INTRODUCTION

This section of the EIR describes existing geology, soils, and mineral resources present on the Baltimore Ravine Specific Plan (BRSP) and Study Areas (proposed project) site. Seismic hazards, soil conditions, and other geotechnical considerations that could affect people and structures at the site are evaluated. Potential effects on mineral resources are also evaluated.

Several comment letters pertaining to geology and soil conditions were received in response to the December 2007 and April 2009 Notices of Preparation (see Appendices A and B). Concerns were raised regarding erosion both within the project site and impacts on surrounding properties, disruption of geology on surrounding properties, grading, foundation, and utility trench design, the potential for the construction of retaining walls to protect adjacent properties, as well as the potential for geologic and seismic hazards such as faulting, groundshaking, liquefaction, expansive or compressible soils, regional subsidence, slope instability, and hazards resulting from former mining activities. These issues are addressed in this section. No comments pertaining to geology, soils or mineral resources were raised in response to the March 2010 Addendum to the April 2009 NOP (see Appendix C).

Information in this section is based on several sources, including a geotechnical feasibility study, a mine hazard evaluation, a Phase One Environmental Site Assessment prepared for the project, various maps and reports from the California Department of Conservation Division of Mines and Geology, the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) web soil survey for Western Placer County, the California Geological Survey, and the City of Auburn General Plan and General Plan EIR.

ENVIRONMENTAL SETTING

Regional Geology

The City of Auburn is located within the “mother lode” of the western Sierra Nevada within the Sierra Nevada geomorphic province, in western Placer County. The Sierra Nevada is a fault block range trending generally north-northwest along the eastern portion of California. The City lies between metamorphic terrain between the Bear River Canyon to the north and the American River Canyon to the east. Terrain within the City varies from gently rolling to steep, specifically within the American River Canyon, where the canyon walls are considered steep to very steep. Elevations within the City range from approximately 1,100 feet mean sea level (msl) in the southwest, above Newcastle, up to approximately 1,540 feet msl north of the airport.
Geologic formations within the City consist primarily of metamorphic rock units, the majority of which consist of hard metavolcanic flows (altered volcanic lava flows). A zone of serpentine exists along Highway 49 within the City. Sedimentary rock units consisting of the Mehrten Conglomerate or formation can also be found within the City.  

**Seismicity and Seismic Hazards**  

Placer County lies between two seismically active regions in the western U.S. Tectonic stresses associated with the North American-Pacific Plate boundary can generate damaging earthquakes along faults 30 to 100 miles west of the county.  

Placer County itself is traversed by a series of northwest trending-faults that are related to the Sierra Nevada uplift. Although portions of western and eastern Placer County are located in a seismically active region, no known faults actually go through any of the cities or towns. However, the Bear Mountain and the Melones faults are situated approximately three to four miles west and east from the City of Auburn respectively. It is reported that an estimated 4.0+ Richter magnitude earthquake occurred between Auburn and Folsom in 1908 with an epicenter possibly associated with the Bear Mountain fault. Earthquakes on these faults would have the greatest potential for damaging buildings in Auburn. Similar lower magnitude but nearby earthquakes are capable of producing comparable damage in other Placer County communities. Additionally, western Placer County could experience ground shaking from distant major to great earthquakes on faults to the west and east. For example, to the west, both the San Andreas fault and the closer Hayward fault have the potential for experiencing major to great events. The U.S. Geological Survey reported that there is a 62 percent probability of at least one 6.7 or greater magnitude earthquake occurring that could cause widespread damage in the greater San Francisco Bay Area before 2032.  

“Active” faults, which represent the highest earthquake hazard, are those that have ruptured to the ground surface during the last 11,000 years (Holocene period). The closest recently active fault in the western Sierra Nevada foothills is the Cleveland Hills fault, which is situated approximately 36 miles northwest of Auburn. This fault was the source of the 1975 Oroville earthquake (Richter Magnitude: 5.7), which was felt strongly in Placer County and neighboring areas. Another potential earthquake source is the Midland Fault Zone on the western side of the Sacramento Valley, where in 1892 an earthquake centered between the cities of Vacaville and Winters caused minor damage in the City of Lincoln.  

Groundshaking – the principal cause of damage – is the major earthquake hazard. Placer County is expected to experience lower levels of shaking less frequently (than other areas in California), but very infrequent earthquakes could still cause strong shaking in the county. Based on scientific and historic information, while the risk to Placer County from earthquakes is moderate, the vulnerability is low. There are no populations in Placer County that are located in a High Seismic Hazard Zone, as delineated in the California Draft Multi-Hazard Mitigation Plan. The CGS estimates peak ground accelerations of 0.1 to 0.2 g for the western portion of Placer County in the project area.  

Ground rupture is a primary effect of an earthquake and occurs when fault activity causes the ground surface to rupture. Placer County does not contain any Alquist-Priolo Earthquake Fault Zone active faults; therefore, ground rupture is not likely to occur on or in the vicinity of the project site.  

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6  Ibid.  
BRSP Project Site

Topography and Terrain

The terrain of the BRSP area varies with ridges and knobs incised by Baltimore Ravine, trending to the northwest in the eastern portion of the site. Dutch Ravine, located at the southern edge of the project site, is also a well-incised drainage that trends to the west. Elevations within the BRSP area range from 996 feet msl along the northern boundary in Baltimore Ravine to 1,321 feet msl on the southern ridge of the plan area. Figure 5.5-1 shows the existing topography and slopes.

In addition to the ravines, the site is traversed by Lower Fiddler Green Canal in the northern portion of the BRSP area, in Future Plan Area 2 west of Baltimore Ravine, and Upper Banvard Canal in the southern portion of the plan area within Plan Area 1. Upper Banvard Canal joins with Lower Fiddler Green Canal west of the project site. Lower Fiddler Green and Upper Banvard Canal are active water conveyance features. There are also abandoned canals and flumes in the project site that are associated with historic mining activities (see “Historic Mining – Abandoned Mines and Stability of Ground Surface” subheading, below, for additional information about mining activities in the BRSP area.)

