4.6 GEOLOGY, SOILS, AND MINERAL RESOURCES

This section of the EIR describes the existing geology, soils, and mineral resources at and in the vicinity of the project site and analyzes the potential physical environmental effects of the project related to these topics. For information on soil quality related to agricultural use, refer to Section 4.2, "Agriculture and Forest Resources." Impacts related to unique paleontological resources at the project site are addressed in Section 4.5, "Cultural Resources," of this EIR. For information related to flooding, drainage, and groundwater quality at the project site, refer to Section 4.9, "Hydrology and Water Quality," of this EIR.

4.6.1 Environmental Setting

REGIONAL GEOLOGY

The City of Davis is located within the Great Valley geomorphic province, which is a river outwash plain roughly 50 miles wide and 400 miles long bordered by the Coast Range to the west and the Sierra Nevada to the east. The Great Valley encompasses the Sacramento and San Joaquin valleys and their respective rivers, which join and enter the San Francisco Bay. In Jurassic and Cretaceous times, the Great Valley was a deep water inland arm of the Pacific Ocean. Over time, the valley was filled in first by fine textured marine sediments, followed by river and flood (alluvial) deposits. Because the bedrock of the Great Valley is tilted, sloping downward from east to west, the deepest areas of marine and alluvial deposits are found along the eastern edge of the Coast Range. The project site is located at the southwestern end of the Sacramento Valley, approximately 30 miles north of the confluence of the San Joaquin and Sacramento rivers.

LOCAL GEOLOGY AND SOILS

The project site is underlain by Quaternary (present time to 1.6 million years ago) alluvial deposits. The Natural Resources Conservation Service (NRCS) Soil Survey of Yolo County (NRCS 2015) indicates that the following soil mapping units occur beneath the project site (see Figure 4.6-1 for soil map unit boundaries):

- Sycamore Silty Clay Loam, drained (Ss): This is a deep soil formed in mixed alluvium on nearly level flood plains. This soil is somewhat poorly drained with moderate runoff potential, and is in Hydrologic Group C (soils with moderately high runoff potential when thoroughly wet). The sycamore soil can be acidic and can be highly corrosive to uncoated steel.

- Yolo Loam (Yo): This soil formed on level to moderately sloping alluvial fans in alluvium from sedimentary rocks. It is deep and well drained with low runoff potential, and is in Hydrologic Group B (soils with moderately low runoff potential when thoroughly wet). The Yolo soil is moderately corrosive to uncoated steel.

