4.10 GEOLOGY, SOILS, SEISMICITY, AND PALEONTOLOGY

This section addresses the potential impacts of The Village at Loomis Project (proposed project) to geologic, soils, and paleontological resources, as well as impacts related to seismic safety and soil stability. The proposed project would construct up to 426 residential units and a village-themed retail center with shops and restaurants, professional offices, parks, open space, and trails.

No comments addressing geology, soils, seismicity, or paleontological resources were received in response to the Notice of Preparation. The Notice of Preparation and comments received in response to the Notice of Preparation are included in Appendix A.

4.10.1 Environmental Setting

Geology

Regional Setting

The Town of Loomis (Town) is located near the boundary between the Great Valley geomorphic province and the Sierra Nevada geomorphic province on the eastern edge of California’s Great Central Valley. Geomorphic provinces are areas comprised of similar geologic origin and erosional/depositional history. The Great Valley province encompasses the San Joaquin and Sacramento Valleys and is generally bounded by the Sierra Nevada Mountains to the east, the Coast Ranges to the west, the Transverse Ranges to the south, and the Klamath Mountains to the north. The Great Valley is a structural trough in which sediments from erosion of the surrounding mountain ranges have been deposited almost continuously since the Jurassic period (approximately 160 million years ago), leaving a flat valley floor composed of alluvial material (California Department of Conservation, California Geological Survey, 2002).

The Sierra Nevada geomorphic province extends approximately 400 miles from Lassen Peak in the north to the Mojave Desert in the south. The Sierra Nevada mountain range is a relatively recent formation, created 10 to 12 million years ago. Elevation increases gradually on the western slope and decreases more rapidly on the eastern slope. The mountain range is composed mainly of metamorphic and igneous rocks. The Sierra Nevada batholith is mostly composed of Mesozoic (144 million to 245 million years ago), plutonic, and volcanic rocks. Along the western edge of the batholith lies a metamorphic belt, characterized by extremely folded and faulted Paleozoic (286 million to 700 million years ago) to Mesozoic metavolcanic and metasedimentary rocks. Tertiary (5 million to 65 million years ago) and Quaternary (1.8 million years ago to present) age volcanic and alluvial deposits overlie the older basement rocks in some areas. These formations have been exposed to millions of years of weathering and erosion of surface structures, such as from glacial activities and stormwater runoff, leading to the creation
of large rivers on both the western and eastern slopes (California Department of Conservation, California Geological Survey, 2002).

**Project Site Conditions**

The 1981 Geologic Map of the Sacramento Quadrangle, prepared by the California Division of Mines and Geology (CDMG), indicates that the project site is underlain by Mesozoic granodiorite (granitic) rocks, commonly referred to as the Penryn and Rocklin plutons. These granitic rock units are a large-scale intrusive body that is part of a series of magmatic intrusions that helped form portions of the Sierra Nevada. The rock is characterized as a light gray, course-grained igneous rock composed of minerals such as quartz, feldspar, hornblende, and biotite. This rock may also contain occasional xenoliths (an inclusion of a pre-existing rock fragment within the magma) of various sizes and shapes, and quartz veins. The Penryn and Rocklin plutons cover an area of approximately 150 square miles, extending from the Folsom area north to the Auburn area (CDMG 1981).

The primary geologic unit on site is Penryn Quartz Diorite, with alluvial units in the vicinity of the tributary to Secret Ravine Creek. Alluvial units are composed of terrace deposits resulting from sediment deposition and subsequent down cutting of the creek bed.

**Topography**

**Regional Setting**

The Sacramento Valley is the northern portion of the Central Valley, which is a broad and flat valley approximately 42,000 square miles in area. Topographic features defining the Sacramento Valley are the Coast mountain range to the west, the Klamath and Cascade mountain ranges to the north, and the Sierra Nevada to the east. Erosion of the surrounding mountain ranges and subsequent transport and deposition of the eroded sediment in the valley over millennia has resulted in a nearly flat valley floor.

The Town is situated on the east side of the Sacramento Valley at the base of the western slope of the Sierra Nevada at an elevation of approximately 400 feet. Topography throughout the Town is also generally flat.

**Project Site Conditions**

The project site is characterized by gently rolling terrain bisected by a tributary to Secret Ravine Creek that runs generally north/south through the center of the site. The site slopes minimally from north to south, with on-site elevations ranging from ±410 feet at the northern boundary to ±390 feet at the site’s southern boundary, as shown in Figure 4.10-1, Project Site Topography.
Mineral Resources

Information on the mineral resource potential within the study area was obtained from the CDMG Mineral Land Classification of Placer County (CDMG 1995). In accordance with California’s Surface Mining and Reclamation Act of 1975, this document classifies the land in Placer County (County) according to “the presence, absence, or likely occurrence of significant mineral deposits in areas of the county subject to either urban expansion or other irreversible land uses incompatible with mining.”

Regional Setting

Various mineral deposits are found in Placer County and throughout the foothills region, including sand, gravel, quarry rock, and gold. Some commercial mineral extraction operations exist within the County including aggregate and gold. Most of these mines are located in the eastern portion of the County in the foothills of the Sierra Nevada mountain range (CDMG 1995).

The initial study completed for the Town of Loomis General Plan Update in 2000 concluded that development proposed by the General Plan would have no effect on mining operations in the Town and the region and would have less-than-significant effects on availability of mineral resources (Town of Loomis 2000).

Project Site Conditions

No active commercial mineral extraction operations are located on the project site. The project site is not classified as a site with known or potential significant mineral deposits (CDMG 1995).

Soils

Soil type is one criterion used to evaluate potential impacts of development. Soils are typically considered for their resource value in agricultural production or for their potential development characteristics or constraints. Some soils are more stable under varying conditions and are better suited for development, and others are more susceptible to erosion and/or are subject to expansion under certain soil moisture conditions.

