate mining operations to the north; a golf course (Yolo Fliers Club), Wild Wings Subdivision, airport (Watts-Woodland), and farm dwellings to the west/southwest; rural residential and cemetery (Monument Hill Memorial Park cemetery) to the south; and farm dwellings to the east. The existing aggregate mining operations in the vicinity consist of Teichert's Storz mining site to the west and Teichert's Woodland Plant site to the northeast, beyond which is Teichert's Schwarzgruber mining site. The Teichert-Woodland Plant has been in continuous operation for over 50 years.

Soil and Geology

Based on the Soil Resource Report prepared for the proposed project,[8] the site consists of Brentwood silty clay loam, 0 to 2 percent slopes, Loamy alluvial land, Riverwash, Sehorn-Balcom complex, 2 to 15 percent slopes, Sehorn-Balcom complex, 30 to 50 percent slopes, eroded, and Yolo silt loam, 0 to 2 percent slopes.

The site is underlain by Holocene-aged stream channel deposits. The depositional and erosional deposits are associated with open, active stream channels and generally consist of unweathered gravel, sand, silt, and clay. The overburden soil at the site consists of an approximate 9- to 18-foot thick layer of interbedded silty sand (SM), silt (ML), silty clay (CL-ML), sandy clay (CL), clay (CL), and clayey sand (SC). The gravelly soil below the overburden generally consists of loose to very dense poorly graded sand. The gravel and cobbles include slightly weathered to fresh metavolcanics and metasedimentary rock with some quartz and chert. The strata proposed for mining overlays a cemented sandstone to clay layer. Consistency of the clay layer varies from very stiff to hard as is typical of this type of sedimentary deposit. The presence of loamy soils on the project site indicates that most of the soils are alluvial, derived from sedimentary, igneous, or metamorphic rock.

Based on review of the drill hole logs, top and bottom elevations of the soil layers are relatively uniform, which is consistent with the erosional/depositional geology of the area.

Groundwater

The Slope Stability Evaluation encountered groundwater in a boring performed on February 20, 2014, at a depth of 70 feet below mean sea level (MSL).[9] Based on the *Preliminary Mining and Reclamation Exhibits* (which are presented as Figures 3-21 through 3-36 of the Project Description Chapter of this EIR), prepared by Cunningham Engineering and dated January 30, 2014, the average low groundwater elevation was determined to be 50 feet above MSL for mining

[8] U.S. Department of Agriculture, Natural Resources Conservation Service. *Custom Soil Resource Report for Yolo County, California Shifler Mining and Reclamation Project.* June 12, 2019.

[9] Geocon Consultants, Inc. *Slope Stability Evaluation Teichert Shifler Mining and Reclamation Project Yolo County, California.* May 2016.

and 40 feet above MSL for reclamation. The average high groundwater elevation was determined to be 65 feet above MSL for mining and 62 feet above MSL for reclamation.[10]

Fluctuations in the level of groundwater may occur due to variations in rainfall, temperature, or other factors such as localized pumping, irrigation practices, and seasonal fluctuations in Cache Creek.

Seismicity

Per the Slope Stability Evaluation, the proposed project site is not located on any known active earthquake fault trace. In addition, the site is not located within an Alquist-Priolo Earthquake Fault Zone. The Great Valley Fault System and a segment of the Dunnigan Hills Fault, located eight miles to the west and northwest, respectively, are the closest known active faults to the site. For the alluvial soil type, the United States Geologic Survey (USGS) estimated modal magnitude is 6.6. While the estimate can be useful for comparison of potential effects of fault activity in a region, other considerations are important in seismic design, including frequency and duration of motion and soil conditions underlying the site. However, the seismic risk at the site is not considered to be high.

Liquefaction

Liquefaction is a phenomenon in which saturated cohesionless soils are subject to a temporary loss of shear strength due to pore pressure buildup under the cyclic shear stresses associated with earthquakes. Primary factors that trigger liquefaction include the following: moderate to strong ground shaking, relatively clean, loose granular soils such as poorly graded sands and silty sands, and saturated soil conditions (i.e., shallow groundwater). The Governor's Office of Emergency Services does not designate the project site in a liquefaction zone area.[11] Additionally, because groundwater at the project site is approximately 42 to 65 feet below the ground surface, the likelihood that saturated soil conditions occur within the zone of potential liquefaction is low.

Landslides

The project site is relatively flat and level with an average elevation ranging from approximately 98.7 feet to 112 feet above MSL. According to General Plan Figure HS-2, the project site is in an area of low landslide susceptibility.

Expansive Soil

Expansive soils are those that increase in volume when they absorb water and shrink when they dry out, commonly referred to as "shrink-swell" potential. Soil surveys generally rate "shrink-swell" potential in soils on a low, medium, and high basis. If the shrink-swell potential is rated moderate to high, shrinking and swelling can cause damage to buildings, roads, and other structures; as a result, special design is often needed. According to the General Plan, the project site contains low to high expansive soils.[12]

Mineral Resources

The California State Mining and Geology Board uses the MRZ system to classify California's mineral resources. The zones are based on the presence of significant aggregate deposits.

[10] Luhdorff & Scalmanini Consulting Engineers. *Groundwater Conditions in the Vicinity of Planned Wetpit Mining Operations, Shifler Property*. February 2016.

[11] California Governor's Office of Emergency Services. *My Hazards*. Available at: http://myhazards.caloes.ca.gov/. Accessed February 28, 2019.

[12] Yolo County. *2030 Countywide General Plan* [Figure HS-3]. November 10, 2009.

Aggregates are used in the production of building materials, such as concrete, asphalt, and cement. Locally produced aggregate is a valuable resource for urban regions, because the cost of transporting these materials makes remote production cost prohibitive.

Yolo County has two primary mineral resources, aggregate (sand and gravel) and natural gas. Mining in Yolo County is regulated by the Off-Channel Mining Plan (OCMP). The MRZ-2 area along Cache Creek contains over 700 million tons of high-grade sand and gravel. Within the project site, 107-acres are designated as MRZ-2 reflecting known significant deposits and 212 acres are designated MRZ-3 reflecting unknown significant deposits. However, based on analysis and testing conducted by the applicant, the quality and quantity of mineral resources underlying the entire site have been confirmed. In July 2020, the applicant submitted an application to the California Department of Conservation (DOC) in July 2020 to modify the MRZ-3 State designation of the site to MRZ-2 to reflect the existence of known significant aggregate reserves over the entire project site.

Paleontological Resources

A fossil locality search (i.e., search of known locations where fossils have been identified) has been conducted within Yolo County to characterize the County's paleontological sensitivity. The fossil locality search identified eight fossil localities within or directly adjacent to the County. Five fossil localities were discovered in the Pliocene Tehama Formation. One fossil locality was found in the Pleistocene Red Bluff formation. Two fossil localities were found in undifferentiated Pleistocene alluvium. Three additional fossil localities were identified along Putah Creek.[13]

According to the Yolo County General Plan EIR, geologic units within Yolo County include the following: Holocene Alluvium, Pleistocene Alluvium, Tehama Formation, Capay Formation, Fores Formation, Guinda Formation, Funks Formation, Sites formation, Yolo Formation, and Venado Formation. The project site, which is located to the south of Cache Creek, is underlain by Holocene-aged stream channel deposits. Such depositional and erosional deposits are associated with open, active stream channels and generally consist of unweathered gravel, sand, silt, and clay. Per the General Plan EIR, late Holocene alluvial deposits such as those found on the project site typically contain vertebrate and invertebrate fossils of extant, modern taxa, which are generally not considered paleontologically significant.[14] Nonetheless, several past discoveries of paleontological resources have taken place near Cache Creek within the project region.

4.6.3 REGULATORY CONTEXT

The following is a description of federal, State, and local environmental laws and policies that are relevant to the review of geology and soils, mineral resources, and paleontological resources under the CEQA process.

Federal Regulations

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

[13] Yolo County. *2030 Countywide General Plan*. November 10, 2009.
[14] Yolo County. *Yolo County 2030 Countywide General Plan Environmental Impact Report. SCH# 2008102034* [pg. 527]. November 10, 2009.

Federal Earthquake Hazards Reduction Act

Passed by Congress in 1977, the Federal Earthquake Hazards Reduction Act (Public Law 95-124, 42 United States Code 7701 et. seq.) is intended to reduce the risks to life and property from future earthquakes. The Act established the National Earthquake Hazards Reduction Program (NEHRP). The goals of NEHRP are to educate and improve the knowledge base for predicting seismic hazards, improve land use practices and building codes, and to reduce earthquake hazards through improved design and construction techniques.

Uniform Building Code

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

State Regulations

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

Alquist-Priolo Earthquake Fault Zoning Act

The 1972 Alquist-Priolo Earthquake Fault Zoning Act (AP Zone Act, Division 2, Chapter 7.5 Sections 2621-2630 of the Public Resource Code) was passed to prevent the new development of buildings and structures for human occupancy on the surface of active faults. The Act is directed at the hazards of surface fault rupture and does not address other forms of earthquake hazards. The locations of active faults are categorized into fault zones by the AP Zone Act. Local agencies regulate new development within the appropriate zones in their jurisdiction.

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

Seismic Hazards Mapping Act

In 1990, following the Loma Prieta earthquake, the California Legislature enacted the Seismic Hazards Mapping Act (SHMA), which was enacted as Public Resources Code Chapter 7.8, Section 2690-2699.6. The act is intended to protect the public from the effects of strong ground shaking, liquefaction, landslides and other seismic hazards. The SHMA established a State-wide mapping program to identify areas subject to violent shaking and ground failure; the program is intended to assist cities and counties in protecting public health and safety. The SHMA requires

the State Geologist to delineate various seismic hazard zones and requires cities, counties, and other local permitting agencies to regulate certain development projects within the designated zones.