SEISMICITY AND FAULT ZONES

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

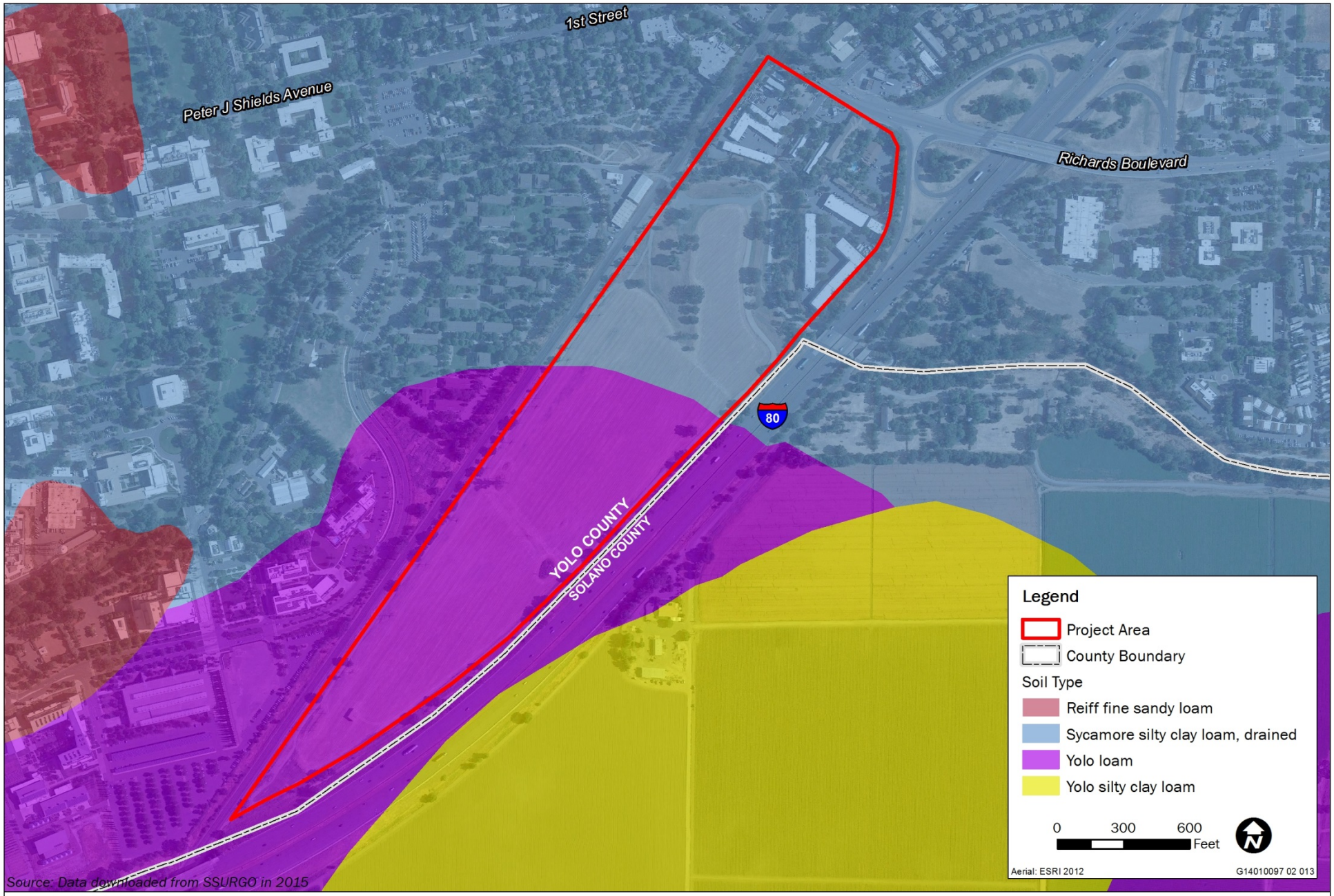

Figure 4.6-1

Soils in the Project Area

Faults

Most earthquakes occur along faults. A fault is a fracture of the Earth's crust along which rocks on one side have moved relative to those on the other side. Most faults are the result of repeated displacement that may have taken place suddenly and/or by slow creep (Bryant and Hart 2007: p. 3). The state of California designates faults as active, potentially active, and inactive depending on how recently they have moved. Faults that show evidence of movement within the last 11,000 years (the Holocene geologic period) are considered to be active, and faults that have moved between 11,000 and 1.6 million years ago (the Quaternary geologic period) are considered to be potentially active. Although there are no known faults within the immediate vicinity of the project site, there are several faults and fault systems nearby that are capable of generating earthquakes that could be felt in the Davis area. Table 4.6-1 lists some of the active and potentially active faults in relatively close proximity.

Table 4.6-1 Nearby Faults

Fault or Fault Zone	Distance from Project Site	Status
Dunnigan Hills Fault	16.5 miles north	Active
Vaca Fault Zone	18.5 miles southwest	Potentially Active
Putah Creek Fault	21 miles west	Potentially Active
Cordelia Fault Zone	27 miles southwest	Active
Bear Mountains Fault Zone	45 miles east	Potentially Active
Bennett Valley Fault Zone	49 miles west-southwest	Potentially Active
San Andreas Fault Zone	69 miles west-southwest	Active

Source: Bryant W.A. 2005. Digital Database of Quaternary and Younger Faults from the Fault Activity Map of California, Version 2.0. California Geological Survey, Sacramento CA.

SEISMIC GROUND SHAKING

The intensity of seismic shaking, or strong ground motion, during an earthquake is dependent on the distance and direction from the epicenter of the earthquake, the magnitude of the earthquake, and the geologic conditions of the surrounding area. Ground shaking could potentially result in the damage or collapse of buildings and other structures. As described above, several active and potentially active faults and fault systems have been identified near the project site, including the well known San Andreas Fault Zone. Numerous earthquakes along these faults have been felt in Davis. Major nearby earthquakes occurred in 1892, 1906, 1984, 1989, and 2014 (Cunningham 2013, EarthquakeTrack 2015). The project site is located in an area mapped as likely to experience high-intensity shaking during an earthquake, with a Modified Mercalli Intensity (MMI) of 7 (ABAG 2015). The MMI scale estimates the intensity of shaking from an earthquake at a specific location by considering its effects on people, objects, and buildings. At MMI 7, household objects would be thrown from wall and shelves, masonry buildings may be cracked or damaged, chimneys may collapse, and weak foundations may be damaged. The April 19, 1892 Vacaville-Winters earthquake (magnitude 6.9) caused severe damage in Winters and moderate damage in Davis and Woodland (Yolo County 2009).