Regional Setting

Soils found within the Town and throughout the foothills region are derived from weathered granite. In the project area, these soils are typically 24 to 40 inches deep over a granitic bedrock unit. Soils from granitic parent material are typically fine grained and well drained (USDA 2015). The Storie Index given for each soil type is an agricultural suitability rating that is based
on soil factors such as soil characteristics, soil texture, and slope. The lower the Index rating, the less suitable that particular soil is for general intensive agriculture.

**Project Site Conditions**

The Soil Survey of Placer County California, Western Part (USDA 2015) shows three soil types occurring within the project site. The soils found on the project site are described in the following text. The numeral preceding the soil name refers to the soil series assigned to each soil by the U.S. Department of Agriculture. Figure 4.10-2, Soil Types, depicts the distribution of each soil on site. The majority of the site is composed of Andregg coarse sandy loam, a small area in the northeast portion of the site is composed of Caperton-Andregg coarse sandy loams; the Xerorthents (an alluvial soil type) occur in association with the floodplain of a tributary to Secret Ravine Creek. The extent of the pre-development 100-year floodplain is shown in Figure 4.11-3 in Section 4.11, Hydrology and Water Quality.

**106 – Andregg coarse sandy loam, 2% to 9% slopes.** Andregg soil types are moderately deep, gently rolling well-drained soils that are underlain by weathered granitic bedrock. This soil type exhibits moderately rapid permeability, medium surface runoff, and moderate erosion hazard, although exposed soils erode rapidly. Depth of the soil to bedrock is 29 to 33 inches. The Storie Index rating for this soil is 54, placing it in agricultural suitability Grade 3, indicating that this soil is fair in regards to its suitability for agriculture. The limitations to development of this soil type are slopes. This soil type does not exhibit expansive characteristics.

**130 – Caperton-Andregg coarse sandy loam, 2% to 15% slopes.** The Caperton series consists of shallow, somewhat excessively drained moderately rapidly permeable soils that formed in material weathered mainly from granodiorite and quartz diorite. Caperton soils are on uplands and have slopes of 2% to 50%.

**197 – Xerorthents, Placer areas.** These soils are commonly found adjacent to streams where placer mining operations have occurred and are a mixture of rocks and silt. Because the soils are varied in their constituents, they exhibit variable permeability, runoff, and erosion hazards. The soil is not suited to agriculture, having a Storie Index rating of less than 5. Limitations to development on this soil type include slopes, flooding, and saturation. This soil type does not exhibit expansive characteristics. The occurrence of this soil type on the project site follows the unnamed drainage from north to south through the center of the project site.
Seismicity

Regional Setting

The major fault systems in the region tend to occur along the interface between differing geologic materials. The nearest major fault system near the Town is the Foothills Fault System, which traverses Amador, El Dorado, and Placer Counties in a path more than 215 miles long and several miles wide. Two segments of this system are relatively close to the Town: the segment of the Bear Mountain Fault Zone (Spenceville Fault) between Folsom and Auburn, and the Melones Fault Zone, approximately 15 miles to the east (Town of Loomis 2001).

No active faults are known to exist in the County, and no Alquist-Priolo Special Studies Zones are designated in the County. The nearest known active fault that has been mapped is the Dunnigan Hills Fault, well to the northwest of the Town across the Central Valley. However, investigations performed for the proposed Auburn Dam indicate that the Foothill Fault System may be undergoing reactivation in the vicinity of Folsom Lake and may be capable of producing a magnitude 6.5 Richter Scale event (Town of Loomis 2001). In 1975, a magnitude 5.7 earthquake was recorded on the Cleveland Hills Fault within the Foothills Fault System near Oroville, in a region thought at the time to be relatively free of seismic events of this severity. Consequently, even though the Bear Mountain and Melones Faults have not ruptured in the past 200 years, they are considered potentially active. The last seismic event recorded in the area with a magnitude of 4.0 or greater was in 1908, with an epicenter between Auburn and Folsom, possibly associated with the Bear Mountain Fault (Town of Loomis 2001).

An inactive inferred fault was mapped across the southern boundary of the Town planning area. The potential for seismic events originating from this fault is considered low (Town of Loomis 2001).

The underlying geologic foundation of the region is a relatively unbroken granitic batholith that extends along the Sierra Nevada. During seismic events, this material tends to react as a uniform block, which has the effect of reducing ground movement, acceleration, and the likelihood of ground rupture. Consequently, the CDMG classifies the region as a low severity earthquake area (CDMG 1995). The maximum expected intensity in a zone of this classification would range between VI and VII on the Modified Mercalli Scale. (The Modified Mercalli Scale is discussed further in the Groundshaking section, under Seismic Hazards.) Events of this intensity level could result in cracks in weak masonry and chimneys, shaking or rustling of trees and bushes, furniture movement, and breaking of glassware.

Project Site Conditions

There are no known active faults beneath or near the project site, and no active fault trace is known to pass beneath the project site. The active fault nearest to the project site is the Cleveland
Hills Fault, approximately 35 miles northeast, and the source of a magnitude 5.7 earthquake in 1975. In addition, studies indicate that there may be active faults, similar to the Cleveland Hills Fault, located within the Bear Mountain and Melones fault zones, approximately 15 miles east of the site (Town of Loomis 2001). The project site is not located in an area that is classified as a Special Studies Zone under the Alquist-Priolo Special Studies Zones Act of 1972.

**Geologic and Seismic Hazards**

The potential for typical geologic and seismic hazards to exist in the vicinity of the project site is described in the following text.

**Geologic Hazards**

**Landslides.** Landslides may be triggered by oversaturated soils (after heavy rains) or by earthquakes. Landslide potential is highest in steeply sloped areas, particularly those areas underlain with saturated and unconsolidated soil. Most areas within the Town, including the project site, are relatively level or gently sloping, and thus not highly susceptible to landslides. Although some areas within the Town have steep slopes, the underlying geology is generally mehrten volcanics and granite, which are not highly susceptible to landslides (Town of Loomis 2001).