California Building Standards Code

The State of California regulates development within the State through a variety of tools that reduce or mitigate potential hazards from earthquakes or other geologic hazards. The 2016 California Building Standards Code (CBSC) (California Code of Regulations [CCR], Title 24) governs the design and construction of all building occupancies and associated facilities and equipment throughout California. In addition, the CBSC governs development in potentially seismically active areas and contains provisions to safeguard against major structural failures or loss of life caused by earthquakes or other geologic hazards. The CBSC includes federal building standards in the national building code, building standards adapted from national codes to meet California conditions, and building standards adopted to address particular California concerns.

Surface Mining and Reclamation Act

The Surface Mining and Reclamation Act (SMARA) was enacted by the State in 1975, through Public Resources Code Sections 2710-2796, as a means of minimizing adverse environmental effects of surface mining, ensuring that mined lands are reclaimed to a usable condition and that the production and conservation of mineral resources are encouraged. The act establishes state policy regarding reclamation of mined lands and minerals management practices, among other things.

Public Resources Code Section 5097.5

Section 5097.5 of the Public Resources Code establishes protections for historic, prehistoric, archaeological, and paleontological features. In particular, section 5097.5 prohibits the intentional excavation, removal, destruction, injury, or defacement of historic or prehistoric ruins, burial grounds, and archaeological or vertebrate paleontological sites on public lands. Public lands are defined as those lands owned by, or under the jurisdiction of, the state, or any city, county, district, authority, public corporation, or any agency thereof.

Local Regulations

The following are the regulatory agencies and regulations pertinent to the proposed project on a local level.

Yolo County General Plan

The relevant goals and policies from the Yolo County General Plan related to geology and soils, mineral resources, and paleontological resources are presented below.

Goal HS-1 Geologic Hazards. Protect the public and reduce damage to property from earthquakes and other geologic hazards.

- Policy HS-1.1 Regulate land development to avoid unreasonable exposure to geologic hazards.
- Policy HS-1.3 Require environmental documents prepared in connection with CEQA to address seismic safety issues and to provide adequate mitigation for existing and potential hazards identified.

Goal ED-1 Economic Diversity. Diversify the local economy to provide substantial and sustainable long-term growth that will benefit businesses, residents and local government.

Policy ED-1.2 Support the continued operation of existing aggregate mining activities within the county as well as new aggregate mining in appropriate areas, to meet the long-range construction needs of the region.

Goal CO-3 Mineral Resources. Protect mineral and natural gas resources to allow for their continued use in the economy.

Policy CO-3.1 Encourage the production and conservation of mineral resources, balanced by the consideration of important social values, including recreation, water, wildlife, agriculture, aesthetics, flood control, and other environmental factors.

Policy CO-3.2 Ensure that mineral extraction and reclamation operations are compatible with land uses both on-site and within the surrounding area, and are performed in a manner that does not adversely affect the environment.

Policy CO-3.5 Preserve and protect the County's unique geologic and physical features, which include geologic or soil "type localities", and formations or outcrops of special interest. (DEIR MM GEO-1a)

Action CO-A37 Designate and zone lands containing identified mineral deposits to protect them from the encroachment of incompatible land uses so that aggregate resources remain available for the future. (Policy CO-3.1)

Action CO-A39 Encourage the responsible development of aggregate deposits along Cache Creek as significant both to the economy of Yolo County and the region. (Policy CO-3.1)

Action CO-A42 Implement the Cache Creek Area Plan to ensure the carefully managed use and conservation of sand and gravel resources, riparian habitat, ground and surface water, and recreational opportunities. (Policy CO-3.1)

Action CO-A43 Monitor updates to the State Mineral Resource classification map and incorporate any needed revisions to the County's zoning and land use map. (Policy CO-3.1)

Action CO-A47 Ensure that mined areas are reclaimed to a usable condition that is readily adaptable for alternative land uses, such as agriculture, wildlife habitat, recreation, and groundwater management facilities. (Policy CO-3.1)

Action CO-A54 Implement the Cache Creek Area Plan (Policy CO-3.2).

Action CO-A63 Require cultural resources inventories of all new development projects in areas where a preliminary site survey indicates a medium or high potential for archaeological, historical, or paleontological resources. In addition, require a mitigation plan to protect the resource before the issuance of permits. Mitigation may include:

- Having a qualified archaeologist or paleontologist present during initial grading or trenching;
- Redesign of the project to avoid historic or paleontological resources;
- Capping the site with a layer of fill; and/or
- Excavation and removal of the historical or paleontological resources and curation in an appropriate facility under the direction of a qualified professional. (Policy CO-4.1, Policy CO-4.13)

Action CO-A65 Require that when cultural resources (including non-tribal archeological and paleontological artifacts, as well as human remains) are encountered during site preparation or construction, all work within the vicinity of the discovery is immediately halted and the area protected from further disturbance. The project applicant shall immediately notify the County Coroner and the Planning and Public Works Department. Where human remains are determined to be Native American, the project applicant shall consult with the Native American Heritage Commission (NAHC) to determine the person most likely descended from the deceased. The applicant shall confer with the descendant to determine appropriate

treatment for the human remains, consistent with State law. (Policy CO-4.1, Policy CO-4.11, Policy CO-4.12, Policy CO-4.13)

Off-Channel Surface Mining Ordinance

Section 10-4.403 of the Yolo County Off-Channel Surface Mining Ordinance (OCSMO) provides the following requirements related to accidental reporting:

> ### Section 10-4.403. Accident Reporting
>
> The operator shall immediately notify the Director of any events such as fires, explosions, spills, land or slope failures, or other conditions at the site which could pose a hazard to life or property. Action shall be immediately undertaken to alleviate the hazard. The operator shall provide a written report of any such event, within thirty (30) days, which shall include, but not be limited to, a description of the facts of the event, the corrective measures used, and the steps taken to prevent a recurrence of the incident. Failure to provide this report shall initiate violation proceedings pursuant to Article 11. This condition does not supersede nor replace any requirement of any other governmental entity for reporting incidents.

Section 10-4.406 of the OCSMO states the following regarding excavation of mining pit benches:

> ### Section 10-4.406. Benches
>
> During mining operations, a series of benches may be excavated in a slope provided that the excavations are made in compliance with the requirements of the state Mine Safety Orders (California Code of Regulations, Title 8, Subchapter 17). The vertical height and slope of the benches constructed for permanent reclaimed slopes shall not exceed maximum standards for the specific soil types presented in the California Code of Regulations, Title 8, Article 6. In general, vertical cutslopes between benches shall not exceed four (4) feet in height in topsoil and overburden sediments. Benching shall be allowed in cohesive soil (clay, sandy or silty clay, clayey silt) only. Slopes above the elevation of groundwater (determined at the time of the excavation by the level of exposed water in the excavation) that exceed the maximum vertical height shall be excavated and maintained at slopes not steeper than 2:1 (horizontal:vertical). Slopes located five (5) feet or less below the average summer low groundwater level shall not be steeper than 2:1 (horizontal:vertical). Slopes located more than five (5) feet below the average summer low groundwater level shall not be steeper than 1:1 (horizontal to vertical).
>
> Vertical cut slopes in excess of four (4) feet in height may be approved for the development of special habitat (e.g., bank swallows) if a site-specific slope stability analysis, performed by a licensed engineer, indicates that the slope does not exceed critical height for the on-site soil conditions. Projects proposing such slopes shall submit a long-term maintenance plan to ensure that the function of the slopes as habitat is met.

Section 10-4.410 of the OCSMO states the following regarding prehistoric sites:

> ### Section 10-4.410. Cultural Resources
>
> (a) All resource records shall be checked for the presence of and the potential for prehistoric and historic sites. Damaging effects on cultural resources shall be avoided whenever possible. If avoidance is not feasible, the importance of the site shall be evaluated by a qualified professional prior to the commencement of mining operations. If a cultural resource is determined not to be important, both the resource and the effect on it shall be reported to the Agency, and the resource need not be

considered further. If avoidance of an important cultural resource is not feasible, a mitigation plan shall be prepared and implemented. The mitigation plan shall explain the importance of the resource, describe the proposed approach to mitigate destruction or damage to the site, and demonstrate how the proposed mitigation would serve the public interest.

(b) If human skeletal remains are encountered during excavation, all work within seventy-five (75') feet shall immediately stop, and the County Coroner shall be notified within twenty-four (24) hours. If the remains are of Native American origin, the appropriate Native American community identified by the Native American Heritage Commission shall be contacted, and an agreement for treating or disposing of, with appropriate dignity, the remains and associated grave goods shall be developed.

If any cultural resources, such as chipped or ground stone, historic debris, building foundations, or paleontological materials are encountered during excavation, then all work within seventy-five (75') feet shall immediately stop and the Director shall be notified at once. The find must be recorded by a qualified archaeologist or paleontologist using relevant professional protocols and a report fully recording the find submitted to the County. This report shall include recommendations for appropriate removal and preservation of the artifact. The County encourages the donation of the find to the County for public display at the Cache Creek Nature Preserve or other appropriate venue.

Section 10-4.431 of the Yolo County Off-Channel Surface Mining Ordinance (OCSMO) states the following regarding engineering of slopes:

Section 10-4.431. Slopes

Except where benches are used, all banks above groundwater level shall be sloped no steeper than 2:1 (horizontal:vertical). Proposed steeper slopes shall be evaluated by a slope stability study, prepared by a Registered Civil Engineer. Slopes below the groundwater level shall be no steeper than 1:1 (horizontal:vertical). Slopes located five (5) feet or less below the summer low groundwater level shall not be steeper than 2:1 (horizontal:vertical).

Section 10-4.432 of the OCSMO states the following regarding soil removal and transport:

Section 10-4.432. Soil Removal

Soil shall be cut in maximum depths in order to minimize traffic and limit compaction. The handling and transportation of soil shall be minimized. All handling of topsoil shall be accomplished when the soil is dry in order to avoid undue compaction.