SURFACE RUPTURE

Surface rupture is an actual cracking or breaking of the ground along a fault during an earthquake. Structures built over an active fault can be torn apart if the ground ruptures. The potential for surface rupture is based on the concept of recency and recurrence. Surface rupture along faults is generally limited to a linear zone a few meters wide. The Alquist-Priolo Act (see the Regulatory Setting discussion below) was created to prohibit the location of structures designed for human occupancy across, or within 50 feet of, an

active fault, thereby reducing the loss of life and property from an earthquake. The project site is not located within an Alquist-Priolo active fault zone (ABAG 2015.) Additionally, there is no evidence of active faulting within the project site.

LIQUEFACTION AND LATERAL SPREADING

Liquefaction is a phenomenon in which loose, saturated, granular soil deposits lose a significant portion of their shear strength because of excess pore water pressure buildup. Cyclic loading, such as an earthquake, typically causes the increase in pore water pressure and subsequent liquefaction. These soils are liquefied during seismic shaking and re-solidify when shaking stops. The potential for liquefaction is highest in areas with high groundwater and loose, fine, sandy soils at depths of less than 50 feet. The area in and surrounding the project site is mapped as having moderate liquefaction potential (ABAG 2015)

Liquefaction may also lead to lateral spreading. Lateral spreading (expansion) is the horizontal movement or spreading of soil toward an "open face," such as a streambank, the open side of fill embankments, or the sides of levees. It often occurs in response to liquefaction of soils in an adjacent area. The potential for failure from lateral spreading is highest in areas where there is a high groundwater table, where there are relatively soft and recent alluvial deposits, and where creek banks are relatively high. There are no streams within the project site; however, because it is anticipated that there is a moderate potential for liquefaction of soil at the site, the potential for lateral spreading to occur should also be considered moderate.

NON-SEISMIC HAZARDS

Expansive Soils

Expansive soils contain shrink-swell clays that are capable of absorbing water. As water is absorbed, the clays increase in volume. This change in volume is capable of exerting enough force on buildings and other structures to damage foundations and walls. Damage can also occur as these soils dry out and contract.

One measure of the shrink-swell potential of soils is linear extensibility. Linear extensibility refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. The volume change is reported as percent change for the whole soil. The amount and type of clay minerals in the soil influence volume change. The shrink-swell potential is low if the soil has a linear extensibility of less than 3 percent, moderate if 3 to 6 percent, high if 6 to 9 percent, and very high if more than 9 percent. The linear extensibility of the sycamore silty clay loam soil (Ss) is 3.9, indicating that this soil is moderately expansive. The other soils in the project area have low shrink-swell potential (NRCS 2015).

Erosion

Erosion is the process by which surface soils are detached and transported by water and/or wind. Erosion has a detrimental effect on soil productivity because erosion begins with the upper horizons of a soil profile, which contain organic matter and microbial communities vital to supporting plant growth. Factors that influence the erosion potential of a soil include: vegetative cover; soil properties such as soil texture, structure, rock fragments and depth; steepness and slope length; and climatic factors such as the amount and intensity of precipitation. The NRCS soil surveys provide a rating of Erosion Hazard resulting from disturbance of non-road areas. This rating is based on slope and soil erosion factor (K). The predicted soil loss is caused by sheet or rill erosion (which happens when shallow flows of water causing sheet erosion are concentrated into rills and increase both in speed and scouring capacity) in off-road or off-trail areas where 50 to 75 percent of the surface has been exposed by some kind of disturbance. The hazard is described as "slight," "moderate," "severe," or "very severe." A rating of "slight" indicates that erosion is unlikely under ordinary conditions; "moderate" indicates that some erosion is likely and that erosion-control measures may be needed; "severe" indicates that erosion is very likely and that erosion-control measures, including revegetation of bare areas, are advised; and "very severe" indicates that significant erosion is expected, loss of soil productivity and off-site damage are likely, and erosion-control measures are costly and generally impractical (NRCS 2015). The erosion potential for soils within the project area is rated as "slight" (NRCS 2015).

Subsidence

Land subsidence is the gradual settling or sinking of an area with very little horizontal motion. It occurs because of changes taking place underground. Land surface subsidence can be induced by both natural and human phenomena. Natural phenomena include subsidence resulting from shifting of tectonic plates and dissolution of limestone resulting in sinkholes. Subsidence related to human activity includes pumping water, oil, or gas from underground reservoirs; collapse of underground mines; drainage of wetlands; and soil compaction. Monitoring of subsidence in Yolo County has been occurring since 1999 on a regional level (YCFCWCD 2006). Subsidence is not uniform throughout the County. The greatest subsidence has occurred in the area north of the project site, between Davis and Zamora, where the ground surface has subsided between 2 to 5 feet (YCFCWCD 2006). This subsidence has been linked to groundwater pumping. A monitoring network has been established to document continuing subsidence and to manage groundwater pumping to avoid overdraft and subsidence.