**Erosion.** Soils throughout the Town generally exhibit moderate erosion potential, particularly when exposed on embankment faces and slopes. Each of the three soil types occurring within the project site also exhibit moderate erosion potential. Erosion is typically most pronounced in areas of unconsolidated alluvial soils adjacent to waterways, and therefore, subject to hydraulic erosive forces and areas of soil denuded of vegetation, typically associated with construction or agricultural activities. The effects of erosion range from nuisance problems, such as increased siltation in storm drains, to extreme cases where watercourses are downcut and gullies develop that can eventually undermine adjacent structures or vegetation (Town of Loomis 2001).

**Seiche.** Seiches are earthquake-generated waves within enclosed or restricted bodies of water. However, because no sizable lakes or reservoirs are present in the planning area, there are no seiche hazards in the Town, including at the project site.

**Seismic Hazards**

**Surface rupture.** Surface rupture during earthquakes is typically limited to those areas immediately adjacent to the fault on which the event is occurring. Because the Town, including the project site, contains no active faults, the likelihood of surface rupture in the area is considered low.
**Groundshaking.** The most serious direct earthquake hazard is the damage or collapse of buildings caused by groundshaking, which, in addition to property damage, can cause injury or death. Groundshaking is the vibration that radiates from the epicenter of an earthquake. The severity of groundshaking and its potential to cause damage to buildings is determined by several factors:

- The nature of the underlying soil and geology
- The location of the epicenter of the earthquake
- The duration and character of the ground motion
- The structural characteristics of a building
- The quality of workmanship and materials used in buildings

Groundshaking is the primary seismic concern for the Town. Portions of the Town are located on alluvial deposits, which can increase the potential for groundshaking damage. As earthquake waves pass from more dense rock to less dense alluvial material, they tend to reduce velocity but increase in amplitude. Ground motion lasts longer on loose, water-saturated materials than on solid rock. As a result, structures located on these types of materials may suffer greater damage and the potential for damage to result from groundshaking may be considered highest on the larger alluvial deposits along the creeks and ravines in the Town (Town of Loomis 2001).

Groundshaking is described in terms of ground acceleration of gravity or through the use of the Modified Mercalli Scale, which is a more descriptive method involving 12 levels of intensity denoted by Roman numerals. Modified Mercalli intensities range from I (not felt) to XII (total damage). Based on information from CDMG, the expected maximum probable groundshaking within the Town would range between VI and VII on the Modified Mercalli Scale (Town of Loomis 2001). Typical structural damage from groundshaking of this magnitude would be minimal if dwellings are constructed in compliance with applicable International Building Code (IBC) requirements. The typical effects of such groundshaking could include cracked chimneys, moved furniture, and broken glassware inside structures. However, historic records suggest a low probability of these maximum events occurring in the Town (Town of Loomis 2001).

**Ground failure.** In addition to structural damage caused by groundshaking, there are other ground effects caused by such shaking. These ground failure effects include liquefaction, subsidence, lurch cracking, and lateral spreading. The potential for these hazards to occur in the Town is discussed in the following text.

**Liquefaction.** Liquefaction in soils and sediments can occur during earthquake events, when material is temporarily transformed from a solid to a liquid (gelatinous) by increases in interpore pressure. Earthquake-induced liquefaction most often occurs in low-lying areas with soils composed of unconsolidated, saturated, clay-free sands and silts. It can also occur in dry,
granular soils or saturated soils with some clay content. Liquefaction also occurs in areas overlain by unconsolidated fill, particularly artificial fill. Within the project site, there are alluvial soils that have a moderate liquefaction potential (Town of Loomis 2001).

**Subsidence.** Subsidence is the compaction of soils and alluvium caused by groundshaking. It occurs irregularly and is largely a function of the underlying soils. Depending on the event, the amount of compaction can vary from a few inches to several feet. In the Town, the potential for subsidence is greatest in areas underlain by alluvium or other soft water-saturated soils. However, no significant subsidence problems have been identified in the project area (Town of Loomis 2001).

**Lurch cracking and lateral spreading.** Lurch cracking refers to fractures, cracks, and fissures produced by groundshaking and may occur far from an earthquake’s epicenter. Lateral spreading is the horizontal movement of soil toward an open face of a stream bank or the side of a levee. Steep-sided artificial fill embankments are most susceptible to damage. The potential for these hazards is greatest on steep-sided alluvial soils where the groundwater table is high. In the Town, this includes areas adjacent to Antelope Creek, Secret Ravine, and Sucker Ravine. The project site does not support any steep slopes. A low potential for lurch cracking and lateral spreading is associated with the on-site tributary to Secret Ravine (Town of Loomis 2001).

**Paleontological Resources**

Paleontological resources are the fossilized remains or impressions of prehistoric plants and animals. They are valuable, nonrenewable, scientific resources used to document the existence of extinct life forms and to reconstruct the environments in which they lived. Fossils can be used to determine the relative ages of the depositional layers in which they occur and of the geologic events that created those deposits.

No state or local agencies have specific jurisdiction over paleontological resources or require a paleontological collecting permit to allow for the recovery of fossil remains discovered as a result of construction-related earth moving on state or private lands in a project site.

In the context of the California Environmental Quality Act (CEQA), fossils of land-dwelling vertebrates and their environment are considered important (i.e., significant) paleontological resources. Such fossils typically are found in river, lake, and bog deposits, although they can occur in nearly any type of sedimentary deposit.
4.10.2 Regulatory Setting

Federal Regulations

The Clean Water Act, administered by the U.S. Army Corps of Engineers, regulates soils disturbance as it affects wetlands and other waters of the United States. The National Pollutant Discharge Elimination System is a federal regulation intended to protect surface water quality. These regulations may influence the extent and methodology of soil disturbance allowed to occur on-site. However, since the intent of these regulations is primarily to protect hydrologic and biological resources, they are discussed in Section 4.3, Biological Resources, and Section 4.11, Hydrology and Water Quality.