Section 10-4.433 of the OCSMO states the following regarding soil stockpiles:

Section 10-4.433. Soil Stockpiles

Topsoil, subsoil, and subgrade materials in stockpiles shall not exceed forty (40) feet in height, with slopes no steeper than 2:1 (horizontal:vertical). Stockpiles, other than aggregate stockpiles, shall be seeded with a vegetative cover, preferably of local native species, to prevent erosion and leaching. The use of topsoil for purposes other than reclamation shall not be allowed without the prior approval of the Director.

Slopes on stockpiled soils shall be graded to a 2:1 (horizontal:vertical) slope for long-term storage to prevent use by bank swallows. At no time during the active breeding season (May 1 through July 31) shall slopes on stockpiles exceed a slope of 1:1, even on a

temporary basis. Stockpiles shall be graded to a minimum 1:1 slope at the end of each work day where stockpiles have been disturbed during the active breeding season.

Section 10-4.434 of the OCSMO states the following regarding technical report recommendations:

> Section 10-4.434. Technical Report Recommendations
> The recommendations contained within each technical report submitted with a surface mining permit application shall be consistent with the OCMP and with all other technical reports submitted. The recommendations of all technical reports shall be implemented.

Section 10-4.502(b)(6) of the Yolo County OCSMO states the following regarding technical reports required to be included in applications for mining permits:

> (6) A cultural resources survey of the proposed mining area, in order to evaluate the potential for historic and/or prehistoric artifacts. A survey may not be required if a preliminary investigation from the Northwest Information Center indicates that the likelihood of archaeological resources is low for the proposed site;

Surface Mining Reclamation Ordinance

Section 10-5.530 of the Yolo County Surface Mining Reclamation Ordinance (SMRO) states the following regarding reclamation slopes:

> Section 10-5.530. Slopes
> All final reclaimed slopes shall have a minimum safety factor equal to or greater than the critical gradient as determined by an engineering analysis of the slope stability. Final slopes less than five (5) feet below the average summer low groundwater level shall be designed in accordance with the reclaimed use and shall not be steeper than 2:1 (horizontal:vertical). Reclaimed wet pit slopes located five (5) feet or more below the average summer low groundwater level shall not be steeper than 1:1 (horizontal:vertical), in order to minimize the effects of sedimentation and biological clogging on groundwater flow, to prevent stagnation, and to protect the public health.
>
> The maximum slope angle for all final reclaimed slopes shall be determined by slope stability analysis performed by a Licensed Geotechnical Engineer or Registered Civil Engineer and submitted with any mining and reclamation application for review by the Director. The slope stability analysis shall conform with industry standard methodologies regarding rotational slope failures under static and pseudostatic (seismic) conditions. The minimum factor of safety for all design reclamation slopes located adjacent to levees or below existing structures shall not be less than 1.5 for static and 1.1 for pseudostatic (seismic) conditions. Other reclamation slopes shall meet a minimum factor of safety that is consistent with the post-reclamation use proposed for the mining area.

4.6.4 IMPACTS AND MITIGATION MEASURES

The following section describes the standards of significance and methodology used to analyze and determine the proposed project's potential impacts related to geology and soils, mineral resources, and paleontological resources. A discussion of the project's impacts, as well as mitigation measures where necessary, are also presented.

Standards of Significance

The significance criteria used for this analysis were developed from Appendix G of the CEQA Guidelines, and applicable policies and regulations of Yolo County. A geology and soils, mineral resources, and paleontological impact is considered significant if the proposed project would:

- Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving:
    - Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area based on other substantial evidence of a known fault;
    - Strong seismic ground shaking;
    - Seismic-related ground failure, including liquefaction;
    - Landslides;
- Result in substantial soil erosion or the loss of topsoil;
- Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on or off-site landslide, lateral spreading, subsidence, liquefaction or collapse;
- Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property;
- 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;
- Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature;
- 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;
- 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; and/or
- Cause a significant environmental impact due to a conflict with applicable plans, policies, or regulations adopted for the purpose of avoiding or mitigating impacts to geology and soils, mineral resources, and paleontological resources;

Impacts Found Less-than-Significant in Initial Study

The Initial Study prepared for the proposed project (see Appendix A) determined that implementation of the proposed project would result in no impact related to soils incapable of adequately supporting the use of septic tanks. Therefore, the following impact is not discussed further in this EIR:

- 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 waste water.

Method of Analysis

Issues related to geology and soils were evaluated in the Slope Stability Evaluation[15] and Local Geology Memorandum[16] prepared for the proposed project by Geocon Consultants, Inc. (see Appendix H) and a Custom Soil Resource Report[17] prepared for the project by the United States Department of Agriculture (USDA), Natural Resources Conservation Service.

Slope Stability Analysis

The analysis within the Slope Stability Evaluation relied on a site reconnaissance conducted on February 20, 2014, review of available information, limited exploratory borings, soil sampling, laboratory testing, and knowledge of geotechnical conditions in the surrounding area.

Slope stability was evaluated at four locations considered representative of the anticipated mining and reclamation slope conditions along the perimeter of the proposed mining pit. The configuration of slope stability analysis sections was based on topography and anticipated mining depths provided by the applicant. The typical slope sections are shown in Figure 4.6-1 and Figure 4.6-2.

The stability of the slopes on the project site were analyzed using the computer program SLOPE/W, Version 7.22 for static and seismic conditions. For the mining slope conditions, Geocon Consultants, Inc. analyzed both shallow surface (surficial) and global stability. Shallow surface failures are those within close proximity to the top of the mining slope, generally within the outer 25-foot portion of the dedicated 50-foot buffer. For reclamation slope conditions, global failure surfaces were analyzed.

A total of six test pits were performed using a CAT 385 excavator. Test pits were excavated to approximate depths ranging from 18 to 21 feet. On exploratory boring was performed using a truck-mounted drill rig with hollow-stem augers to a depth of approximately 101 feet (see Appendix H). Based on the results of the test pits, shear strength parameters for overburden, gravel, clay, and fill soil were estimated and incorporated into the slope stability and seepage analyses.

Local Geology Memorandum

The Local Geology Memorandum was prepared to evaluate the geologic conditions along the south bank of Cache Creek. The existing conditions were used to aid in evaluating the potential for lateral stream migration of Cache Creek and bank retreat southward toward the project site. As part of the Local Geology Memorandum, a site reconnaissance was performed on November 1, 2019. In addition, Geocon reviewed published geologic mapping and available exploration logs. The Cache Creek bank was evaluated for steepness, length, and shape of the slopes.

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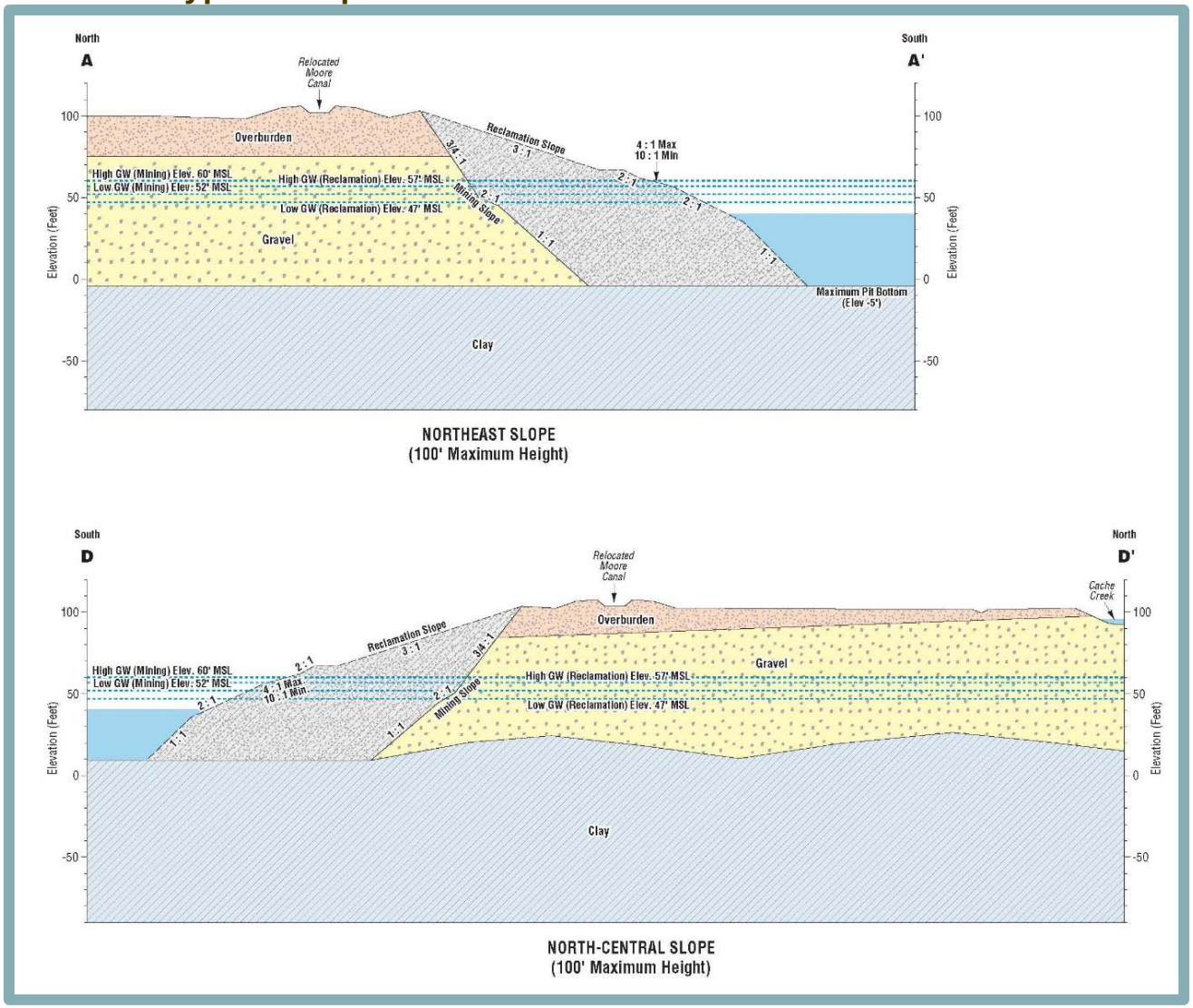
15 Geocon Consultants, Inc. *Slope Stability Evaluation Teichert Shifler Mining and Reclamation Project Yolo County, California.* May 2016.