Landslides

Many factors contribute to an areas potential for landslides, including geologic conditions as well as the drainage, slope, and vegetation of the site. Cut and fill slopes (such as road cuts), or slopes effected by high severity fires can be susceptible to landslides. The potential for landsides within the project site is low due to the lack of significant slopes.

MINERAL RESOURCES

Although in the past, small amounts of gold and silver were mined from Putah and Cache creeks, currently, the chief mineral resources mined in Yolo County are aggregate rock and natural gas (Yolo County 2009). The California Department of Conservation, Division of Mining and Geology (DMG) has established a classification system for mineral resources. The project site is located in MRZ-1, which is an area where there is sufficient information to determine that no significant mineral deposits (specifically aggregate rock) are present (DMG 1988). Natural gas production has become more important to the regional economy in recent years. Portions of the project site are in the Davis Southeast Gas field (DOGGR 2015). There are several dry or plugged gas wells in the vicinity; however, the nearest active gas wells are north of Davis and in Winters (DOGGR 2015).

4.6.2 Regulatory Setting

FEDERAL

National Earthquake Hazards Reduction Act

The National Earthquake Hazards Reduction Act was passed to reduce the risks to life and property resulting from earthquakes. The act established the National Earthquake Hazards Reduction Program (NEHRP). The mission of NEHRP includes improved understanding, characterization, and prediction of hazards and vulnerabilities; improved building codes and land use practices; risk reduction through post-earthquake investigations and education; development and improvement of design and construction techniques; improved mitigation capacity; and accelerated application of research results. NEHRP designates the Federal Emergency Management Agency (FEMA) as the lead agency of the program and assigns several planning, coordinating, and reporting responsibilities. Other NEHRP agencies include the National Institute of Standards and Technology, National Science Foundation, and the U.S. Geological Survey (USGS).

STATE

Alquist-Priolo Earthquake Fault Zoning Act

The Alquist-Priolo Earthquake Fault Zoning Act (Alquist-Priolo Act) (Public Resources Code [PRC] Sections 2621–2630) was passed in 1972 to mitigate the hazard of surface faulting to structures designed for human occupancy. The main purpose of the law is to prevent the construction of buildings used for human

occupancy on the surface trace, the intersection of a fault with the ground surface, of active faults. The law addresses only the hazard of surface fault rupture and is not directed toward other earthquake hazards. The Alquist-Priolo Act requires the State Geologist to establish regulatory zones known as "Earthquake Fault Zones" around the surface traces of active faults and to issue appropriate maps. The maps are distributed to all affected cities, counties, and state agencies for their use in planning efforts. Before a project can be permitted in a designated Alquist-Priolo Earthquake Fault Zone, cities and counties must require a geologic investigation to demonstrate that proposed buildings would not be constructed across active faults.

Seismic Hazards Mapping Act

In 1990, following the Loma Prieta earthquake, the California Legislature enacted the Seismic Hazards Mapping Act to assist cities, counties, and other local permitting agencies with protecting the public from the effects of strong ground shaking. The Seismic Hazards Mapping Act established a state-wide mapping program to address earthquake hazards from non-surface fault rupture, including liquefaction and seismically induced landslides. The Act also specifies that the lead agency for a project may withhold development permits until geologic or soils investigations are conducted for specific sites and mitigation measures are incorporated into plans to reduce hazards associated with seismicity and unstable soils.

California Building Standards Code

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

The state earthquake protection law (California Health and Safety Code Section 19100 et seq.) requires that structures be designed to resist stresses produced by lateral forces caused by wind and earthquakes. Specific minimum seismic safety and structural design requirements are set forth in Chapter 16 of the CBC. The CBC identifies seismic factors that must be considered in structural design.

Chapter 18 of the CBC regulates the excavation of foundations and retaining walls, and Chapter 33 regulates grading activities, including drainage and erosion control and construction on unstable soils, such as expansive soils and areas subject to liquefaction.

Surface Mining and Reclamation Act of 1975

The State Mining and Reclamation Act of 1975 (PRC Section 2710 et seq.) (SMARA) requires that the California State Geologist implement a mineral land classification system to identify and protect mineral resources of regional or statewide significance in areas where urban expansion or other irreversible land uses may occur, thereby potentially restricting or preventing future mineral extraction on such lands. As mandated by SMARA, aggregate mineral resources within the state are classified by the State Mining and Geology Board through application of the Mineral Resource Zone (MRZ) system. The MRZ system defines four zones based on the degree of available information characterizing the area and the presumed significance of the resource. These zones are described as follows.