State Regulations

Building Codes and Standards

Construction within the Town is required to conform to the current version of the California Building Code (CBC), which is based on the IBC. The CBC incorporates the IBC and includes numerous more detailed and/or more stringent regulations to reflect conditions specific to California. Where no other building codes apply, the IBC/CBC regulates excavation, foundations, and retaining walls, and regulates grading activities, including drainage and erosion control and construction on expansive soils.

In addition, Section 19100 et seq. of the California Health and Safety Code, State Earthquake Protection Law, requires that structures be designed to resist stresses produced by lateral forces caused by wind and earthquakes. Specific minimum seismic safety requirements are set forth in the IBC and CBC. The CBC identifies seismic factors that must be considered in structural design. It provides seismic design and construction standards applicable for designated seismic zones in California based on the seismic event with potential to occur in each zone. The IBC is incorporated into Chapter 11.04 of the Town’s Municipal Code (Town of Loomis 2015); thus, all construction within the Town must comply with the IBC.

Alquist-Priolo Earthquake Fault Zoning Act

The Alquist-Priolo Earthquake Fault Zoning Act, codified in California Public Resources Code, Sections 2621–2630, prohibits construction of buildings used for human occupancy on the surface of active faults. This act also 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 to be used by local agencies in regulating and planning construction. As discussed previously, the project site is not included in an Alquist-Priolo earthquake hazard zone.
**Seismic Hazards Mapping Act**

The Seismic Hazards Mapping Act, codified in California Public Resources Code, Sections 2690–2699.6, requires the California Department of Conservation to identify Seismic Hazard Zones within the state based on the probable seismic shaking exposure and soil conditions in a given area. Areas that may be subject to substantial shaking, or where soil conditions indicate the area may be prone to liquefaction or earthquake-induced landslides, are included in Seismic Hazard Zones.

**Other State Regulations**

Similar to the Clean Water Act, the State Water Resources Control Board and California Department of Fish and Wildlife have developed standards and guidelines related to disturbance of hydrologic and biological resources. These standards and guidelines may influence the extent and methodology of soil disturbance allowed to occur on site. In particular, these agencies require the use of best management practices (BMPs) to control soil erosion from entering waterways. Because the intent of these standards and guidelines is primarily to protect hydrologic and biological resources, they are discussed in Section 4.3, Biological Resources, and in Section 4.11, Hydrology and Water Quality.

Consideration of paleontological resources is required by CEQA (see Appendix G in the CEQA Guidelines (14 CCR 15000 et seq.)). Other state requirements for paleontological resource management are found in California Public Resources Code, Chapter 1.7, Section 5097.5, Archaeological, Paleontological, and Historical Sites. This statute specifies that state agencies may undertake surveys, excavations, or other operations as necessary on state lands to preserve or record paleontological resources. This statute does not apply to the project because none of the property is state owned.

**Local Regulations**

**Town of Loomis General Plan**

The Public Health and Safety Element of the Town’s General Plan contains a range of goals and policies related to the treatment of geologic and soil resources, and safety considerations related to geology and seismicity (Town of Loomis 2001). An analysis of the project’s consistency with General Plan policies that support the goals listed here, as well as other goals related to resource protection, is provided in Appendix B to this draft environmental impact report (EIR). The goals and policies listed in the following text are applicable to the analysis of the proposed project’s impacts associated with geology, soils, and seismicity:
Goals

1. To reduce risks associated with natural and man-made hazards through compliance with State and Federal safety programs.
2. To reduce the risks associated with potential seismic activity, including groundshaking, liquefaction, and landslides.

Policies

1. Engineering analysis of new development proposals shall be required in areas with possible soil instability, flooding, earthquake faults, or other hazards, and prohibit development in high danger areas.
2. Loomis shall cooperate with Federal, State, and local authorities to ensure that loss due to seismic activity and other natural and man-made disasters is minimized.
3. Loomis shall encourage compliance with State requirements for unreinforced masonry buildings and seismic safety.

Town of Loomis Grading Ordinance

The Town’s grading ordinance, codified in Chapter 12.04 of the Municipal Code, establishes requirements for grading, erosion and sediment control, and stormwater management. Development projects must comply with these requirements during grading and construction. The primary goals of the ordinance are to protect the health, safety, and general welfare of individuals working or living in the Town. Except in the case of certain exemptions specified in Section 12.04.050 of the Municipal Code, a grading permit issued by the director of public works is required for all grading activities within the Town. Grading permits may only be issued for projects that are consistent with General Plan goals and comply with all applicable local and state codes and regulations, including the CBC. The grading ordinance includes provisions intended to minimize safety hazards and erosion, maintain natural conditions, and protect public rights-of-way and drainage channels; avoid pollution of watercourses and maintain proper functioning of drainage infrastructure; and ensure restoration of areas disturbed as a result of grading (Town of Loomis 2015).

Grading permit requirements and design standards are detailed in Articles VI and VII of Chapter 12.04 of the Municipal Code. These conditions include requirements for control of dust, erosion and sediment, and limits on hours of operation for construction activities, as well as requirements to comply with required mitigation resulting from CEQA compliance. When issuing a grading permit, the Town may impose any condition necessary to protect public health and welfare and avoid any hazardous conditions. The grading ordinance also specifies that grading projects
cannot be allowed to violate the National Pollutant Discharge Elimination System or to interfere with the flow of stormwater (Town of Loomis 2015).

4.10.3 Impacts

Methods of Analysis

The project setting was developed by reviewing available geological documentation for the project area from the California Department of Mines and Geology, the U.S. Geological Survey, The U.S. Department of Agriculture, and the 2001 General Plan for the Town of Loomis. The understanding of potential impacts resulting from the proposed project was based on analysis of these documents.