Geologic Formations

There are three underlying geologic formations within the BRSP area: Mehrten Conglomerate (Tmc), Sierra Nevada Granitics (Mzd), and Copper Hill Volcanics (Jch). The locations of these formations are shown in Figure 5.5-2. The following descriptions are from the Geotechnical Feasibility Report prepared for the proposed project:

- **Mehrten Conglomerate.** The Tertiary-age Mehrten Conglomerate is located on top of the ride in the southern portion of the site and contains dominantly volcanic rounded to subrounded cobbles in a moderately cemented silt-sand matrix. Cobbles are typically smaller than 1½ feet in size but can be much larger. The conglomerate can contain discrete to massive beds of siltstone and sandstone.

- **Sierra Nevada Granitics.** The Sierra Nevada granitic rock predominates the western portion of the site. The Mesozoic-age granitic rocks are principally made up of quartz diorite, which is composed of less quartz and potassium feldspar as compared to granite but has similar physical properties.

- **Copper Hill Volcanics.** The Copper Hill Volcanics, commonly called greenstone, are located in the northeastern portion of the site and are part of the western metamorphic belt of the Sierra Nevada from the Jurassic Period. This formation consists mainly of metamorphosed mafic pyroclastic rocks, pillow lava and minor felsic porphyrite.

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9 PBS&J, GIS calculation.
Faults and Seismic Hazards

According to the Geotechnical Feasibility Report, a Late Quaternary portion of the Bear Mountain Fault Zone called Deadmans Fault is located just northeast of the northeast corner of the BRSP area. However, this fault is considered to be older than the Holocene age; therefore, it is not considered active. There are no known active faults within the project site.\(^{13}\)

Static or perched groundwater was not observed in any of the subsurface explorations at the site, and liquefaction was not identified as a potential hazard.\(^{14}\)

Landslides/Slope Instability

The Geotechnical Feasibility Report concluded that based on limited geologic mapping and subsurface exploration there was no evidence of landslides or slope instability within the project site.\(^{15}\) However, historic mining and underground mines that are no longer active (“abandoned mines”) could be a source of ground instability within the BRSP area, as described below.

Historic Mining - Abandoned Mines and Ground Stability

Overview

The primary geotechnical issue concerning underground mine workings, especially at abandoned mines dating from the mid-1800s into the first part of the 20\(^{th}\) century, is related to subsidence or collapse of the ground surface overlying the workings. Surface features resulting from the collapse of underground workings range from subtle depressions to depressions with steeply sloped sides several feet to tens-of-feet deep. In addition, underground workings that are currently open could collapse in the future, resulting in new features.

A site-specific mine hazards evaluation was prepared for the proposed project to identify known and potential geotechnical hazards associated with historic mining at the site, as it relates to the development of occupied structures and related improvements on the project site.\(^{16}\) The following information is based on the Baltimore Ravine Specific Plan, Placer County, California, Mine Hazard Evaluation and Mitigation Options Report, prepared by Geocon Consultants, Inc. (2009),\(^{17}\) unless otherwise noted.

Historically, the project site and vicinity have been explored to mineral resources since approximately 1849. The mines were primarily mined using underground workings consisting of the following:

- Shafts – vertical or inclined openings sunk from the surface used for ventilation or access.
- Adits – horizontal or near-horizontal openings used for drainage and surface access.

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\(^{13}\) Ibid., p. 4.
\(^{14}\) Ibid.
\(^{15}\) Ibid., p. 5.
\(^{16}\) Abandoned mines also present a physical safety hazard, such as people falling into shafts, which is addressed in Section 5.6, Hazards, Hazardous Materials, and Public Safety. But abandoned mines can also provide habitat for certain wildlife species, such as bats, which is described in Section 5.3, Biological Resources. The reader is referred to these sections for more information.
• Winzes – openings like small shafts, sunk within the mine to connect adjacent levels.
• Drifts – horizontal openings lying in or near the ore body and running parallel to it.
• Stopes – horizontal tunnels excavated along an ore vein in order to remove the ore.
• Crosscuts – horizontal openings, like tunnels, running through the “country rock” (rock containing the ore) or through the ore body and crossing it at an angle.

The openings to these features include those that are partly or completely open at the surface, and those that are exposed at the surface, but are plugged with soil, rock, and/or debris. Any fill within a shaft or adit is considered by geotechnical engineering professionals as “undocumented fill” unless it was placed under the supervision of a professional engineer, and such placement is documented in a report with the engineer’s professional stamp and signature.

Surface workings are also present at the site. Such features are obvious mining features that are readily observed at the site; however, it is likely that significant unmapped or poorly mapped (by the miners) underground workings could exist at the site.

A review of Mineral Resources Online Spatial Data (MROSD) records shows there were several known mines at the site. The mines and their locations within the project site are summarized below. The locations are as reported in historic records (referred to as “mapped”). Information from literature reviews is also summarized. Section 5.4, Cultural and Paleontological Resources, of this EIR provides additional detail about these historic features.

Historic Mines In and Around the Project Site

Plan Area 1

The Butts Mine is mapped in the central portion of Plan Area 1. It is described in the MROSD as an underground mine consisting of shaft and tunnel workings. The Butts Mine worked a four-foot quartz vein, which was reported to contain free gold and associated sulfide minerals. The reported workings included a 40-foot inclined shaft and an 800-foot tunnel. A five-stamp mill reportedly operated at the Butts Mine. As of 1916, the mine was reported to have been idle for over 15 years.

Future Plan Area 2

The California Mine (west) is mapped in the northern central portion of Future Plan Area 2. It is described in the MROSD records as an underground mine located to within 330 feet of the mapped location. Also referred to as the California Quartz Mine, the mine worked an 18-inch quartz vein for free gold from a 100-hundred-foot open cut along the vein. The mine was reportedly idle as of 1916. According to the mine hazard evaluation report preparers, the waste rock/tailings and structures observed during site visits appeared to be more extensive than would be expected for the limited workings described in the literature.