- **MRZ-1:** Areas where adequate information indicates that no significant mineral deposits are present, or where it is judged that little likelihood exists for their presence.
- **MRZ-2:** Areas where adequate information indicates that significant mineral deposits are present, or where it is judged that a high likelihood exists for their presence.
- **MRZ-3:** Areas containing mineral deposits for which the significance cannot be determined from available data.
- **MRZ-4:** Areas where available information is inadequate for assignment of any other MRZ category.

LOCAL

City of Davis General Plan

The City of Davis General Plan contains the following goals and policies that are relevant to geologic and soil resources:

Goal AG 3: Conserve soil resources within the planning area.

- **Policy AG 3.1:** Develop programs to help to conserve soil resources.

Goal AG 4: Maintain Davis' visual character and natural topography by minimizing mineral resource exploitation.

- **Policy AG 4.1:** Discourage the extraction of mineral resources in the planning area.

4.6.3 Impacts and Mitigation Measures

SIGNIFICANCE CRITERIA

Based on Appendix G of the State CEQA Guidelines, the project would result in a potentially significant impact on geology, soils, and mineral resources if it would:

- expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:

    1. rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault. Refer to Division of Mines and Geology Special Publication 42,

    2. strong seismic ground shaking,

    3. seismic--related ground failure, including liquefaction, or

    4. 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 landslides, 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 waste water disposal systems where sewers are not available for the purposes of the disposal of waste water;

- result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state;

- 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; or
- conflict, or create an inconsistency, with any applicable plan, policy, or regulation adopted for the purpose of avoiding or mitigating environmental effects related to geology, soils, and mineral resources.

METHODS AND ASSUMPTIONS

Components of the Nishi Sustainability Implementation Plan That Could Affect Project Impacts

The following goals and objectives from the Nishi Sustainability Implementation Plan are applicable to the evaluation of geology, soils, and mineral resource impacts:

Goal 4: Maximize water and wastewater efficiency through the use of conservation, reuse and integrated landscaping and stormwater management strategies.

Objective 4.4: Incorporate creative low-impact development (LID) solutions to meet stormwater treatment and water quality requirements.

Impact Analysis Methodology

As noted in Chapter 3, "Project Description," this EIR evaluates development of the Nishi site at a project level and potential redevelopment that may occur within West Olive Drive as a result of rezoning/redesignation at a programmatic level. The evaluation of potential geologic and soil impacts is based on a review of documents covering the project site, including CGS and USGS technical guides; the NRCS Soil Survey; regulations and planning documents; environmental impact reports; background reports prepared for plans and projects in the vicinity; and publish and unpublished geologic literature. The information obtained from these sources was reviewed and summarize to understand existing conditions and to identify potential environmental effects, based on the thresholds of significance. In determining the level of significance, the analysis assumes that the project would comply with relevant, federal, state, and local laws, regulations, and ordinances.

ISSUES NOT EVALUATED FURTHER

Septic Tanks

The wastewater system of the project would connect directly to the City of Davis wastewater collection and treatment system. The City is also considering an option where the project would connect directly to the University of California at Davis wastewater treatment plant located southwest of the project site. No septic systems or alternative waste water disposal systems are proposed or present on-site and therefore, no impacts related to septic systems would occur. This issue is not evaluated further herein.

Mineral Resources

The project site is located in an area mapped as MRZ-1, indicating that the site does not contain mineral resources. Additionally, the site is not indicated as a locally important mineral resource site. As a result, impacts related to mineral resources would not occur, and this issue is not discussed further herein.

PROJECT-SPECIFIC IMPACTS AND MITIGATION MEASURES

Impact 4.6-1: Seismic hazard impacts.

Nishi Site

Although the Nishi site would include the construction of residential and commercial buildings in an area that could experience strong seismic shaking, all project components would be required to comply with the seismic design standards of the California Building Code. These standards account for the shaking hazard of an area and the type of occupancy and are designed to minimize the potential risk to life and property. Therefore, the potential for impacts related to seismic shaking or fault rupture within the Nishi site would be **less then significant**.

The Nishi site is not located on or near any known faults and is not located in an Alquist-Priolo earthquake zone. However, the large fault systems to the west and east are capable of producing earthquakes that would generate strong ground shaking in the Davis area. This is reflected in the California Geological Survey probabilistic earthquake hazard mapping and the MMI Scale mapping for the area which indicated a moderate hazard related to seismic shaking within the vicinity of the project site.