CEQA requires that the project be analyzed for potential impacts including exposing people or property to risk from seismic events or ground instability, resulting in soil erosion, resulting in the alteration of existing land forms, or destroying paleontological resources. As discussed previously, no active commercial mineral extraction operations are located on the project site. The initial study completed for the Town’s General Plan Update in 2000 concluded that development anticipated under the General Plan would have no effect on mining operations in the region and would have less-than-significant effects on availability of mineral resources. The project site is not classified as a site with known or potential significant mineral deposits. Therefore, development of the proposed project would not contribute to a loss of availability of important mineral resources, and there would be no impact associated with the project. This issue is not addressed further.

Significance Criteria

Potential impacts associated with soils, geology, and seismicity have been evaluated using the following criteria, based on Appendix G of the CEQA Guidelines. The proposed project would have a potentially significant impact related to geology, seismicity, and soils if it would:

- Expose people or structures to 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 or based on other substantial evidence of a known fault.
  - Strong seismic ground shaking.
  - Seismic-related failure including liquefaction.
• Be located on a geologic unit or soil that is unsuitable for the project, resulting in potential on-site or off-site landslide, lateral spreading, excessive expansion, subsidence, liquefaction or collapse.

• Result in substantial soil erosion or the loss of topsoil during construction activities and following completion of the proposed project.

• Result in substantial alterations to existing landforms.

• Directly or indirectly destroy paleontological resources.

Impact Discussion

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<tr>
<th>IMPACT 4.10-1:</th>
<th>Project implementation could expose people or structures to substantial seismic risk.</th>
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<tr>
<td>SIGNIFICANCE:</td>
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<tr>
<td>MITIGATION:</td>
<td>Mitigation Measure 4.10a</td>
</tr>
<tr>
<td>RESIDUAL SIGNIFICANCE:</td>
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Although no faults capable of ground rupture have been identified on or adjacent to the project site, there is potential for seismic events to affect the project site. The project site is located approximately 15 miles west of portions of the Foothills Fault System. This system has been characterized as having the potential to produce earthquakes with a magnitude up to 6.5 (Town of Loomis 2001), although it is not designated as an active fault zone. The project site is not located in an Alquist-Priolo Earthquake Fault Zone.

Although there are no active faults within the project area, an earthquake produced within the Foothills Fault System could result in ground movement at the project site, and there is potential for moderate to severe shaking to occur. Thus, development of the proposed project would potentially expose people and property to ground shaking associated with earthquake activity.

All new structures constructed on the project site are required to conform to building standards specified by the CBC, including specifications for seismic force resistance and structural integrity. Adherence to these standards would ensure that buildings on the site would be constructed to withstand seismic ground accelerations that may occur at the project site. This would reduce the risk that seismic events could result in personal injury or property damage. Compliance with IBC/CBC standards would ensure that impacts related to seismic events with potential to occur on the project site would remain less than significant.
As discussed previously, the project site has very limited potential for seismic effects such as liquefaction, lurch cracking, and lateral spreading. The alluvial soils within the 100-year floodplain of the on-site unnamed drainage to Secret Ravine in the central portion of the project site have a moderate to low potential for liquefaction, lurch cracking or lateral spreading, but the proposed project would leave most areas within the 100-year floodplain in open space. There are 14 proposed residential lots along the eastern side of the 100-year floodplain that would encroach into the existing 100-year floodplain. Project construction would alter the boundaries of the 100-year floodplain such that none of the proposed residential home sites would be located within the post-development 100-year floodplain after the site is graded; however, development that encroaches into the existing 100-year floodplain may be placed in areas with potential for liquefaction, lurch cracking or lateral spreading. To ensure that any seismic risks associated with development in an area of alluvial soils, **Mitigation Measure 4.10a** requires that a geotechnical investigation of development areas within the existing 100-year floodplain be completed and that recommendations of that focused geotechnical investigation be implemented during project construction. This focused geotechnical investigation would identify the existing soil conditions in the area, evaluate the capability of the soil to support the proposed development, and identify specific design and construction measures that would ensure soil stability post-development. These measures may include recommendations regarding excavation of soil and replacement with engineered soil, maximum cut and fill bank slopes, and use of retaining walls.

Because construction on the alluvial soils would be limited and a geotechnical analysis of the soils underlying the 14 lots that would encroach into the floodplain would be prepared, as provided for under Section 12.04 of the Municipal Code and required by **Mitigation Measure 4.10a**, the risk of personal injury or property damage associated with liquefaction, lurch cracking, and lateral spreading would remain less than significant. Additionally, the risk of subsidence is low throughout the Town, and risks associated with this effect remain less than significant.

**IMPACT 4.10-2:** The project site could be located on an unstable geologic unit or soil, which could expose people to hazardous conditions.

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<th>SIGNIFICANCE:</th>
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<tr>
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As discussed previously, there are three soil types within the project site: Xerorthents, Andregg, and Caperton-Andregg. The Xerorthents soil type is associated with soils within the 100-year floodplain, and the majority of the floodplain on site is proposed to remain in open space. There
are 14 residential lots that would encroach into the eastern portion of the floodplain (as designated by the Federal Emergency Management Agency (FEMA 1998)), in the area of the Xerorthents soil type. The soils of this type are varied in their constituents and exhibit variable permeability, runoff, and erosion hazards. Limitations to development on this soil type include slopes, flooding, and saturation. Project construction would alter the boundaries of the floodplain such that none of the proposed homes would be located within the post-development floodplain and the site would be graded. Therefore, the limitation of slopes, flooding, and saturation that could occur within the Xerorthents soil type would be avoided.

The majority of the proposed development would occur on the Andregg and Caperton-Andregg soil types. The primary limitation to development associated with this soil is steep slopes; however, no steep slopes occur on the project site. The project site is generally flat and is therefore not subject to landslides. Soils on the site are capable of supporting the proposed residential and commercial structures if site preparation is carried out in accordance with general engineering practices. Successful development of surrounding areas underlain by the same or similar soils and with similar topographical relief supports this conclusion.