The Malmberg Mine is 300 feet east of the California Mine (west). It is described as consisting of underground workings, and the location is estimated.

The Pine Tree Mine (west) is mapped in the northwestern corner of Future Plan Area 2. It is described in the MROSD record as an underground mine consisting of five shafts. Its location is estimated.

Baltimore Ravine Specific Plan
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5.5-7
June 2010
The Pine Tree Mine (east) is mapped in the north-central portion of Future Plan Area 2 near the California Mine (north). The Pine Tree Mine (east) is described in the MROSD record as an underground mine. The location for the mine is indicated as within 1,700 feet.

Study Areas

The California Mine (east) is mapped in the east-central portion of Study Area 4. It is described in the MROSD record as consisting of surface and underground workings. The location is indicated as estimated.

The Golden Acacia Mine is mapped in the northeastern corner within Study Area 3. It is described as consisting of underground workings located to within 3,280 feet (1,000 meters).

The Oro Fino and Floyd Claims (north and south) are mapped in the northeastern corner within Study Area 3. The Oro Fino and Floyd Claim (north) are described as being of unknown origin and estimated location. The Oro Fino and Floyd Claim (south) are described as being of unknown workings and located to within 3,280 feet.

Mines Adjacent to the Project Site

The Big Pine Mine was a copper prospect, which reportedly explored a vein with a 170-foot shaft. This mine is adjacent to the project site.

The Adams Mine was reported to have mined a 15-inch quartz vein in slate in a 200-foot inclined shaft. The site was idle by 1916. Based on the length and location of the reported workings, they are not expected to extend under the project site.

The Lundquist Mine operated on a 12-foot quartz vein in slate carrying free gold and sulfide minerals. The reported mine workings included a shaft 200 feet deep and 200 feet of tunnel. The mine was idle by 1916. Based on the length and location of reported workings, they are not expected to extend under the project site.

The Razzle Dazzle Mine was reported to have mined a 14-foot decomposed quartz vein in slate. The mine workings were reported to include a 180-foot-deep shaft and a single 60-foot drift. The mine was idle by 1916. Based on the length and location of the reported workings, they are not expected to extend under the project site.

Mines Whose Locations Could Not Be Determined

There are two mines reported in the literature whose locations could not be determined relative to the project site. The locations were generally described in reports based on section, township, and range in which the project site and vicinity are located, but no additional detail was provided in the historic records.

The Malmburg Mine was a lode gold mine reported to have worked a quartz vein in amphibolites with a 100-foot shaft. However, amphibolites are not a rock unit that occurs on the project site.

The Mollie Stark Mine worked quartz veins in granodiorite for gold and silver. The workings included shafts, an incline, a tunnel, and drifts. There are discrepancies between the reported elevation (above sea level) of the mine and the actual elevations present in the section, township, and range in which the mine is reported.
Extent of Historic (Abandoned) Mine Hazards in the Project Site

In general, the hazards posed by underground workings, such as those identified at the project site, are primarily related to subsidence or collapse of the ground surface overlying the workings. Surface features resulting from the collapse of underground workings range from subtle depressions to depressions with steeply sloped sides several feet to tens-of-feet deep. In addition, underground workings that are currently open could collapse in the future, resulting in new features.

During the site reconnaissance, mines and possible mining-related features were observed in several locations, primarily in Future Plan Area 2. However, heavy vegetative cover limited the amount of property that could be investigated. The reported or observed depths to underground workings on the site range from less than 5 feet to 200 feet or more. Subsidence features have not been positively identified in the project site. Whether the collapse of an underground working would result in a surface feature likely to pose a hazard to people or structures, and the type of feature observed at the surface, would depend on several factors, including the depth to the workings, the height and width of the workings, and the nature and structural competency (stability) of the overburden.

In consideration of these factors, the mine hazard evaluation report preparers concluded there are abandoned mine hazards at the project site, but the full lateral and vertical extent of subsurface workings is unknown. Their review of the MROSD data, literature, aerial photos, and site reconnaissance indicated that subsurface mining activities were more prevalent than surface mining activities, and it is possible a large portion of the site (which could not be surveyed due to heavy vegetative cover) contains additional abandoned mines other than the ones described above.

The standard approach to identifying specific hazards at the project site must be implemented on a case-by-case basis. The impact analysis in this EIR outlines the mitigation strategy for addressing the known and potential geotechnical issues associated with mine hazards at the project site. The reader is referred to Impact 5.5-4 later in this section for more information.

Soils

The USDA NCRS has mapped 17 soil units located within the project site. The soil types and their descriptions from the Placer County NCRS Soil Survey are summarized in Table 5.5-1. The locations of the mapped units are shown in Figure 5.5-3. The predominant soil types on the site are Auburn-Sobrante-Rock outcrop (119), Boomer Rock outcrop complex (125), and Inks variant cobble loam (152).

Erosion

As shown in Table 5.5-1, soils at the project site generally exhibit moderate to high erosion potential.