Although the Nishi site would include the construction of residential and commercial buildings in an area that could experience strong seismic shaking, all project components would be required to comply with the seismic design standards of the CBC. These standards account for the shaking hazard of an area and the type of occupancy and are designed to minimize the potential risk to life and property.

*Development of the Nishi site as part of the project would be conducted in a manner consistent with the most recent requirements of the CBC, which has provisions for seismic safety. This would be a **less-than-significant** impact.*

Mitigation Measures

No mitigation measures are required.

West Olive Drive

Although West Olive Drive would include construction in an area that could experience strong seismic shaking, all project components would be required to comply with the seismic design standards of the California Building Code. These standards account for the shaking hazard of an area and the type of occupancy and are designed to minimize the potential risk to life and property. Therefore, the potential for impacts related to seismic shaking or fault rupture within West Olive Drive would be **less then significant**.

The seismic conditions associated with West Olive Drive are equivalent to the Nishi site. As described above, the City has the potential to experience strong seismic shaking, however all redevelopment associated with the rezoning of West Olive Drive would be required to comply with the California Building Code seismic design standards. Compliance with these standards would minimize the potential risk associated with ground shaking.

*Potential redevelopment of uses within West Olive Drive would be designed to comply with the most recent requirements of the CBC, which has provisions for seismic safety. This would be a **less-than-significant** impact.*

Mitigation Measures

No mitigation measures are required.

Impact 4.6-2: Erosion impacts.

Nishi Site

The construction activities associated with development of the Nishi site would create ground disturbance and soil compaction which could lead to increased erosion. However, the Nishi site is not located in an area that his highly susceptible to erosion. Additionally, the development of the Nishi site as part of the project would be required to comply with City of Davis construction permitting and Central Valley Regional Water Quality Control Board (RWQCB) NPDES permit conditions requiring temporary and permanent erosion control best management practices (BMPs). Therefore, the potential for development of the Nishi site to result in increased erosion would be a **less-than-significant** impact.

Development of the Nishi site would involve approximately 47 acres of ground disturbance. Construction activities would include vegetation removal and grading. Excavation would be required for the installation of storm drains, utilities, and foundations. Replacement of the existing crossing of North Putah Creek would require excavation and removal of the existing fill and wall structure, and excavation for the installation of abutments and possibly piers. These activities would result in temporary disturbance of soil and would expose disturbed areas to storm events. Rain of sufficient intensity and duration could dislodge soil particles, generate runoff, and cause localized erosion. Soil disturbance during the summer months could result in loss of topsoil because of wind erosion and thunderstorm events. Heavy equipment traffic on the site could result in soil compaction which would reduce the water holding capacity of the soil, increasing the potential for runoff and erosion.

The NRCS Erosion Hazard rating estimates the risk of soil loss from sheet and rill erosion (erosion caused by overland flow of water) for disturbed soils where 50 to 75 percent of the soil surface has been exposed (NRCS 2015). Because the soils of the Nishi site have low to moderate runoff potential and the topography (with the exception of the banks of the channel of North Putah Creek) is flat to gently sloped, the NRCS described the Erosion Hazard rating at "Slight." This means that erosion would be unlikely under normal conditions.

All development projects within the City of Davis are required to submit Grading Plans and Erosion and Sediment Control Plans which minimize ground disturbance and incorporate erosion control practices and BMPs. Erosion control and stormwater BMPs must comply with the City of Davis' Stormwater Management Plan (City of Davis 2006) and municipal NPDES permit and must include:

- Appropriate BMP's which prevent off-site stormwater transport of silt or other deleterious substances during the wet season.
- Inspection of all BMPs during rain, or at a minimum within 24 hours before and after rain, to assure that erosion and sediment controls are properly maintained and functioning as designed.
- Adequate erosion and sediment control materials on site, or readily available, to install in the event that significant rainfall is predicted (this condition applies to all sites covered by an NPDES permit, or as instructed by the City).