Section 14.20.040 of the Municipal Code requires that a site-specific preliminary geotechnical investigation be prepared prior to approval of any subdivision of five or more parcels, and additional lot-specific geotechnical reports are required if the preliminary geotechnical investigation identifies the presence of soils or geologic conditions that would lead to structural defects in future buildings. Additionally, Municipal Code, Section 12.04.310, requires preparation of a geotechnical investigation for any grading within areas of known or suspected geologic hazards, within areas suspected to have highly expansive soils, or when the proposed grading includes cuts and fills greater than 10 feet in depth (Town of Loomis 2015). None of these conditions are known or expected to occur on site. Specifically, there are no known or suspected geologic hazards in the vicinity, the project’s cuts and fills would generally be approximately 3 feet in depth, and the soil types on site do not exhibit expansive characteristics, as discussed previously. With the exception of development areas that would encroach into the existing 100-year floodplain, where alluvial soils may be present, the geologic units and soils on site are stable and appropriate to support development.

As discussed in Impact 4.10-1 and required in Mitigation Measure 4.10a, a geotechnical investigation must be prepared for any development areas that would encroach into the existing 100-year floodplain to ensure the stability of those soils. This focused geotechnical investigation would identify the existing soil conditions in the area, evaluate the capability of the soil to support the proposed development, and identify specific design and construction measures that would ensure soil stability post-development. These measures may include recommendations regarding excavation of soil and replacement with engineered soil, maximum cut and fill bank slopes, and use of retaining walls. With preparation of a focused geotechnical investigation and
implementation of the recommended design and construction measures, the project is expected to have **less than significant** impacts related to unstable geologic units or soils.

**IMPACT 4.10-3:** Project construction could result in substantial soil erosion or the loss of topsoil.

**SIGNIFICANCE:** Potentially Significant

**MITIGATION:** Mitigation Measure 4.10b

**RESIDUAL SIGNIFICANCE:** Less Than Significant

**Construction Impacts**

Grading and excavation activities associated with project construction would disrupt normal soil conditions and remove vegetative cover. The alteration of site soils and topography is an unavoidable result of site development. Chapter 12.04, Grading, Erosion, and Sediment Control, of the Town’s Municipal Code requires that a grading permit be issued for each individual development project within the project site (Town of Loomis 2015). It is anticipated that the full site would be mass graded during the initial 2 months of project construction, with minor additional grading completed as each development phase proceeds. Preliminary grading analysis indicates that there would be approximately 130,000 cubic yards of grading for the entire project, including the construction of Doc Barnes Drive. Across most of the site the average cut/fill depth/height would be 3 feet (this does not include the open space area, where no grading would occur). As demonstrated in the preliminary grading plan prepared by the project engineer and submitted to the Town, it is expected that final grading would balance on site so no soil would be imported to or exported from the project site. Due to the volume of material that would be moved within the site (130,000 cubic yards), there is potential for soil erosion to occur, which could lead to sedimentation of on-site and nearby waterways, as well as deposition of soil on neighboring properties and public rights-of-way. This would be a **significant** impact during construction of the proposed project.

Chapter 12.04, Grading, Erosion, and Sediment Control, of the Municipal Code provides that grading permits issued by the Town include conditions of approval requiring incorporation of measures necessary to ensure that soil erosion is minimized during and following construction (Town of Loomis 2015). Consistent with these requirements, **Mitigation Measure 4.10c** requires that the grading permit application for the project site include an erosion and sediment control plan that stipulates implementation of BMPs to control erosion during grading. Erosion and sediment control plans must comply with the Town’s Stormwater Management Plan, the California Stormwater Quality Association BMP Handbook, and requirements of other
responsible agencies. BMPs in the erosion and sediment control plan shall include use of soil stabilizers on exposed soils, covering of soil and gravel stockpiles, revegetation of exposed soil areas, and use of fiber rolls or hay bales to prevent eroded soil from entering waterways or leaving the project site. Implementation of Mitigation Measure 4.10c would ensure that the impacts associated with soil erosion during construction would be reduced to a less than significant level.

Operational Impacts

After construction, the project site would support impervious surfaces. The rate and volume of stormwater runoff would increase as water passes over these impervious surfaces. Soils adjacent to the impervious surfaces may be subject to increased erosion as a result of the increased rate and volume of runoff. The potential for soil erosion to lead to water quality impacts is evaluated in detail in Section 4.11, Hydrology and Water Quality. As discussed in Section 4.11, the project would be required to comply with the requirements and conditions of the National Pollutant Discharge Elimination System permit issued by the Regional Water Quality Control Board, and would be required to prepare a stormwater pollution prevention plan that must be implemented during construction of the proposed project. The stormwater pollution prevention plan would include permanent BMPs to control soil erosion, including revegetation of disturbed areas, use of vegetated swales to filter runoff to detention basins, detached downspouts and landscape strips to promote infiltration of stormwater. The project would also preserve approximately 10 acres in its natural state to aid in controlling stormwater pollution. These project features would ensure that the project does not result in substantial soil erosion or associated sedimentation throughout project operation and this impact would remain less than significant.