Expansive Soils

Expansive soils are composed largely of clays, which greatly increase in volume when saturated with water and shrink when dried. If expansive soils are present, the changes in moisture content causes the clay soils to shrink or expand, which can damage foundations and cause structural

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### Table 5.5-1

#### PROJECT SITE SOILS CHARACTERISTICS

<table>
<thead>
<tr>
<th>Rock unit (NCRS map symbol)</th>
<th>General Location on Project Site</th>
<th>Erosion Potential</th>
<th>Hydrologic Soil Group</th>
<th>Surface Runoff</th>
<th>Constraints</th>
</tr>
</thead>
<tbody>
<tr>
<td>Andreg coarse sandy loam 2-9% slopes (106)</td>
<td>20, 21 (UHDR), 42, 43 (MU), open space, Future Plan Area 2</td>
<td>Moderate</td>
<td>C</td>
<td>Medium</td>
<td>Moderate to Severe: slope, depth to rock</td>
</tr>
<tr>
<td>Andreg coarse sandy loam 9-15% slopes (107)</td>
<td>open space, Study Area 2</td>
<td>Moderate</td>
<td>C</td>
<td>Medium</td>
<td>Moderate to Severe: slope, depth to rock</td>
</tr>
<tr>
<td>Andreg coarse sandy loam 15-30% slopes (108)</td>
<td>20, 21 (UHDR), 41 (MU), open space, Future Plan Area 2</td>
<td>High</td>
<td>C</td>
<td>Medium to rapid</td>
<td>Moderate to Severe: slope, depth to rock</td>
</tr>
<tr>
<td>Andreg coarse sandy loam rocky 2-15% slopes (109)</td>
<td>open space, Study Area 2</td>
<td>Moderate</td>
<td>C</td>
<td>Medium</td>
<td>Moderate to Severe: slope, depth to rock</td>
</tr>
<tr>
<td>Auburn-Rock outcrop complex 2-30% slopes (117)</td>
<td>11 (LDR) Plan Area 1, Study Area 3, Study Area 4</td>
<td>Slight to high</td>
<td>C/D</td>
<td>Medium to rapid</td>
<td>Severe: slope, depth to rock</td>
</tr>
<tr>
<td>Auburn-Sobrante silt loams 15-30% slopes (118)</td>
<td>Study Area 4</td>
<td>Moderate to high</td>
<td>C/D</td>
<td>Medium to rapid</td>
<td>Severe: slope, depth to rock</td>
</tr>
<tr>
<td>Auburn-Sobrante-Rock outcrop complex 2-30% slopes (119)</td>
<td>40, 41, 42 (MU) Future Plan Area 2, 4a, 4b, 7 (ULDR) Plan Area 1, open space</td>
<td>Slight to high</td>
<td>C/D</td>
<td>Medium to rapid</td>
<td>Severe: slope, depth to rock</td>
</tr>
<tr>
<td>Auburn-Sobrante-Rock outcrop complex 30-50% slopes (120)</td>
<td>open space, Study Area 3, Study Area 4</td>
<td>Very High</td>
<td>C/D</td>
<td>Rapid</td>
<td>Severe: slope, depth to rock</td>
</tr>
<tr>
<td>Boomer-Rock outcrop complex 30-50% slopes (125)</td>
<td>5, 6, 11 (ULDR) Plan Area 1, open space</td>
<td>High</td>
<td>B</td>
<td>Rapid</td>
<td>Severe: slope</td>
</tr>
<tr>
<td>Caperton-Andreg coarse sandy loams 15-30% slopes (131)</td>
<td>3A (ULDR) Plan Area 1, open space, Study Area 1, Study Area 2</td>
<td>High</td>
<td>D</td>
<td>Medium to rapid</td>
<td>Severe: slope</td>
</tr>
<tr>
<td>Caperton-Rock outcrop complex 2-30% slopes (132)</td>
<td>Study Area 1, southwest corner</td>
<td>Moderate to high</td>
<td>D</td>
<td>Medium to rapid</td>
<td>Severe: slope</td>
</tr>
<tr>
<td>Inks cobbly loam 2-30% slopes (152)</td>
<td>2, 3a, 3b, 83 (ULDR, MDR, open space) Plan Area 1, Study Area 1, Study Area 2</td>
<td>Moderate</td>
<td>D</td>
<td>Medium to rapid</td>
<td>Severe: slope, depth to rock</td>
</tr>
<tr>
<td>Inks variant cobbly loam 2-30% slopes (155)</td>
<td>2, 3a, 3b, 83 (ULDR, MDR, open space) Plan Area 1, Study Area 1, Study Area 2</td>
<td>High</td>
<td>B</td>
<td>Medium to rapid</td>
<td>Severe: slope</td>
</tr>
<tr>
<td>Sierra sandy loam 15-30% slopes (185)</td>
<td>Parcel 42 (MU) and open space Future Plan Area 2</td>
<td>High</td>
<td>B</td>
<td>Medium to rapid</td>
<td>Severe: slope</td>
</tr>
<tr>
<td>Sobrante silt loam 2-15% slopes (191)</td>
<td>Study Area 4, northeast corner</td>
<td>Slight to moderate</td>
<td>C</td>
<td>Medium</td>
<td>Moderate: depth to rock: clayey</td>
</tr>
<tr>
<td>Xerorthents cut and fill areas (196)</td>
<td>Specific Plan northern boundary near l-80 (open space, Study Area 2) Future Plan Area 2</td>
<td>Moderate</td>
<td>D</td>
<td>Very rapid</td>
<td>Severe: floods, large stones</td>
</tr>
<tr>
<td>Xerorthents placer areas (197)</td>
<td>Study Area 1, Specific Plan southwestern boundary (open space Parcel 81) Plan Area 1</td>
<td>variable</td>
<td>variable</td>
<td>Severe: floods, large stones</td>
<td></td>
</tr>
</tbody>
</table>

**Notes:**

1. Indicates in which parcel and Plan Area the soil is located.
2. General Location – for reference purposes only. (Proposed land use types in parentheses) Hydrologic soil types: B – moderate infiltration when thoroughly wet; C – slow infiltration when thoroughly wet; D – very slow infiltration rate
3. Constraints: Soil characteristics affect suitability for accommodating uses such as shallow excavations, dwellings with basements, small buildings, roads and streets, and lawns and landscaping. Soil limitations can include slow or very slow permeability, limited ability to support a load, high shrink-swell potential, moderate depth to hardpan, low depth to rock, and frequent flooding. The level of limitation is classified as slight, moderate, or severe.
   - Slight, if soil properties and site features generally are favorable for the indicated use and limitations are minor and easily overcome.
   - Moderate, if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or reduce the limitations.
   - Severe, if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are necessary.