Additionally, because the project would disturb more than one acre of land, it would require an NPDES permit for construction activities. One condition in the Central Valley RWQCB NPDES permit is a Storm Water Pollution Prevention Plan (SWPPP), prepared by a qualified SWPPP practitioner. This plan would detail the BMPs that would be implemented to minimize erosion, reduce sediment transport, and control stormwater flow from the project area. In addition, the SWPPP would address grading and slope stabilization methods, as well as construction waste disposal methods. Typical temporary BMPs include properly installed silt fences, sediment logs, detention basins, and inlet protection. Temporary BMPs would be installed before beginning site grading and would be maintained throughout construction until permanent erosion control features are functioning. The required elements of a SWPPP are discussed in greater detail in Section 4.9, "Hydrology and Water Quality." After construction is completed, temporarily disturbed areas would be

stabilized and revegetated, thereby minimizing long-term erosion potential. Also, as discussed in Impact 4.9-2 in Section 4.9, "Hydrology and Water Quality," LID control measures to reduce erosion will be incorporated into the project and will be included in the Stormwater Quality Control Plan.

The Nishi site is not located in an area that is highly susceptible to erosion. Additionally, the development of the Nishi site as part of the project would be required to comply with City of Davis and Central Valley RWQCB NPDES permit conditions requiring temporary and permanent erosion control BMPs. Therefore, the potential for development of the Nishi site to result in increased erosion would be a ***less-than-significant*** *impact.*

Mitigation Measures

No mitigation measures are required.

West Olive Drive

Construction activities associated with redevelopment of West Olive Drive would create ground disturbance which could lead to increased erosion. However, West Olive Drive does not contain soils that are highly susceptible to erosion. Additionally, redevelopment of the site would require compliance with Central Valley RWQCB NPDES permit conditions and City of Davis Code provisions requiring temporary and permanent erosion control BMPs. Therefore, the potential for the redevelopment of West Olive Drive to result in increased erosion would be a **less-than-significant** impact.

Rezoning of West Olive Drive could result in building demolition, construction activities and ground disturbance during subsequent redevelopment, potentially leading to wind and water erosion. Redevelopment could occur on a parcel by parcel basis or on a larger scale, depending on property-owner decisions. Although the types and scale of potential disturbance is not known at this time, the soil physical conditions and regulatory environment at the same as those discussed above in regards to the Nishi site.

As discussed above, any project disturbing over one acre of land would require a NPDES permit, which includes a SWPPP. The BMPs and protective measures included in this permit would minimize the potential for wind and water erosion. Any project disturbing less than one acre would be required to meet the City of Davis Code requirement that all projects area designed to minimize soil erosion, runoff, and water waste (Davis Municipal Code Section 40.42.110). Additionally, the California Green Building Standards Code (adopted by the City of Davis in 2013) requires that projects that are less than one acre (not covered by the RWQCB NPDES permit) control stormwater and limit erosion and runoff during and after construction.

As described above, the potential for erosion resulting from redevelopment of West Olive Drive would be minimized through compliance with Central Valley RWQCB or City of Davis building code requirements. This would be a ***less-than-significant*** *impact.*

Mitigation Measures

No mitigation measures are required.

Impact 4.6-3: Impacts resulting from unstable or expansive soils.

Nishi Site

The Nishi site may contain expansive soils or soils with the potential to liquefy during seismic events. However, the proposed development of the Nishi site would include large, multi-story structures which are subject to geotechnical investigations in accordance with the CBC. Through completion of the required geotechnical report and adherence to its recommendations, the potential to expose users to risk related to liquefaction and expansive soils would be minimized. Therefore, the development of the Nishi site as part of the project would have a **less-than-significant** impact relative to expansive or unstable soils.

The Nishi site and vicinity may contain moderately expansive soils or soils with moderate potential for liquefaction and lateral spreading. Buildings constructed on expansive soils often require specialized building techniques to protect foundations from damage caused by the expanding and contracting movement of the soil. Similarly, the potential hazards associated with building on soils that may liquefy during seismic shaking or that may experience lateral spreading can be reduced through soil modification or specialized engineering practices. The risk associated with these soils can be minimized if they are identified during the planning phase of a project and design accommodations are made in accordance with California Building Code requirements.

The CBC requires a geotechnical report for any structure that exceeds 4,000 square feet or is more than one story. All of the structures proposed for the Nishi site are large multi-story buildings and would therefore require the completion of a geotechnical report. This report would evaluate the potential for slope instability, liquefaction, and expansive or unstable soils would be used to develop the final design of all project components. As required by CBC Chapter 18, this report would be prepared by a Registered Professional Geologist, or Registered Civil or Geotechnical Engineer and would ensure that all applicable codes and seismic standards are adequately addressed in the design and construction of the project. The Geotechnical Report would include recommendations on the following:

- bridge, retaining wall, and roadway design;
- structural foundations;
- grading practices;
- erosion/winterization;
- best practices to address groundwater and expansive or unstable soils;
- slope stability; and
- post-construction restoration.

Through completion of the required geotechnical report and adherence to its recommendations, the potential to expose users to risk related to liquefaction and expansive soils would be minimized.