16 Geocon Consultants, Inc. *Technical Memorandum – Local Geology, Shifler Mining and Reclamation Project, Yolo County, California.* November 27, 2019.

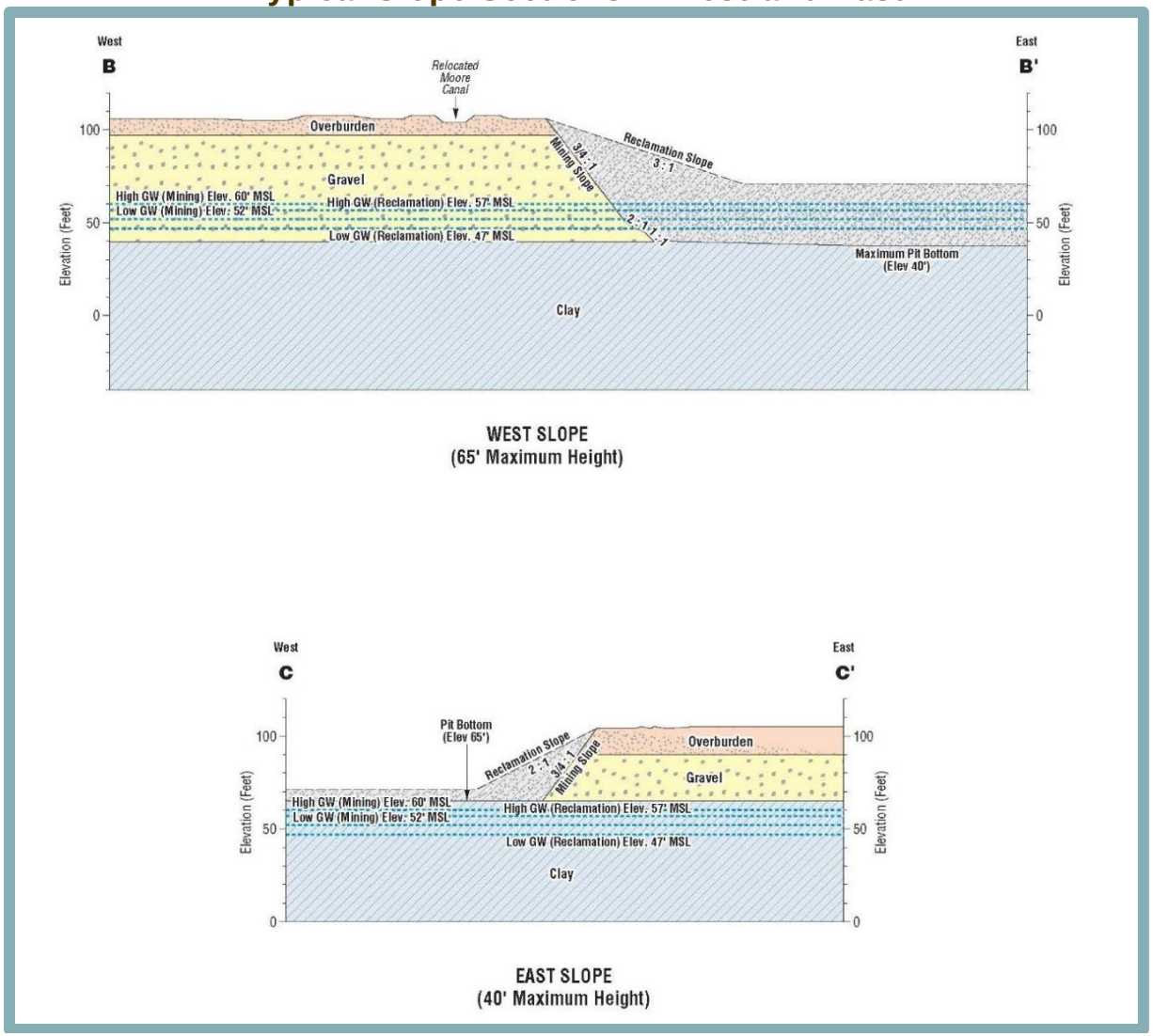
17 U.S. Department of Agriculture, Natural Resources Conservation Service. *Custom Soil Resource Report for Yolo County, California Shifler Mining and Reclamation Project.* June 12, 2019.

Figure 4.6-1
Typical Slope Sections – Northeast and North Central



Source: Geocon Consultants, Inc., 2016.

Figure 4.6-2
Typical Slope Sections – West and East



Source: Geocon Consultants, Inc., 2016.

Custom Soil Resource Report

The Custom Soil Resource Report prepared for the proposed project was based on soil survey data maintained by the National Cooperative Soil Survey, a joint effort of the USDA and other federal, State, and local agencies. The soil survey data included in the Custom Soil Resource Report is also available through the Natural Resources Conservation Service Web Soil Survey online platform.

Soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses. Within the project site, soils were classified by taxonomic classes (units). Each taxonomic class has a set of soil characteristics with precisely defined limits.

Project-Specific Impacts and Mitigation Measures

The following discussion of impacts related to geology and soils, mineral resources, and paleontological resources is based on implementation of the proposed project in comparison to existing conditions and the standards of significance presented above.

4.6-1 Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area based on other substantial evidence of a known fault; strong seismic ground shaking; seismic-related ground failure, including liquefaction; or landslides. The impact would be *less than significant*.

The key proposed elements of this project are as follows: 1) relocation of a segment of Moore Canal to the northerly portion of the site and modification of Magnolia Canal to align with the relocated Moore Canal; 2) transfer of tonnage from the Teichert Esparto and Teichert Schwarzgruber operation to the Teichert Shifler operation; 3) continued operation and expansion of the Teichert Woodland Plant facilities (including new equipment and increased processing capacity); 4) excavation at the Shifler site; 5) reclamation of the Shifler site; 6) delayed reclamation at Woodland Plant site; 7) dedication of various reclaimed properties to the County; and 8) completion of an in-channel gravel bar removal project. The proposed new water pipe would be used to convey groundwater from the mining pit to the Woodland Plant site to supply aggregate processing operations at the plant. The proposed depths of mining at the project site would be approximately 40 feet below the existing ground surface in the northeastern corner of the site, and approximately 70 feet below the existing ground surface in the southwestern corner of the mining area. Above-ground structures included in the proposed project would be limited to the relocated Moore Canal, a new junction with Magnolia Canal, two new overcrossings at the Moore Canal, and a floating dredge to be used for the proposed mining activities.

Fault Rupture

The site is not located within an Alquist-Priolo Earthquake Fault Zone and the nearest active fault system is located approximately eight miles west of the site. Thus, fault rupture would not pose a risk to the proposed project.

Strong Seismic Ground Shaking and Slope Stability

Although the site is not located within an Alquist-Priolo Earthquake Fault Zone, the proposed mining pit, relocated Moore Canal, and other project components could be subject to seismic ground shaking and resultant seismic ground failure. Risks associated with seismic ground shaking and failure are discussed below.

The Slope Stability Evaluation analyzed the impacts associated with seismic ground shaking and potential ground failure during mining and reclamation by modeling an earthquake event and producing a seismic FOS value, which is used to characterize the stability of soil conditions. Strong slope conditions generally have values above 1.0. Per the Soils Stability Evaluation, the seismic FOS for the mining conditions varied from 1.0 to 1.4 at different locations on the project site. The areas with lower FOS, indicating comparatively reduced stability, were located within the outer portion of the 50-foot buffer surrounding the proposed mining pit. During reclamation, the slopes would become more stable compared to conditions during active mining.

The Slope Stability Evaluation determined that seismic events occurring in shallow surfaces during mining could be susceptible to adverse effects; however, even under worst-case conditions, the FOS would be above 1.0, which is the generally acceptable standard for stability of a structure or component such as a mining slope. Considering the relatively short amount of time that the mining slopes would be exposed (less than one year), the likelihood of a design-level earthquake occurring during mining is low. Therefore, the risk of seismic-induced ground failure on the project site during mining and reclamation activities, as well as after reclamation is complete, would be relatively low. Seismic-induced ground failure of slopes would be considered a landslide; thus, because the risk of seismic-induced ground failure is low, the risk of seismic-induced landslide is low.

All proposed structures, including the relocated Moore Canal, the new junction with Magnolia Canal, two new overcrossings at the Moore Canal, and the floating dredge, would be subject to compliance with the CBSC, as applicable. The CBSC provides minimum standards to ensure that the proposed structures would be designed using sound engineering practices and appropriate engineering standards for the seismic area in which the project site is located. Projects designed in accordance with the CBSC should be able to: 1) resist minor earthquakes without damage; 2) resist moderate earthquakes without structural damage, but with some non-structural damage; and 3) resist major earthquakes without collapse, but with some structural, as well as non-structural, damage. While new buildings would not be developed within the proposed mining area, the project would include transport of aggregate materials to the Teichert Woodland Plant north of the project site. The existing structures at the Woodland Plant would not be modified as part of the proposed project. Furthermore, the project area is not subject to strong seismic risk. Thus, risk of injury or loss is less-

than-significant at the project site and at the Woodland Plant as a result of the proposed project.

The Governor's Office of Emergency Services does not designate the project site in a liquefaction zone area.[18] Additionally, because groundwater at the project site is approximately 42 to 65 feet below the ground surface, the likelihood that saturated soil conditions occur within the zone of potential liquefaction is low, and seismic-induced liquefaction at the site would be unlikely.

Conclusion

Based on the above, a ***less-than-significant*** impact related to directly or indirectly causing potential substantial adverse effects, including the risk of loss, injury, or death involving rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area based on other substantial evidence of a known fault; strong seismic ground shaking; seismic-related ground failure, including liquefaction; or landslides.