Source: United States Department of Agriculture, Natural Resources Conservation Service, Soil Survey Western Placer County, Tables 7, 9, 12, 13 and soil descriptions.
Figure 5.5-3

Project Area Soils

Soil Types

106, ANDREGG COARSE SANDY LOAM, 2 TO 9 PERCENT SLOPES
107, ANDREGG COARSE SANDY LOAM, 9 TO 15 PERCENT SLOPES
108, ANDREGG COARSE SANDY LOAM, 15 TO 30 PERCENT SLOPES
109, ANDREGG COARSE SANDY LOAM, ROCKY, 2 TO 15 PERCENT SLOPES
117, AUBURN-ROCK OUTCROP COMPLEX, 2 TO 30 PERCENT SLOPES
118, AUBURN-SOBRANTE SILT LOAMS, 1 TO 30 PERCENT SLOPES
119, AUBURN-SOBRANTE-ROCK OUTCROP COMPLEX, 2 TO 30 PERCENT SLOPES
120, AUBURN-SOBRANTE-ROCK OUTCROP COMPLEX, 30 TO 50 PERCENT SLOPES
121, BOOMER-ROCK OUTCROP COMPLEX, 30 TO 50 PERCENT SLOPES
131, CAPERTON-ANDREGG COARSE SANDY LOAMS, 1 TO 30 PERCENT SLOPES
132, CAPERTON-ROCK OUTCROP COMPLEX, 2 TO 30 PERCENT SLOPES
152, INKS COBBLY LOAM, 2 TO 30 PERCENT SLOPES
155, INKS VARIANT COBBLY LOAM, 2 TO 30 PERCENT SLOPES
185, SIERRA SANDY LOAM, 15 TO 30 PERCENT SLOPES
191, SOBRANTE SILT LOAM, 2 TO 15 PERCENT SLOPES
196, XERORTHENTS, CUT AND FILL AREAS
197, XERORTHENTS, PLACER AREAS

Notes:

Projection: State Plane 2
Datum: NAD 83
Unit: Feet

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instability if the underlying expansive soils are not properly accounted for in engineering design. However, soils at the project site are all considered to have low expansion potential.\textsuperscript{19}

\textbf{Soil Strength}

Soil conditions through the project site were evaluated by Engeo Inc. as a part of the Geotechnical Feasibility Report. Four test pits were excavated as a part of this investigation in different areas of the project site, within each of the geologic formations within the site. Test Pit (TP)-1 was located in the Granitics portion of the site. TP-2 and TP-3 were located within a portion of the site with Copper Hill Volcanics, while TP-4 was located within the Mehrten Conglomerate.\textsuperscript{20} Soils within TP-1 were sandy silt underlain by grayish brown friable massive granitic rock. TP-2 and TP-3 both showed reddish brown silty sand with gravel underlain by moderately weathered closely fractured metavolcanics. TP-4 had brown to light gray well cemented cobble and gravel. Soils were not noticeably weak or compressible.\textsuperscript{21}

\textbf{Other Soils Considerations}

Soils at the project site are not subject to ponding due to flooding and are generally not considered a good source of topsoil.\textsuperscript{22} Table 5.5-1 also summarizes other characteristics that relate to runoff potential and types of conditions that could affect site development. Note, however, the characteristics summarized in Table 5.5-1 are generalized from NRCS information and are intended to supplement, but not replace, site-specific geotechnical studies prepared in accordance with state and local building requirements.

Seismic refraction surveys of the project site indicate the excavatability of the soil and rock at the site is highly dependent on the underlying geologic formation where earthwork is planned. The Mehrten Conglomerate (generally the topographically highest and flattest part of the project site) would generally be excavatable with large dozers and excavators. More difficult excavation could be encountered in the granitics (eastern third of site) and volcanics (central and western third), possibly requiring hydraulic rams.\textsuperscript{23}

\textbf{Mineral Resources}

As described previously in this section, the project site has been mined historically for gold, silver, quartz, and other minerals. The following provides additional information about the regional occurrences of mineral resources and the context for evaluation of the significance of mineral resources on and around the project site.

\begin{itemize}
  \item[19] United States Department of Agriculture, Natural Resources Conservation Service, \textit{Soil Survey Western Placer County}, Table 12.
  \item[22] United States Department of Agriculture, Natural Resources Conservation Service, \textit{Soil Survey Western Placer County}, Tables 9 and 13.
\end{itemize}
Much of Placer County, including the City of Auburn, is known for the presence of minerals, including significant deposits of limestone, chromite, gold, carbonite rock, talc, and asbestos. Lands evaluated for the presence of mineral resources by the Department of Conservation are classified into Mineral Resource Zones (MRZ), which indicate the presence, absence, or likely occurrence of mineral deposits. These categories are MRZ-1, MRZ-2a, MRZ-2b, MRZ-3a, MRZ-3b, and MRZ-4.

Applicable definitions of MRZ-2b, MRZ-3a, and MRZ-4 are:

**MRZ-2b.** Areas underlain by inferred mineral resources where geologic information indicated that significant inferred resources are present. Areas classified MRZ-2b contain discovered deposits that represent either inferred reserves or deposits that are presently subeconomic as determined by limited sample analysis, exposure, and past mining history. Further exploration work and/or changes in technology or economics could result in upgrading areas classified MRZ-2b to MRZ-2a.

**MRZ-3a.** Areas underlain by geologic settings within which undiscovered mineral resources similar to known deposits in the same producing district or region may be reasonably expected to exist (hypothetical resources). Land areas classified MRZ-3a are underlain by geologic setting which are favorable environments for the occurrence of specific mineral deposits. In the McKelvey diagram, these are referred to as hypothetical resources. Further exploration work within these areas could result in the reclassification of specific of specific localities into the MRZ-2a or MRZ-2b categories.