**IMPACT 4.10-4:** Project construction could result in substantial alterations to existing landforms.

<table>
<thead>
<tr>
<th>SIGNIFICANCE:</th>
<th>Less Than Significant</th>
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<tbody>
<tr>
<td>MITIGATION:</td>
<td>None</td>
</tr>
<tr>
<td>RESIDUAL SIGNIFICANCE:</td>
<td>Less Than Significant</td>
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</tbody>
</table>

Topographical features characterizing the site include gently rolling terrain and a riparian corridor that bisects the site north to south. In addition, the project site contains more than 51 rock outcroppings. Among the rock outcroppings, there are two larger rock formations that exceed 10 feet in height or have a base diameter greater than 50 feet. These are proposed to be preserved on site. The first rock formation that would be preserved by the proposed project is located approximately 600 feet east of the end of Library Drive and approximately 100 feet south
of that point. This site includes a large rock outcropping 50 feet wide by 100 feet long. The second rock formation that would be preserved by the proposed project is located in the eastern portion of the project site and is approximately 50 feet in diameter and more than 10 feet tall. The proposed project would require substantial grading and site preparation to provide for construction of proposed improvements, which consist of wet and dry underground utilities, including the South Placer Municipal Utility District Loomis Diversion Line through the project site and under Interstate 80, paved roadways, building pads, and drainage infrastructure. Figures 4.10-3, 4.10-4, and 4.10-5 provide a reduced-scale representation of the grading plan, which shows where substantial cuts and fills would occur for the proposed project. The full-scale grading plan is available for review during normal business hours at the Town of Loomis Planning Department, 3665 Taylor Road, Loomis, California 95650.

Alterations to topography and retaining wall construction associated with the proposed project include the following changes in each portion of the project site:

**Western Portion:** The ground elevations of the residential lots adjacent to the proposed park at the westernmost edge of the project site would be decreased by approximately 5 feet compared to the existing elevation. Ground level within an area less than 1 acre on the western edge of the riparian corridor would be increased by approximately 5 feet. Finished ground elevations would be generally the same as existing conditions throughout the remainder of the western portion of the site. The riparian corridor and the adjacent open space would remain ungraded. As shown in Figure 4.10-3, eight retaining walls constructed with block, rockery or similar material are proposed for the western portion of the project site. Five would run along the lot lines of lots 135–139. These retaining walls would be 56, 56, 59, 64, and 74 feet long with heights of 0 to 3 feet, 0.9 feet, 0.9 feet, 1 foot, and 2.1 feet, respectively. A 157-foot-long retaining wall would be constructed adjacent to the pedestrian mews in the northwest corner of the project site, and would vary in height from 3.6 to 5.9 feet. Two retaining walls would be built along the southern edge of Doc Barnes Drive in the western portion of the site. These walls would be 175 and 818 feet long along the California Department of Transportation (Caltrans) right-of-way and vary in height from up to 2 feet and up to 8.3 feet.

**Central Portion:** In the southwestern corner of the central portion of the project site, the finished ground elevation would be increased by ±5 to 10 feet from the existing elevation. As shown in Figure 4.10-4, a hill in the northwest corner of the central portion of the project site, adjacent to existing residences at the southern end of Day Avenue, would be removed, with finished ground elevations as much as 13 feet lower than the existing elevation. Grading in the remainder of the central portion of the project site would generally maintain existing elevations. Five retaining walls would be constructed in this portion of the project site. Two retaining walls would be installed along the eastern edge of the riparian corridor. These walls would be 243 and 563 feet long and would vary in height from 9 to 14 feet and 10 to 12 feet, respectively. One 70-
foot-long, 2-foot-high retaining wall would be constructed along the lot line of lots 183 and 215. In the center of the proposed residential cluster between Blue Goose Drive and Red Ravine Drive, a 523-foot-long retaining wall of 1.8 to 3.5 feet in height would be installed. One retaining wall would be built along the southern edge of Doc Barnes Drive in the central portion of the site. This wall would be 350 feet long and would vary in height up to 4 feet.

**Eastern Portion:** As shown in Figure 4.10-5, the finished ground elevations of the western edge of this portion of the project site would be approximately 5 to 8 feet lower than existing elevations. The remainder of the finished elevations would be generally the same as the existing elevations in this portion of the project site. The southwestern and northeastern corners of this portion of the project site would contain two stormwater detention basins. The northeastern corner contains a delineated wetland that would be preserved in ungraded open space. A delineated wetland is also present in the southeastern corner of this portion of the project site. A portion of this wetland would be graded as part of the proposed extension of Doc Barnes Drive. A large rock outcropping would be preserved within the proposed Monument Rock Court roadway. One retaining wall would be constructed in the eastern portion of the project site. This wall would run along the southern edge of Doc Barnes Drive (along the Caltrans right of way) for a length of 1,193 feet and ranging from 0 to 10.7 feet high.

Many of the existing rock outcroppings present throughout the project site would be removed during grading, although two prominent rock outcroppings would be preserved, as would those found in the proposed open space adjacent to the western boundary of the riparian corridor.

The conceptual grading plans demonstrate that the project would minimize alterations of the natural rolling topography, consistent with Section 12.04.511 of the Municipal Code. This section requires that, to the extent practicable, grading of rolling terrain should occur in a manner to maintain the effect of the rolling terrain close to what existed prior to grading. Section 12.04.580 of the Town’s Municipal Code also requires that the limits of grading be clearly defined and that natural features be preserved to the extent possible (Town of Loomis 2015). Compliance with these and other provisions of Chapter 12.04 of the Town’s Municipal Code (Grading Ordinance) would be required as a condition of the issuance of grading permits for the project. Town staff will review final grading plans to ensure consistency with these requirements prior to issuance of a grading permit. Compliance with the provisions of the Town’s grading ordinance would ensure that the project would have a **less than significant** impact associated with alteration of existing landforms.
IMPACT 4.10-5: Project construction could directly or indirectly affect unknown paleontological resources.

SIGNIFICANCE: No Impact
MITIGATION: None
RESIDUAL SIGNIFICANCE: No Impact

The soils underlying the project site are derived from plutonic rock (Pernyn Pluton), or Quartz Diorite to be exact (Olmsted 1971). Plutonic rocks are formed by cooling magma prior to reaching the surface of the earth, and therefore, the bedrock has no potential to contain fossils. This means the soils derived from it also have no potential to contain fossils. The stream in the center of the site may have very narrow zones of sediment deposition (i.e., Pleistocene- or Holocene-age alluvium) that can bury organisms—zones that are likely to be too narrow to be shown at the scale of the geologic map. However, no development is proposed within or adjacent to the stream, except for the Doc Barnes Drive crossing of this feature along the southern project site boundary. Based on this information, there is a very low potential for paleontological resources to occur on site, and proposed activities would have no impact with respect to such resources.