Mitigation Measure(s)

None required.

4.6-2 Result in slope failure or substantial erosion or loss of topsoil. Based on the analysis below, the impact is *less than significant*.

The following is an evaluation of the risk of erosion during the mining and reclamation phases, as well as the risk of pit capture.

Erosion and Loss of Topsoil

During mining operations, overburden soil would be removed using scrapers and graders. The soil would be stored until required for reclamation. The topsoil would be stored on-site during mining operations. The stockpiled slopes would not exceed 40-feet. While erosion from the top soil could occur, the project would operate under the requirements of the OCSMO and the OCMP, which require erosion control and topsoil management practices to be implemented.

Specifically, in accordance with Sections 10-4.413 and 10-4.433 of the OCSMO, the stockpiles would be seeded with a vegetative cover, would not exceed 40 feet in height, and would not have slopes steeper than 2:1 for long-term storage to prevent erosion. The stockpiles would also remain a minimum distance of 100 feet from the top of the bank of Cache Creek, which would ensure that the creek quality would not be deteriorated by any potential erosion. Additionally, the SMRO establishes requirements to eliminate erosion, such as mining pit slopes above the average seasonal high groundwater level, using a drought-tolerant weed-free mix of native grass species on reclamation slopes, and phasing of mining to minimize the length of exposed mining slopes during the rainy season.

[18] California Governor's Office of Emergency Services. *My Hazards*. Available at: http://myhazards.caloes.ca.gov/. Accessed February 28, 2019.

During reclamation, the stockpiled soils would be used for fill. Various grading revegetation activities would be carried out to minimize erosion. The finish grading of pit slopes would be performed as soon as practical after the completion of mining activities, and the final land surface would be graded so as to create broad gentle slopes to prevent soil erosion.

Because the proposed project would adhere to all applicable requirements of the OCSMO and SMRO, the project would not result in substantial erosion or loss of topsoil.

Pit Capture

In off-channel mining operations, "pit capture" is a term to describe the process where the earthen material separating the mining pit from an adjacent watercourse is breached by overflowing floodwaters, streambank erosion, and/or channel migration. Outside of mining applications, the process of a water course moving due to stream bank erosion is more generally referred to as lateral migration. Because the process would involve streambank erosion, pit capture is discussed within the context of substantial erosion or soil loss. The northern portion of the site is bordered by Cache Creek. The project plans propose a 200-foot setback from the top of bank to the relocated alignment of Moore Canal, with mining occurring no closer than 300 feet from the top of bank. A 100-foot buffer is proposed between the stockpiled soils and the creek.

To investigate the potential for pit capture due to flood conditions of Cache Creek, Geocon Consulting, Inc. reviewed aerial photographs covering the period of 1958 to 2012. The photographs capture Cache Creek in various stages of flow, including flood conditions. Based on historic channel migration and floodwater conditions in Cache Creek, the floodwaters, when present, do not flow over the south bank of the creek adjacent to the site. The historic imagery comports with the hydrologic models developed by Cunningham Engineering for the project area, which indicate the floodwaters spread to the north of Cache Creek, away from the project site. Historic photographs also show increasing vegetation on the south bank over the course of 54 years. The existing and historic conditions, coupled with the absence of adverse seepage and slope stability conditions, would result in low potential for damage to the relocated Moore Canal or pit capture. Thus, based on the analysis, neither the relocated canal, the mining slopes, or stockpiled soils would be subject to unacceptable risk of overflowing floodwaters. The conclusion that Cache Creek floodwaters generally do not flow over the south bank and that Moore Canal would not be subject to adverse slope stability conditions, further indicate that the relocation of Moore Canal would not subject Moore Canal to substantial hazards related to southward lateral migration of Cache Creek in the site vicinity.[19]

Additional discussion related to the stability of the south bank of Cache Creek along the project reach is provided in Chapter 4.8, Hydrology and Water Quality, of this EIR. In conclusion, the relocation of the Moore Canal to the north is not anticipated to result in exposure to unacceptable risks related to lateral migration (the process of a water

[19] Geocon Consultants, Inc. *Technical Memorandum: Dewatering Shifler Mining and Reclamation Project Yolo County, California.* August 11, 2020.

course moving due to stream bank erosion) of the Cache Creek channel, particularly as a result of Mitigation Measures 4.8-4(a), 4.8-4(b), and 4.8-4(c) identified in the Hydrology and Water Quality Chapter. The proposed mining slopes and stockpiled soils would not be subject to substantial risk of overflowing floodwaters; thus, the proposed project would not result in significant impacts related to pit capture.

Conclusion

Based on the above, the project would not result in substantial erosion or topsoil loss during mining and reclamation or due to pit capture, and a ***less-than-significant*** impact would occur.

Mitigation Measure(s)

None Required.

4.6-3 Be located on a geological unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse. The impact would be *less than significant*.

Below is a discussion of the possible risks associated with being located on a geologic unit or soil that is unstable and could potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse. Evaluation of slopes stability, which is related to unstable soils, is based on a Slope Stability Evaluation performed by Geocon Consultants, Inc. in May 2016. Potential impacts related to liquefaction are discussed in Impact 4.6-1.

Slope Stability

Several regulations exist throughout the OCSMO and SMRO which ensure stability of the mining and reclamation slopes. Sections 10-4.431 and 10-4.433 of the OCSMO require slopes adhere to specific slope angles and heights. Section 10-5.530 of the SMRO also regulates slope stability by requiring all reclaimed slopes have a minimum FOS equal to or greater than critical gradient as determined by an engineering analysis. A discussion of consistency with the OCSMO and SMRO is included in Impact 4.6-8 below.

For the purposes of this EIR two types of slope failures are considered, a shallow surface failure and a global failure, both of which are discussed in relation to the 50-foot buffer that would be maintained between the tops of the mining slopes and the nearest property line or relocated location of Moore Canal. Shallow surface failures are considered to be those that would occur within close proximity of the top of the mining slope, generally within 25 feet of the dedicated 50-foot buffer. Global failures for the mining slope condition are considered failure surfaces that would extend beyond the 50-foot buffer, thus encroaching to distances less than 50-feet from the nearest property line or Moore Canal. For the reclamation slopes, global failure was analyzed.

In limit-equilibrium slope stability analysis, ponded water against a slope tends to increase global slope stability due to the buttressing effect of the mass of water against the slope. Geocon Consultants, Inc. conducted a conservative analysis by assuming that ponded water would not be present under the mining condition. In practice, while certain project-related groundwater pumping scenarios analyzed by Luhdorff & Scalmanini could result in fluctuations of pit water levels by as much as 23 feet, some amount of ponded water would remain present within the mining pit, and would act to buttress the mining slopes. Because Geocon Consultants, Inc. assumed that ponded water would not be present under any mining conditions, the conclusions of the analysis prepared by Geocon Consultants, Inc. are considered conservative and would be valid regardless of the actual level of ponded water within the mining pit.[20] For analysis of the reclamation condition, however, Geocon Consultants, Inc. assumed that ponded water would occur and would be coincident with the groundwater surface. The potential for static failure is presented in Table 6.5 of the Slope Stability Evaluation (see Appendix H of this EIR). The Slope Stability Evaluation concluded that the static FOS against failure during mining ranged from 1.1 to 2.1. The lowest FOS value was found in the shallow surfaces within the outer portion of the 50-foot buffer. Per the Slope Stability Evaluation, the FOS values indicate that the slopes would be globally stable during the mining period.

For the long-term reclamation condition, the static FOS for all slope configurations exceeds 1.5, which would meet the standards established in Section 10-5.530 of the SMRO. Therefore, permanent slopes are anticipated to remain stable relative to global failure provided unanticipated conditions are not encountered during mining or reclamation.

Seepage Analysis

The project plans propose a 200-foot setback from the top of bank to the relocated alignment of Moore Canal, with mining occurring no closer than 300 feet from the top of bank. A 100-foot buffer is proposed between the stockpiled soils and the creek. While the stockpiled soil would be located within 100-feet of the creek, the piles would not be subject to seepage because they would be located aboveground. In the analysis, the initial condition considered for the site was the average high groundwater elevation of 65 feet above MSL. Geocon Consultants, Inc. then modeled the transient 200-year water surface elevation (+98 feet MSL, per Cunningham Engineering, 2014) in Cache Creek for durations of one month, 100 days, and 100 years.

The results of the analyses indicate that the seepage front does not intercept the proposed north mining slope at an elevation higher than the average seasonal high groundwater condition, even when sustained indefinitely (100 years). Therefore, anticipated subsurface seepage conditions at the proposed north mining slope under the 200-year Cache Creek flood event are not expected to be more adverse than normal, average seasonal high groundwater conditions.

[20] Geocon Consultants, Inc. *Technical Memorandum: Dewatering Shifler Mining and Reclamation Project Yolo County, California.* August 11, 2020.

Relocated Moore Canal

A supplemental seepage analysis for the proposed Moore Canal relocation was included in the Slope Stability Evaluation. The proposed north mining slope would be set back from the relocated canal by approximately 50 feet. The analysis considered the initial condition for the site to be the average high groundwater elevation of 60 feet above MSL for the mining condition (2016 groundwater conditions for this analysis). The transient design water surface elevation was then modeled (+105.5 feet MSL, per Cunningham Engineering) in the canal for durations of one month and 100 days as well as steady state conditions.

Two different near-surface soil conditions were evaluated for the relocated Moore Canal (overburden and clayey gravel). The canal is anticipated to be located primarily in overburden soils but would likely be established in the underlying clayey gravels. Although a concrete lining is proposed for the relocated Moore Canal, the analysis conservatively does not assume a concrete lining.

The results of the analyses for the two conditions modeled indicate that the seepage front does not intercept the proposed north mining slope at an elevation higher than the average seasonal high groundwater condition, even when sustained indefinitely (100 years). Seepage is minimal from the canal during transient analysis and does not extend to the mining slope due to the generally clayey nature of the overburden and gravelly soils at the project location and the shallow depth of water in the canal. Therefore, anticipated subsurface seepage conditions at the proposed north mining slope under the design water conditions for the relocated canal are not expected to be more adverse than the normal, average seasonal high groundwater conditions.