**MRZ-4.** Areas where geologic information does not rule out either the presence or absence of mineral resources.

The Mineral Land Classification prepared for the Auburn Quadrangle shows that the northern portion of the site, generally north of the ridge in the center of the site, is classified as MRZ-2b for gold. The southwest corner of the site is classified as MRZ-4. The western half of the ridge located in the center of the site is classified as MRZ-3a for placer gold; the southeastern corner of the project site is classified as MRZ-3a for copper, zinc, and gold. Figure 5.5-4 shows the locations of the mapped classifications, along with locations of historic mines (see above and Section 5.4, Cultural and Paleontological Resources, and Section 5.6, Hazards, for additional information about mine sites).

The mapped MRZ-2b is within the Ophir District, a famous gold-bearing quartz vein system situated between Auburn and Gold Hill. The quartz veins, which occupy fractures and faults developed on the flank of granodiorite stock (the “Sierra Nevada Granitics” geologic unit shown on Figure 5.5-2), was known for small but rich pockets of gold. The type of gold found in the quartz veins in the Ophir District is mainly of the volcanogenic massive sulfide (VMS) type. This type of ore bodies comprises masses of sulfide minerals that were deposited on the sea floor by submarine hot springs systems. Zinc and copper are important byproducts of VMS processes, and associated minerals found in these ore bodies include pyrite, galena, and chalcopyrite. Lead and arsenic, which are the primary metals in these minerals, are also commonly found in soils weathered from these deposits.

An estimated 300,000 ounces of gold were produced from the mines within the entire Ophir District. The veins range from one to five feet thick, and several were mined to depths of more than 1,000 feet. It is likely that many of the ore bodies hosting quartz veins also extend to great depths.
Therefore, significant inferred resources of gold are believed to still exist within the Ophir District. The value of the total output of the district is estimated at more than $5 million.\textsuperscript{26,27}

The Ophir district reportedly was the most productive source of lode-gold in Placer County. Many of the mines in the Ophir district were developed in the 1870s, and the district continued to operate until 1921. Today, the lands that composed the Ophir Mining District consist mainly of orchards, vineyards, and rural estates whose landscapes are strewn with prospect pits, adits (i.e., horizontal mine passages), tailings piles, dumps, mill foundations, and ditches from the now-defunct mining operations. The California Mine, which is located on the project site, was a large mining operation that dates from the 1900s to the 1940s. More information regarding this mine feature can be found in Section 5.4, Cultural Resources.

**Regulatory Context**

**Federal**

There are no federal regulations directly applicable to geotechnical conditions on the project site. Nonetheless, installation of underground utility lines must comply with national industry standards specific to the type of utility (e.g., National Clay Pipe Institute for sewers; American Water Works Association for water lines) and the discharge of contaminants must be controlled through the National Pollutant Discharge Elimination System (NPDES) permitting program for management of construction and municipal stormwater runoff. These standards contain specifications for installation, design, and maintenance to reflect site-specific geologic and soils conditions.

**State**

The major state regulations protecting the public from geologic and seismic hazards are contained in the Seismic Hazards Mapping Act, the California Building Code (CBC), and the State Earthquake Protection Law.

**Seismic Hazards Mapping Act**

The Seismic Hazards Mapping Act, passed by the California legislature in 1990, addresses earthquake hazards from nonsurface fault rupture, including liquefaction and seismically-induced landslides. The act established a mapping program for areas that have the potential for liquefaction, strong groundshaking, or other earthquake and geologic hazards. To date, no maps that include the project site have been published under this program.\textsuperscript{28}

**California Building Code**

The state regulations protecting structures from geo-seismic hazards are contained in California Code of Regulations, Title 24, Part 2 (the CBC). These regulations apply to public and private buildings in the state. Until January 1, 2008, the CBC was based on the then-current Uniform Building Code and contained Additions, Amendments and Repeals specific to building conditions.


\textsuperscript{27} California Department of Conservation, Division of Mines and Geology, *Gold Districts of California*, Bulletin 193, p. 103.

and structural requirements in the State of California (ICBO 1994). The 2007 CBC, effective January 1, 2008, is based on the current (2006) International Building Code and contains prominent enhancement of the sections dealing with fire safety, equal access for disabled persons, and environmentally friendly construction. Seismic-resistant construction design is required to meet more stringent technical standards than those set by previous versions of the CBC. For example, in Seismic Design Category “C” (which includes most parts of Placer County), section 2308.3.3 of the CBC specifies the required maximum spacing of ½-inch-diameter bolts anchoring structures over two stories in height to their foundations as four feet on centers. The previous (2001) CBC did not require a minimum bolt diameter or maximum spacing, but specified that each such building be individually constructed to remain anchored during the design earthquake for its building site.

Chapters 16 and 16A of the 2007 CBC deal with Structural Design requirements governing seismically resistant construction, including (but not limited to) factors and coefficients used to establish seismic site class and seismic occupancy category for the soil/rock at the building location and the proposed building design. Chapters 18 and 18A of the 2007 CBC include (but are not limited to) the requirements for foundation and soil investigations (sections 1802 and 1802A); excavation, grading, and fill (sections 1803 and 1803A); allowable load-bearing values of soils (sections 1804 and 1804A); and the design of footings, foundations, and slope clearances (sections 1805 and 1805A), retaining walls (sections 1806 and 1806A), and pier, pile, driven, and cast-in-place foundation support systems (sections 1808, 1809, and 1810). Chapter 33 of the 2007 CBC includes (but is not limited to) requirements for safeguards at work sites to ensure stable excavations and cut or fill slopes (section 3304).

Cities and counties are required to enforce the regulations of the 2007 CBC beginning January 1, 2008. Subsequently, each jurisdiction may adopt its own building code based on the 2007 CBC. City and county codes are permitted to be more stringent than the 2007 CBC, but not less stringent.

Construction activities are subject to occupational safety standards for excavation and trenching as specified in the California Occupational Safety and Health Administration (Cal-OSHA) regulations (Title 8 of the California Code of Regulations) and in Chapter 33 of the CBC. These regulations specify the measures to be used for excavation and trench work where workers could be exposed to unstable soil conditions. The project would be required to employ these safety measures during excavation and trenching.