Because continued planning and design would include site-specific design requirements to ensure consistency with the CBC and its requirements related to soil stabilization, the development of the Nishi site as part of the project would have a ***less-than-significant*** *impact relative to expansive or unstable soils.*

Mitigation Measures

No mitigation measures are required.

West Olive Drive

West Olive Drive may contain expansive soils or soils with the potential to liquefy during seismic events. However, the potential redevelopment of West Olive Drive would likely include multi-story structures which are subject to geotechnical investigations in accordance with the CBC. Through completion of the required geotechnical report and adherence to its recommendations, the potential to expose users to risk related to liquefaction and expansive soils would be minimized. Therefore, potential redevelopment of West Olive Drive as part of the project would have a **less-than-significant** impact relative to expansive or unstable soils.

West Olive Drive is located entirely on the Sycamore Silty Clay Loam soil mapping unit. These soils are moderately expansive and may present a risk of liquefaction or lateral spreading during seismic shaking. As described in the Nishi site discussion above, the risk associated with these soils can be minimized through identification of problem areas and design accommodation in accordance with building code regulation.

West Olive Drive would likely include office, commercial service, and small scale neighborhood uses located in two or three story buildings. Because the CBC requires a geotechnical report for any structure that exceeds 4,000 square feet or is more than one story, redevelopment would require an approved geotechnical report. Because West Olive Drive is currently developed, future project may make use of any

geotechnical reports prepared for the existing structures, provided that a reevaluation is made and the report is found to be currently appropriate (CBC Section 1803.7)

As described in regards to the Nishi site, the Geotechnical Report would assess the potential hazards associated with expansive or unstable soils on the site and would provide design recommendations to minimize risks.

Potential redevelopment of uses within West Olive Drive would be designed to comply with the geotechnical reporting and design requirements of the CBC. The potential hazards associated with expansive or unstable soils would be minimized through this process. Therefore, the redevelopment of West Olive Drive would have a ***less-than-significant*** *impact relative to expansive or unstable soils.*

Mitigation Measures

No mitigation measures are required.

Impact 4.6-4: Conflict, or create an inconsistency, with any applicable plan, policy, or regulation adopted for the purpose of avoiding or mitigating environmental effects related to geology, soils, or mineral resources.

Nishi Site

Implementation of the project within the Nishi site would be consistent with the policies of the City of Davis General Plan related to geology, soils, and mineral resources. This would be a **less-than-significant** impact.

The City of Davis General Plan includes policies to protect environmental resources, including geology, soils, and mineral resources. The features of the proposed development of the Nishi site and mitigation measures discussed in this document are consistent with the policies of the City of Davis General Plan as shown in Table 4.6-2.

Development of the Nishi site as part of the project would not conflict with any local policies or ordinances protecting geology, soils, or mineral resources. Impacts would be ***less than significant****.*

Mitigation Measures

No mitigation measures are required.

West Olive Drive

Redevelopment that could occur as a result of the redesignation/rezoning of parcels located in West Olive Drive would be consistent with the policies of the City of Davis General Plan related to geology, soils, and mineral resources. This would be a **less-than-significant** impact.

Similar to what was discussed above, potential redevelopment of West Olive Drive would not create conflicts or result in inconsistencies with the policies of the City General Plan related to geology, soils, and mineral resources.

Potential redevelopment associated with the proposed General Plan Amendment and zoning change of West Olive Drive would not conflict with any regulations established for the protection of geology, soils, or mineral resources. Impacts would be ***less than significant****.*

Mitigation Measures

No mitigation measures are required.

Table 4.6-2 City of Davis General Plan Policy Consistency

Policy	Project Consistency
Policy AG 3.1: Develop programs to help to conserve soil resources.	Consistent with CBC requirements, the site would be designed to minimize potential runoff and erosion as a result of development, which would help to conserve soil resources within the planning area. The project is consistent with this policy.
Policy AG 4.1: Discourage the extraction of mineral resources in the planning area.	As noted above, no mineral resources are known to exist within the project site, and as a result, the project would not result in the extraction of mineral resources, consistent with this policy.
Policy HAZ 2.1: Take necessary precautions to minimize risks associated with soils, geology, and seismicity.	As noted above under Impacts 4.6-1 through 4.6-3, the project would be designed in compliance with current building code requirements, including the preparation of site-specific geotechnical studies. These studies would identify specific recommendations for compaction and soils so as to minimize risks associated with local soils, geology, and seismicity, consistent with this policy.

Source: City of Davis General Plan 2007; Ascent 2015