IMPACT 4.10-6: Project construction could make a considerable contribution to cumulative soil erosion impacts.

SIGNIFICANCE: Less Than Significant
MITIGATION: None
RESIDUAL SIGNIFICANCE: Less Than Significant

A cumulatively considerable contribution to soil erosion impacts would result if the proposed project contributed an incremental increase in soil erosion that, when taken into account with concurrent projects contributing to soil erosion, results in a significant net effect. With respect to cumulative soil erosion impacts, the geographic range for this analysis is the Town, which represents the larger project vicinity and the area where substantial soil erosion could lead to sedimentation of waterways in the vicinity, impaired air quality that would adversely affect Town residents, and soil deposition on neighboring properties and public rights-of-way. Other past, present, and reasonably foreseeable development in the area is described in Section 4.1, Land Use. It includes development of approximately 430 acres within the Town, which could contribute to soil erosion effects. However, all projects within the Town are required to comply
with the Municipal Code, which requires that grading occur subject to an erosion and sediment control plan and implementation of BMPs. Specifically, Chapter 12.04, Grading, Erosion, and Sediment Control, of the Municipal Code provides that grading permits issued by the Town include conditions of approval requiring incorporation of measures necessary to ensure that soil erosion is minimized during and following construction (Town of Loomis 2015). These requirements of the Municipal Code would apply to all other development projects within the Town, ensuring that each project controls erosion and sedimentation and that the cumulative impact related to erosion would be less than significant and, therefore, there is no cumulative impact to which the project could contribute.

4.10.4 Mitigation Measures

4.10a The applicant shall retain a qualified geotechnical engineer to prepare a geotechnical investigation in compliance with Section 14.20.040 and Section 12.04.310 of the Municipal Code. The geotechnical investigation shall address any area within the existing 100-year floodplain and that is proposed for development. The report shall detail the geologic conditions of the project site, and identify any potential hazards related to geology, seismic conditions, or soil conditions that could lead to structural defects in future buildings or pose a risk to the health or safety of future occupants. A grading permit shall not be issued prior to approval of the final site grading plan by the Town Engineer and the qualified geotechnical engineer. Specifically, the final grading plan shall incorporate all recommendations by the geotechnical engineer necessary to ensure that the proposed project does not locate facilities on areas vulnerable to landslide, lateral spreading, excessive expansion, subsidence, liquefaction, or collapse, as provided in the geotechnical report. Recommendations provided by the geotechnical engineer shall include one or more of the following: best management practices, mitigation, design parameters, performance standards, or siting requirements to ensure that the proposed project does not expose people or property to significant risk related to unstable geologic conditions or soil.

4.10b All proposed grading shall conform to the Town of Loomis (Town) Grading, Erosion, and Sediment Control Ordinance (Municipal Code, Chapter 12.04). No grading, clearing, or tree disturbance shall occur until a Grading Permit has been issued, unless the Town permits otherwise (i.e., clearing and grubbing or tree removal prior to issuance of a grading permit). All cut/fill slopes shall be at a maximum slope of 2:1 (horizontal:vertical) unless a soils report supports a steeper slope and the Public Works Department concurs with said recommendation. A grading erosion and sediment control plan shall be submitted with each grading permit application. The erosion and sediment control plan shall comply with the
Town’s Stormwater Management Plan, the California Stormwater Quality Association Best Management Practice (BMP) Handbook, and requirements of other responsible agencies. BMPs in the erosion and sediment control plan shall include use of soil stabilizers on exposed soils, covering of soil and gravel stockpiles, revegetation of exposed soil areas, and use of fiber rolls or hay bales to prevent eroded soil from entering waterways or leaving the project site.

The applicant shall revegetate all disturbed areas in accordance with the improvement plans. Revegetation undertaken from April 1 to October 1 shall include regular watering to ensure adequate growth. A winterization plan shall be provided with project grading plans. It is the applicant’s responsibility to ensure proper installation and maintenance of erosion control/winterization during project construction. Where soil stockpiling or borrow areas are to remain for more than one construction season, proper erosion control measures shall be applied as specified in the grading plans.

The applicant shall submit to the Town a letter of credit or cash deposit in the amount of 110% of an approved engineer’s estimate for winterization and permanent erosion control work prior to issuance of grading permits to guarantee protection against erosion and improper grading practices. Upon the Town’s acceptance of improvements and satisfactory completion of a 1-year maintenance period, unused portions of said deposit shall be refunded to the project applicant or authorized agent.

Town personnel shall conduct periodic site visits during construction to review field conditions. Field reviews shall be conducted a minimum of once every 6 weeks. If, at any time during construction, a field review by Town personnel indicates a significant deviation from the proposed grading shown on the grading plans, specifically with regard to slope heights, slope ratios, erosion control, winterization, tree disturbance, and/or pad elevations and configurations (a significant deviation would occur if field conditions show greater than 5% difference from grading plans where applicable, or if any components of temporary construction BMPs or avoidance measures have not been implemented in accordance with the performance criteria identified in the Mitigation Monitoring and Reporting Program), the plans shall be reviewed by the Town for a determination of substantial conformance to the project approvals (demonstrating that environmental effects are no greater than those evaluated in this environmental impact report) prior to any further work proceeding. If the Town cannot make a determination of substantial conformance, this may serve as grounds for the revocation/modification of project approval by the Town Planning Commission or Town Council.
Soil Types

Soil Types:
106 - Andregg coarse sandy loam, 2% to 9% slopes
130 - Caperton-Andregg coarse sandy loams, 2% to 15% slopes
197 - Xerorthents, placer areas

FIGURE 4.10-2
Soil Types