As indicated above, the CBC is periodically updated and revised. The City of Auburn will use the most current CBC at the time building permits are issued.

State Earthquake Protection Law

The State Earthquake Protection Law (California Health and Safety Code 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 requires a site-specific geotechnical study to address seismic issues and identifies seismic factors that must be considered in structural design. Because the proposed project is not located within an Alquist-Priolo Earthquake Fault Zone, as noted above, no associated provisions would be required for project development related to fault rupture.

Mineral Resource Classifications and Changes in Land Use

Lands evaluated for the presence of mineral resources by the Department of Conservation are classified into Mineral Resource Zones (MRZ), which indicate the presence, absence, or likely occurrence of mineral deposits. The Public Resources Code Section 2762 contains specific actions
that must be taken if a change in land use is proposed that could result in the availability of a known mineral resource. Specifically,

d) If any area is classified by the State Geologist as an area described in paragraph (2) of subdivision (b) of Section 2761, and the lead agency either has designated that area in its general plan as having important minerals to be protected pursuant to subdivision (a), or otherwise has not yet acted pursuant to subdivision (a), then prior to permitting a use which would threaten the potential to extract minerals in that area, the lead agency shall prepare, in conjunction with preparing any environmental document required by Division 13 (commencing with Section 21000), or in any event if no such document is required, a statement specifying its reasons for permitting the proposed use, and shall forward a copy to the State Geologist and the board for review.

e) Prior to permitting a use which would threaten the potential to extract minerals in an area classified by the State Geologist as an area described in paragraph (3) of subdivision (b) of Section 2761, the lead agency may cause to be prepared an evaluation of the area in order to ascertain the significance of the mineral deposit located therein. The results of such evaluation shall be transmitted to the State Geologist and the board.

Portions of the project site are classified as MRZ-2b, as shown in Figure 5.5-4, reflecting the site’s historic source of gold, although the site has not been mined in recent times. As required by PRC section 2762, the City has prepared a draft Statement of Reasons for permitting development of the site, which will be forwarded to the State Geologist and Board of Mines and Geology for review.

Local

City of Auburn

General Plan

The following goals and policies from the City of Auburn General Plan, 1992-2012, are pertinent to geology, soils, and mineral resources and to the development of the proposed project.

Land Use Element

Goal 3 Guide development so that it takes advantage of Auburn’s unique character including, but not limited to, terrain and vegetation.

Policies

3.1 Minimize disturbance to terrain by limiting “pads” on steep slopes to reduce cut and fill.

3.2 Minimize disturbance to terrain by encouraging that roads follow existing topography.

Goal 6 Discourage extension of strip commercial development and encourage future commercial infill development.

6.2 Encourage commercial design that utilizes existing topography, minimizing cut and fill.

Open Space/Conservation Element

Goal 2 Minimize adverse development impacts to the natural environment.

Policies

2.2 Continue to implement the grading ordinance of the City of Auburn to protect against sedimentation and erosion.

2.6 Encourage development of all building sites and residences in a manner minimizing disturbance to natural terrain and vegetation and maximizing preservation of natural beauty and open space.

Goal 4 Provide for the conservation, utilization, and development of mineral, geologic, and soil resources in keeping with sound conservation and reclamation practices.

4.2 Consider the limitations of geological formations in the design and siting of buildings, roads, and utilities.

Safety Element

Goal 3 Minimize hazards to public health, safety, and welfare resulting from natural and man-made hazards.

Policies

3.1 All development shall incorporate measures to reduce natural and man-made hazards.

Zoning Ordinance

Chapter 155: Grading, Erosion, and Sediment Control

Chapter 155 of the City of Auburn Zoning Ordinance contains the City's Grading Ordinance, which regulates grading on private property within the City to protect public health and welfare, avoid pollution caused by surface runoff to water courses, and to ensure that the intended use of a graded site is consistent with the General Plan, specific plans adopted, other City ordinances, and Chapter 70 of the Uniform Building Code. The ordinance requires that development include provisions for storm drainage control (section 155.056[k]), and erosion and sediment control including both temporary facilities and long-term site stabilization features such as planting or seeding for the area affected by proposed grading (section 155.056[i]). Final grading plans must show specific locations and construction details for temporary and permanent sediment control structures and facilities (section 155.057[B][7]) and a revegetation plan (section 155.057[B][8]). The code contains additional requirements for erosion and sediment control from grading operations in sections 155.114 through 155.116.

Placer County

The project requires the construction of offsite infrastructure improvements in Placer County, such as the widening of Werner Road. The County must approve encroachment permits for those improvements. The County General Plan seeks to protect the county population from seismic hazards by requiring preparation of soils engineering and geologic-seismic analysis prior to permitting development in areas prone to geological or seismic hazards (i.e., ground shaking, landslides, liquefaction, critically expansive soils, avalanche).

The Placer County Grading and Erosion Prevention Ordinance (Section15.48) requires soils and geotechnical reports, and contains standards for slopes, drainage and sediment and erosion control.

IMPACTS AND MITIGATION MEASURES

Methods of Analysis

Site-specific studies have been prepared for the BRSP area, as discussed below. Because no development plans are proposed at this time, similar studies have not been prepared for the Study.
Areas. In some instances information prepared for the project would also be applicable to the Study Areas and is included in the analysis, as applicable.

**Geotechnical Considerations**

The geotechnical characteristics of a project site determine its potential for structural and safety hazards that could occur during construction and/or operation of a proposed project.