Landslide and Lateral Spreading

Landsliding is the natural process of relatively rapid downslope movement of soil, rock, and rock debris as a mass. Lateral spreading is another form of slope failure in which gently sloping ground is displaced as a result of pore pressure build-up. Lateral spreading is typically associated with terrain near free faces such as excavations, channels, or open bodies of water. The potential for landsliding is affected by the type and extent of vegetation, slope angle, degree of water saturation, strength of rocks, and the mass and thickness of the deposit. Per the Yolo County General Plan, the project site is located within an area of low landslide susceptibility.

Per Impact 4.6-1 above, the project site would not be subject to substantial risks related to seismic-related slope failure during the proposed mining and reclamation activities, or after reclamation is complete. In addition, the project would not include any grading or other ground disturbance on the Woodland Plant site that would have the potential to exacerbate landslide potential at the Plant. Thus, the proposed project would not result in substantial risks related to on- or off-site landslide or lateral spreading.

Collapse of Mining and Stockpile Slopes

During mining operations, overburden soil would be removed in order to expose layers of sand and gravel. Prior to mining of aggregate material, approximately five to 10 feet of the top layer of soil would be removed from the site and stockpiled for reclamation.

The soil would be stockpiled to a maximum height of 40 feet, with slopes of 2:1 or gentler, in accordance with Section 10-4.433 of the OCSMO. A 50-foot buffer would be created between the tops of the mining slopes and the relocated Moore Canal. The mining slopes would be subject to the regulations within Section 10-4.406 (which includes requirements from the California Code of Regulations Title 8, Subchapter 17) as well as 10-4.431. Adherence to the foregoing regulations would be achieved by constructing minimum slope depths, as described as a ratio of horizontal to vertical:

- 3/4:1 down to average low groundwater level during mining (52 feet above MSL);
- 2:1 between average low groundwater level during mining (52 feet above MSL) and 5 feet below average low groundwater level during mining (47 feet above MSL); and
- 1:1 below 5 feet below average low groundwater level during mining (47 feet above MSL).

Following mining operations, reclamation slopes would be constructed using the stockpiled overburden soil taken prior to mining. The soil would be placed and compacted to form new slopes ranging in inclination from 2:1 to 4:1 above an elevation of 43 feet MSL and 1:1 at any elevation lower. The reclamation slopes would be constructed in a sequential manner as mining progresses.

See Impact 4.8-1 above. Based on the Slope Stability Evaluation, the proposed slopes would be within an acceptable FOS during both mining and reclamation under seismic and static circumstances. Additionally, the stockpile slopes would be designed in compliance with the steepness and maintenance requirements included in Section 10-4.433 of the OCSMO. The proposed project would not result in substantial risks related to collapse.

Subsidence and Other Soil Stability Issues

Subsidence occurs when the earth's surface sinks due to settlement of soils during earthquake shaking, excessive groundwater extraction, and/or loose soil conditions. Although earthquakes could potentially occur within the region and generate shaking at the site, the distance of the site from any active faults would reduce the severity of shaking. Furthermore, while groundwater pumped from two wells at the nearby Woodland Plant site would be used for aggregate processing and dust suppression at the project site, as occurs with existing mining operations in the project region, the project would not require excessive groundwater extraction.

The Slope Stability Evaluation determined that the soil beneath the overburden generally consists of loose to very dense poorly graded sand and gravel. During mining, aggregate material would be mined up to 40 feet below the surface of the mine. As such, loose soils would be moved and would not be subject to subsidence. During reclamation, the proposed project would use stockpiled soil to construct the reclaimed slopes and return the area to agricultural and other uses. The Slope Stability Evaluation determined that the reclamation fill should be compacted in horizontal lifts not exceeding eight inches. Per the Slope Stability Evaluation, each lift would require moisture-conditioning to at least two percent above optimum and compacted to at least

90 percent relative compaction. The water for the moisture condition would be extracted from the existing wells. Chapter 4.8, Hydrology and Water Quality, of this EIR analyzes the potential for the proposed project to result in impacts related to the ground water level. As further discussed in Chapter 4.8, while implementation of the proposed project could result in fluctuations in groundwater levels during mining and reclamation, as compared to existing levels, ultimately, the project would not result in significant impacts related to ground water levels in the vicinity of the project site. Consequently, the project site, including Moore Canal and Magnolia Canal would not be subject to impacts related to subsidence caused by reductions in groundwater levels.

As noted above, analysis of multiple groundwater pumping scenarios by Luhdorff & Scalmanini demonstrated that under worst-case conditions, water levels within the mining pit could be lowered by a maximum of 23 feet. Water within the pit would act to buttress the mining slopes; thus, fluctuations in the water level within the pit could have an effect on the stability of mining slopes. However, the Slope Stability Evaluation prepared for the project assumed that ponded water would not be present at any level within the mining pit. The absence of water from the mining pit represents a worst-case analysis of slope stability. Even with the conservative assumption of no pit water ponding, Geocon Consulting, Inc. ultimately concluded that the mining slopes would remain stable. Considering that any level of water within the mining pit would increase the stability of the slopes from the level of stability determined in the Slope Stability Evaluation, any groundwater levels or pit water level fluctuations due to groundwater pumping would not result in reductions of slope stability beyond the levels assumed in this analysis.[21]

Based on the above, subsidence due to earthquake shaking is not likely to occur at the project site due to the distance of the site from any active faults. Additionally, substantial dewatering and groundwater extraction would not have the potential to result in subsidence or other soil stability issues. However, without proper moisture conditioning of the proposed slopes, as recommended per the Slope Stability Evaluation, the proposed project could result in significant impacts related to subsidence.

Conclusion

Based on compliance with the CCAP, relevant local and state regulations, and the recommendations from the Slope Stability Evaluation, mining and reclamation at the site would not result in substantial risks related to on- or off-site landslide, lateral spreading, liquefaction, collapse, subsidence, or expansive soils. Consistency with the CCAP is discussed in Impact 4.6-8 below. Specific existing regulations that would ensure that risks related to on- or off-site landslides, lateral spreading, liquefaction, collapse, or subsidence would be reduced to a less-than-significant level include sections 10-4.431, 10-4.431 an 10-4.433 of the OCSMO, as well as the California Code of Regulations Title 8, Subchapter 17 (related to benching of excavated slopes), among others. The project will be conditioned to require adherence to all recommendations within the project-specific Slope Stability Evaluation.

[21] Geocon Consultants, Inc. *Technical Memorandum: Dewatering Shifler Mining and Reclamation Project Yolo County, California.* August 11, 2020.

Based on the above, a ***less-than-significant*** impact would occur with regard to substantial risks related to on- or off-site landslide, lateral spreading, liquefaction, collapse, subsidence, or expansive soils.

Mitigation Measure(s)
None required.

4.6-4 Be located on expansive soils, as defined in Table 18-1-B of the California Building Code, creating substantial risks to life or property. The impact would be *less than significant*.

The Slope Stability Evaluation prepared for the project determined that the existing soil and geologic conditions on-site would be suitable for the proposed project. Thus, expansive soils would not have the potential to result in any risks to life or property related to slope instability. Relocation of Moore Canal and modification of Magnolia Canal would represent the only substantial structures on-site that could be subject to potential effects of expansive soils. However, according to the Natural Resource Conservation Service's Web Soil Survey, only a small portion of the project site (approximately 0.3 percent of the site area) are underlain with soils that experience shrink-swell effects of expansive soils.[22] The expansive soils are located on the southern portion of the project site, whereas both Moore Canal and Magnolia Canal are and would be located on the northern portion of the project site. Consequently, the project would not experience risks to life or property due to expansive soils and a ***less-than-significant*** impact would result.

Mitigation Measure(s)
None required.

4.6-5 Directly or indirectly destroy a unique paleontological resource. The impact would be *significant*.

According to the Yolo County General Plan and a search of the University of California Museum of Paleontology website, eight fossil localities are present within or adjacent to the County. While the Holocene Alluvium geologic unit that underlies the project site is not typically considered to be paleontologically significant, several past discoveries of paleontological resources have taken place near Cache Creek within the project region. Therefore, the potential exists for previously unknown paleontological resources to occur on the project site. Section 10-4.410(b) addresses this potential. In the event that previously unknown resources are discovered during excavation the applicant is required to stop work, record the find, and make appropriate arrangements regarding removal and preservation. Considering the discovery of paleontological resources near Cache Creek, the proposed project could directly or indirectly destroy a unique paleontological resource and ***significant*** impact could occur.

[22] U.S. Department of Agriculture, Natural Resources Conservation Service. *Web Soil Survey*. Available at: https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx. Accessed June 2020.

Mitigation Measure(s)

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

4.6-5 *Pursuant to Section 10-4.410(b) of the mining ordinance, should paleontological resources be discovered during ground disturbing activities, work shall be halted in the area within 75 feet of the find. The applicant shall notify the Director (as defined by the OCSMO as the County Administrator or designee chosen by the Administrator) and the Yolo County Department of Community Services and retain a qualified paleontologist to inspect the discovery. The find must be recorded by a qualified archaeologist or paleontologist using relevant professional protocols and a report fully recording the find submitted to the County Administrator or designee chosen by the Administrator and the Yolo County Department of Community Services. This report shall include recommendations for appropriate removal and preservation of the artifact. If deemed appropriate in the report, the resource(s) shall then be salvaged and deposited at the Cache Creek Nature Preserve, or other appropriate venue, where the discovery would be properly curated and preserved for the benefit of current and future generations. The language of this mitigation measure shall be included on any future grading plans, mining plans, and reclamation plans approved by the Department of Community Services for the proposed project, where ground disturbance would be required.*

4.6-6 The loss of availability of a known mineral resource that would be of value to the region and the residents of the State. The impact would be *less than significant*.

The proposed project would result in extraction of aggregate mineral resources from the project site, consistent with the County's long-term plan for the management of aggregates along Cache Creek. The CCAP area is known to contain over 700 million tons of sand and gravel deposits. The Mining Permit for the project site would allow for up to 2.6 million tons of aggregate material to be mined per year. Given that the proposed project would provide for the productive use of existing aggregate resources known to occur within the project site, a ***less-than-significant*** impact would occur related to the loss of availability of a known mineral resource that would be of value to the region and the residents of the State.

Mitigation Measure(s)

None required.

4.6-7 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. The impact would be *less than significant*.

The proposed project would result in extraction of aggregate mineral resources from the project site, consistent with the County's long-term plan for the management of aggregates along Cache Creek. Approximately 107 acres of the site is designated by the California State Mining and Geology Board as MRZ-2, reflecting the existence of known significant mineral deposits or a high likelihood for the presence of mineral deposits. The remaining approximately 212 acres of the project site is designated MRZ-3, indicating an area of known reserves of unknown significance. The applicant has submitted an application to the California Department of Conservation (DOC) in July 2020 to change the MRZ-3 State designation of the site to MRZ-2 to reflect the existence of known significant aggregate reserves over the entire project site. Re-designation of the entire site is supported by the fact that the site is known to contain over 700 million tons of sand and gravel deposits. The Mining Permit for the project site would allow for up to 2.6 million tons of aggregate material to be mined per year. Currently, the portion of the project site designated as MRZ-2 is located in the General Plan Mineral Resource Overlay area. With approval of the DOC redesignation request, the remainder of the mining area would be included in the overlay as part of the proposed project. As discussed under Impact 4.6-8, the proposed project would comply with all applicable standards and regulations related to off-channel mining operations. Given that the proposed project would provide for the productive use of existing aggregate resources known to occur within the project site, a ***less-than-significant*** impact would occur related to the loss of a locally-important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan.

Mitigation Measure(s)
None required.

4.6-8 Cause a significant environmental impact due to a conflict with applicable plans, policies, or regulations adopted for the purpose of avoiding or mitigating impacts to geology and soils, mineral resources, and paleontological resources The impact would be *less than significant*.

Table 4.6-1 below provides an analysis of the proposed project's consistency with applicable policies and regulations that have been adopted for the purpose of avoiding or mitigating environmental effects related to geologic hazards, mineral resources, and paleontological resources.

As shown in the table below, the proposed project would be generally consistent with applicable standards related to geologic hazards and mineral and paleontological resources. Thus, a ***less-than-significant*** impact would occur.

Mitigation Measure(s)

None required.

Table 4.6-1
Consistency with Applicable Standards

Policy / Regulation	Consistency Discussion
Yolo County General Plan	
Policy HS-1.1 Regulate land development to avoid unreasonable exposure to geologic hazards.	As discussed above, impacts related to geologic hazards would be less than significant. Therefore, the project would be consistent with this policy.
Policy HS-1.3 Require environmental documents prepared in connection with CEQA to address seismic safety issues and to provide adequate mitigation for existing and potential hazards identified.	As discussed in Impact 4.6-1 above, a Slope Stability Evaluation was prepared to evaluate the seismic impacts associated with the slopes of the mining and reclamation phases. Therefore, the project would be consistent with this policy.
Policy ED-1.2 Support the continued operation of existing aggregate mining activities within the county as well as new aggregate mining in appropriate areas, to meet the long-range construction needs of the region.	The proposed project would result in operation of an aggregate mine and mining activities in order to meet the economic needs of the County.
Policy CO-3.1 Encourage the production and conservation of mineral resources, balanced by the consideration of important social values, including recreation, water, wildlife, agriculture, aesthetics, flood control, and other environmental factors.	The proposed project would result in the production of aggregate resources from the site. All relevant environmental issues associated with the proposed mining and reclamation activities, including impacts to recreation, wildlife, agriculture, aesthetics, and flood control, are discussed throughout this EIR. Where applicable, mitigation is provided to reduce potential impacts to the maximum extent feasible. Therefore, the project would be consistent with this policy.
Policy CO-3.2 Ensure that mineral extraction and reclamation operations are compatible with land uses both on-site and within the surrounding area, and are performed in a manner that does not adversely affect the environment.	Impacts related to the creation of land use incompatibilities are discussed in Chapter 4.9, Land Use and Planning, of this EIR. The potential for the project to result in adverse impacts to the environment is addressed throughout this EIR as well as in the Initial Study (see Appendix A) prepared for the project. Any impacts identified within this EIR have been reduced to the maximum extent feasible through the imposition of mitigation measures. As such, the project would be consistent with this policy.
Policy CO-3.5 Preserve and protect the County's unique geologic and physical features, which include geologic or soil "type localities", and formations or outcrops of special interest. (DEIR MM GEO-1a)	The project site is underlain by Holocene-aged stream channel deposits typical of the Cache Creek area. Drill hole logs demonstrate that the soil layers are relatively uniform, which is consistent with the alluvial nature of the area. The project site is currently used for agricultural production, which is common within Yolo County and the project area. Consequently, the project site does not contain any unique geologic or physical features that are not found elsewhere in the County or the Cache Creek

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Table 4.6-1
Consistency with Applicable Standards

Policy / Regulation	Consistency Discussion
	Area. Considering the geologic and physical setting of the project site, the project would not inhibit preservation or protection of any unique physical features, and, consequently, the project would comply with this policy.
Action CO-A37 Designate and zone lands containing identified mineral deposits to protect them from the encroachment of incompatible land uses so that aggregate resources remain available for the future. (Policy CO-3.1)	As discussed in Impact 4.6-7, a portion of the project site is currently included in a Mineral Resource Overlay area, and implementation of the project would include redesignation of the remaining portion of the project site with a Mineral Resource Overlay. Following redesignation of the site, the deposits within the project site would be mined. Accordingly, the project would not result in the loss of availability of mineral resources. The project would comply with this action
Action CO-A39 Encourage the responsible development of aggregate deposits along Cache Creek as significant both to the economy of Yolo County and the region. (Policy CO-3.1)	The proposed project would involve extraction of aggregate deposits within the Cache Creek area in a manner that would be consistent with the CCAP. Thus, the project would be considered to comply with this action.
Action CO-A42 Implement the Cache Creek Area Plan to ensure the carefully managed use and conservation of sand and gravel resources, riparian habitat, ground and surface water, and recreational opportunities. (Policy CO-3.1)	The project was anticipated by the CCAP and would include extraction of sand and gravel resources. Reclamation of the project site would include establishment of riparian habitat within the project site. Impacts to ground and surface water are analyzed in Chapter 4.8, Hydrology and Water Quality. Recreational opportunities would not be afforded at the project site following reclamation; rather the site would be reclaimed for continued agricultural uses and habitat conservation purposes. Based on the analysis presented in this EIR and the Initial Study prepared for the proposed project, the project would comply with this action.
Action CO-A43 Monitor updates to the State Mineral Resource classification map and incorporate any needed revisions to the County's zoning and land use map. (Policy CO-3.1)	As discussed in impact 4.6-6, an application to redesignate the entirety of the site to MRZ-2 has been submitted to the DOC. Although a portion of the project site is currently designated with a Mineral Resource Overlay, implementation of the proposed project would include redesignation of the remaining portion of the site with a Mineral Resource Overlay. Consequently, the project would comply with this action.
Action CO-A47 Ensure that mined areas are reclaimed to a usable condition that is readily adaptable for alternative land uses, such as agriculture, wildlife habitat, recreation, and groundwater management facilities. (Policy CO-3.1)	Reclamation of the project site would result in 117 acres of agricultural uses, a combined total of 47.5 acres of grassland and riparian woodland habitat and 113 acres of lake uses. Thus, the project would comply with this action.
Action CO-A54	As discussed in further depth in Chapter 4.9, Land

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Table 4.6-1
Consistency with Applicable Standards

Policy / Regulation	Consistency Discussion
Implement the Cache Creek Area Plan (Policy CO-3.2).	Use and Planning, of this EIR, the project would comply with the CCAP, and, as a result, this action.
Action CO-A63 Require cultural resources inventories of all new development projects in areas where a preliminary site survey indicates a medium or high potential for archaeological, historical, or paleontological resources. In addition, require a mitigation plan to protect the resource before the issuance of permits. Mitigation may include: • Having a qualified archaeologist or paleontologist present during initial grading or trenching; • Redesign of the project to avoid historic or paleontological resources; • Capping the site with a layer of fill; and/or • Excavation and removal of the historical or paleontological resources and curation in an appropriate facility under the direction of a qualified professional. (Policy CO-4.1, Policy CO-4.13)	The project is not a development proposal; nevertheless, the project would be subject to the requirements of Section 10-4.410, Cultural Resources, of the OCSMO. Section 10-4.410 contains specific standards for avoiding damage to cultural, historic, and paleontological resources, as well as assessing and preserving any resources discovered during mining activities. Moreover, Mitigation Measure 4.6-5 includes requirements that implement Section 10-4.410. Because the project would be required to comply with Section 10-4.410 and Mitigation Measure 4.6-5, the proposed project would comply with this action as well.
Action CO-A65 Require that when cultural resources (including non-tribal archeological and paleontological artifacts, as well as human remains) are encountered during site preparation or construction, all work within the vicinity of the discovery is immediately halted and the area protected from further disturbance. The project applicant shall immediately notify the County Coroner and the Planning and Public Works Department. Where human remains are determined to be Native American, the project applicant shall consult with the Native American Heritage Commission (NAHC) to determine the person most likely descended from the deceased. The applicant shall confer with the descendant to determine appropriate treatment for the human remains, consistent with State law. (Policy CO-4.1, Policy CO-4.11, Policy CO-4.12, Policy CO-4.13)	Section 10-4.410 of the OCSMO includes requirements that are substantively similar to the requirements included in this action. Moreover, Mitigation Measure 4.6-5 includes requirements that implement Section 10-4.410. Because the project would be required to comply with Section 10-4.410 of the OCSMO and Mitigation Measure 4.6-5, the project would comply with this action.
Off-Channel Surface Mining Ordinance	
Section 10-4.403 The operator shall immediately notify the Director of any events such as fires, explosions, spills, land or slope failures, or other conditions at the site which could pose a hazard to life or property. Action shall be immediately undertaken to alleviate the hazard. The operator shall provide a written report of any such event, within thirty (30) days,	Section 10-4.403 includes enforcement mechanisms that would ensure that any hazards are promptly reported to the County. Impacts 4.6-1 and 4.6-3 demonstrate that the proposed mining activity would not be anticipated to result in impacts such as collapse, subsidence, or landslide. Consequently, the project would comply with this section of the ordinance.

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Table 4.6-1
Consistency with Applicable Standards

Policy / Regulation	Consistency Discussion
which shall include, but not be limited to, a description of the facts of the event, the corrective measures used, and the steps taken to prevent a recurrence of the incident. Failure to provide this report shall initiate violation proceedings pursuant to Article 11. This condition does not supersede nor replace any requirement of any other governmental entity for reporting incidents.	
Section 10-4.406 During mining operations, a series of benches may be excavated in a slope provided that the excavations are made in compliance with the requirements of the state Mine Safety Orders (California Code of Regulations, Title 8, Subchapter 17). The vertical height and slope of the benches constructed for permanent reclaimed slopes shall not exceed maximum standards for the specific soil types presented in the California Code of Regulations, Title 8, Article 6. In general, vertical cut slopes between benches shall not exceed four (4) feet in height in topsoil and overburden sediments. Benching shall be allowed in cohesive soil (clay, sandy or silty clay, clayey silt) only. Slopes above the elevation of groundwater (determined at the time of the excavation by the level of exposed water in the excavation) that exceed the maximum vertical height shall be excavated and maintained at slopes not steeper than 2:1 (horizontal:vertical). Slopes located five (5) feet or less below the average summer low groundwater level shall not be steeper than 2:1 (horizontal:vertical). Slopes located more than five (5) feet below the average summer low groundwater level shall not be steeper than 1:1 (horizontal to vertical). Vertical cut slopes in excess of four (4) feet in height may be approved for the development of special habitat (e.g., bank swallows) if a site-specific slope stability analysis, performed by a licensed engineer, indicates that the slope does not exceed critical height for the on-site soil conditions. Projects proposing such slopes shall submit a long-term maintenance plan to ensure that the function of the slopes as habitat is met.	The proposed project was subject to a Slope Stability Evaluation. The results of the analysis are relied upon to support the determinations presented within this chapter, specifically, those presented in Impacts 4.6-1 and 4.6-3 regarding the design of cut slopes and benches. Preparation of a Slope Stability Evaluation fulfills the requirements of Section 10-4.406.
Section 10-4.410 (a) All resource records shall be checked for the presence of and the potential for prehistoric and historic sites. Damaging effects on cultural resources shall be avoided whenever possible.	See discussion of Impact 4.6-5. In the event of the inadvertent discovery of prehistoric, historic, paleontological resources or human remains, the project would implement the provisions of OCSMO

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Table 4.6-1
Consistency with Applicable Standards

Policy / Regulation	Consistency Discussion
If avoidance is not feasible, the importance of the site shall be evaluated by a qualified professional prior to the commencement of mining operations. If a cultural resource is determined not to be important, both the resource and the effect on it shall be reported to the Agency, and the resource need not be considered further. If avoidance of an important cultural resource is not feasible, a mitigation plan shall be prepared and implemented. The mitigation plan shall explain the importance of the resource, describe the proposed approach to mitigate destruction or damage to the site, and demonstrate how the proposed mitigation would serve the public interest. (b) If human skeletal remains are encountered during excavation, all work within seventy-five (75') feet shall immediately stop, and the County Coroner shall be notified within twenty-four (24) hours. If the remains are of Native American origin, the appropriate Native American community identified by the Native American Heritage Commission shall be contacted, and an agreement for treating or disposing of, with appropriate dignity, the remains and associated grave goods shall be developed. If any cultural resources, such as chipped or ground stone, historic debris, building foundations, or paleontological materials are encountered during excavation, then all work within seventy-five (75') feet shall immediately stop and the Director shall be notified at once. Any cultural resources found on the site shall be recorded by a qualified archaeologist and the information shall be submitted to the Agency. (§ 1, Ord. 1190, eff. September 5, 1996)	Section 10-4.410. Therefore, the project would be consistent with this regulation.
Section 10-4.431 Except where benches are used, all banks above groundwater level shall be sloped no steeper than 2:1 (horizontal:vertical). Proposed steeper slopes shall be evaluated by a slope stability study, prepared by a Registered Civil Engineer, Certified Engineering Geologist, or Professional Geologist. Slopes below the groundwater level shall be no steeper than 1:1 (horizontal:vertical). Slopes located five (5) feet or less below the summer low groundwater level shall not be steeper than 2:1 (horizontal:vertical). This section applies only to	A Slope Stability Evaluation was prepared for the proposed project by a Registered Civil Engineer. Reclamation of the project site would comply with the following minimum slopes: • 2:1 above average high reclaimed groundwater level (57 feet MSL at the reclaimed lake), except for reclaimed mining slopes that are within 50 feet of the relocated Moore Canal, which will have a minimum slope of 3:1;

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Table 4.6-1
Consistency with Applicable Standards

Policy / Regulation	Consistency Discussion
final/reclaimed slopes and not to active mining faces.	• 4:1 between average high reclaimed groundwater level (57 feet MSL) and five feet below average high reclaimed groundwater level (52 feet MSL); • 2:1 between five feet below average high reclaimed groundwater level (52 feet MSL) and five feet below average low reclaimed groundwater level (42 feet MSL); and • 1:1 below five feet below average low reclaimed groundwater level (42 feet MSL). As discussed under Impact 4.6-1 and 4.6-3 above, the stability of the proposed slopes has been evaluated in the Slope Stability Evaluation and would comply with the standards established in the OSCMO. Thus, the project would be consistent with this regulation.
Section 10-4.432 Soil shall be cut in maximum depths in order to minimize traffic and limit compaction. The handling and transportation of soil shall be minimized. To the extent feasible, all handling of topsoil shall be accomplished when the soil is dry in order to avoid undue compaction.	The proposed project would stockpile soil on the project site in order to minimize transport of soil. All topsoil would be handled when the soil is dry. The updated version of the OCSMO did not include significant changes to the regulation. Therefore, the project would be consistent with this regulation.
Section 10-4.433 Soil stockpiles. Topsoil, subsoil, and subgrade materials in stockpiles shall not exceed forty (40) feet in height, with slopes no steeper than 2:1 (horizontal:vertical). Stockpiles, other than aggregate stockpiles, shall be seeded with a native vegetative cover to prevent erosion and leaching. The use of topsoil for purposes other than reclamation shall not be allowed without the prior approval of the Director. Slopes on stockpiled soils shall be graded to 2:1 (horizontal:vertical) for long-term storage to prevent use by bank swallows. At no time during the active breeding season (May 1 through July 31) shall slopes on stockpiles exceed a slope of 1:1, even on a temporary basis. Stockpiles shall be graded to a minimum 1:1 slope at the end of each work day where stockpiles have been disturbed during the active breeding season.	As discussed in Impact 4.6-3 above, soil stockpiles would not exceed 40 feet in height and would not be steeper than 2:1. Additionally, the stockpiles would be seeded with a native vegetative cover to prevent erosion. During updates to the OCSMO, this regulation was not significantly altered. Thus, the project would be consistent with this regulation.
Section 10-4.434 Technical report recommendations. The recommendations contained within each technical report submitted with a surface mining permit application shall be consistent with the OCMP and	The Slope Stability Evaluation prepared for the proposed project has been discussed throughout this chapter. All recommendations in the report would be incorporated into the proposed project. Therefore, the project would be consistent with this

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Table 4.6-1
Consistency with Applicable Standards

Policy / Regulation	Consistency Discussion
with all other technical reports submitted. The recommendations of all technical reports shall be implemented.	regulation.
Section 10-4.502(b)(6) A cultural resources survey of the proposed mining area, in order to evaluate the potential for historic and/or prehistoric artifacts. A survey may not be required if a preliminary investigation from the Northwest Information Center indicates that the likelihood of archaeological resources is low for the proposed site;	The Cultural Resource Assessment prepared for the proposed project (see Appendix G) included a survey of the proposed mining area. Thus, the proposed project is consistent with this regulation.
Surface Mining Reclamation Ordinance	
Section 10-5.530 All final reclaimed slopes shall have a minimum safety factor equal to or greater than the critical gradient as determined by an engineering analysis of the slope stability. Final slopes less than five (5) feet below the average summer low groundwater level shall be designed in accordance with the reclaimed use and shall not be steeper than 2:1 (horizontal:vertical). Reclaimed wet pit slopes located five (5) feet or more below the average summer low groundwater level shall not be steeper than 1:1 (horizontal:vertical), in order to minimize the effects of sedimentation and biological clogging on groundwater flow, to prevent stagnation, and to protect the public health. The maximum slope angle for all final reclaimed slopes shall be determined by slope stability analysis performed by a Licensed Geotechnical Engineer or Registered Civil Engineer and submitted with any mining and reclamation application for review by the Director. The slope stability analysis shall conform with industry standard methodologies regarding rotational slope failures under static and pseudostatic (seismic) conditions. The minimum factor of safety for all design reclamation slopes located adjacent to levees or below existing structures shall not be less than 1.5 for static and 1.1 for pseudostatic (seismic) conditions. Other reclamation slopes shall meet a minimum factor of safety that is consistent with the post-reclamation use proposed for the mining area.	As discussed throughout this chapter, and in consistency with Section 10-4.431 of the OCSMO, the proposed project proposes slope angles consistent with the requirements set forth by the County. As such, the proposed project would be consistent with this regulation.