Several documents were reviewed for the analysis presented in this EIR to develop existing conditions and identify potential impacts on the BRSP project site. These include: *Baltimore Ravine Specific Plan, Placer County, California, Mine Hazard Evaluation and Mitigation Options Report*, prepared by Geocon Consultants, Inc. (2009), *Baltimore Ravine Project, Auburn, California, Geotechnical Feasibility Report* (December 7, 2007), the Phase One Environmental Site Assessment prepared for the project, various maps and reports from the California Geological Survey, State Mining and Geology Board, the USDA NRCS web soil survey for Western Placer County, the California Geological Survey, the City of Auburn General Plan and General Plan EIR, and other environmental documents prepared for Placer County.

The conclusions of the Geotechnical Feasibility Report are incorporated into the analysis.

The locations of the project’s proposed developed land uses (i.e., ULDR, LDR, MDR) relative to existing topography/slopes (Figure 5.5-1), and earthwork/grading information provided by the project engineer (Ubora) were qualitatively reviewed to determine where changes in site topography would generally occur. A conceptual grading plan was not available to review as part of this analysis. Instead, information provided by the applicant regarding anticipated grading forms the basis of assumptions used in this analysis. The project proposes to mass grade only the flatter areas of the site for the MDR, UHDR, and commercial uses, while grading only level pads for the ULDR and LDR to reduce the amount of cut and fill. In addition, the project has been designed to avoid developing in areas where the slope is greater than 20 percent. In addition, the analysis assumes implementation of Hillside Development guidelines from the BRSP.

The components of building foundation support, protection from seismic ground motion, and soil or slope instability are governed by existing regulations of the CBC and City standards. These regulations require that project designs reduce potential adverse soils, geology, and seismicity effects to levels that would not pose an adverse risk to people and property. Compliance with these regulations is required, not optional. Compliance must be demonstrated by the project applicant to have been incorporated in the project’s design before permits for project construction would be issued by the City.

Site assessment studies for specific structures are required by the City to be undertaken in the project site to characterize the extent and nature of geotechnical conditions at each proposed building site prior to issuing building permits.

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Abandoned Mine Hazards

The conclusions and mitigation strategy recommended by the preparers of the mine hazards evaluation (Geocon, 2009) are incorporated into the impact analysis. Geocon performed the following tasks to identify the types and extent of geotechnical hazards posed by the historic underground mining at the site:

- Review of geologic maps, mining reports, and geotechnical reports;
- Review of U.S. Geological Survey Mineral Resources Online Spatial Data (MROSD);
- Review of the Engeo Geotechnical Feasibility Report (Engeo), Phase One and Phase Two ESAs (Engeo), and Archaeological and Historic Properties Report (PBS&J);
- Review of historic aerial photographs; and
- Site reconnaissance.

Geocon used the results of this evaluation to develop a range of methods (mitigation measures) to address potential ground stability hazards associated with historic underground mine workings.

Mineral Resources

The analysis of potential effects related to the loss of availability of mineral resources is based on the requirements of sections 2761 and 2762 of the Public Resources Code (see the Regulatory Setting, above and Appendix O for information on the Statement of Reasons). As noted in the Setting, the City is preparing a Statement of Reasons for permitting development of the site, which will be forwarded to the State Geologist and Board of Mines and Geology for review.

Standards of Significance

For purposes of this EIR, impacts on geologic and soil resources or from geologic, soils, or seismic conditions are considered significant if the proposed project would:

- expose people or structures to potential adverse effects beyond those for which structures are required to be designed by the Auburn Building Code, 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 Zones Map issued by the State Geologist for the Auburn area or based on documented evidence of a known fault provided by the geologic/ geotechnical investigations required by the Auburn Building Code;
  - Strong seismic groundshaking (Modified Mercalli Intensity equal to, or greater than, MMI VII);
  - Seismic-related ground failure, including liquefaction; or
  - Landslides.
- result in substantial soil erosion as a result of topographic alteration and/or development of project features;
- be underlain by a geologic or soil unit that is unstable, or that would become unstable as a result of the project, and potentially result in on or offsite lateral spreading, subsidence, settlement, or collapse; or
• result in the loss of availability of a known mineral resource that would be of value to the City of Auburn, region, or the residents of the State.

**Project-Specific Impacts and Mitigation Measures**

<table>
<thead>
<tr>
<th>Impact</th>
<th>The proposed project could result in the exposure of people to seismic hazards.</th>
</tr>
</thead>
</table>

**Full BRSP/Study Areas**

There are no active faults that cross the BRSP area or the Study Areas, so there is no known source of potential fault rupture. From a review of regional and local geo-seismic conditions, there is a possibility that the City of Auburn could be subject to at least one major earthquake during the useful life of the project. The primary effects of seismic activity would be damage to some buildings, roads and infrastructure (primary effects) as a result of groundshaking. Related hazards such as liquefaction have not been identified as potential hazards at the site.

Development of the proposed project would convert undeveloped land to urban uses, along with an increase in the number of people, who could be subject to these seismic risks. Extensive grading to prepare building pads for development would involve excavation, re-placement, and compaction of engineered cut and fill slopes and pads, which, if done improperly, could exacerbate damage from seismic activities.

To reduce the primary and secondary risks associated with seismically induced groundshaking, it is necessary to take the location and type of subsurface materials into consideration when designing foundations and structures in the project site. The residential and non-residential components would be required to reduce the exposure to potentially damaging seismic vibrations through seismic resistant design, in conformance with Chapters 16 and 16A, Structural Design, section 1613, Earthquake Loads, of the 2007 CBC, as adopted by the City.

Adherence to the Building Code, as required by state and City law, would ensure maximum practicable protection available for users of buildings and associated infrastructure. Adherence would include:

- the use of 2007 CBC seismic standards as the minimum seismic-resistant design for all proposed facilities;
- seismic-resistant earthwork and construction design criteria, based on the site-specific recommendations of a California-registered civil engineer in cooperation with the project’s California-registered geotechnical and structural engineers; and
- an engineering analyses that demonstrates satisfactory performance of cut and fill areas.

Similarly, the design of the roads, bridges (vehicular and pedestrian overcrossings), and underground utilities (especially gas and water pipelines) would be required to comply with city, county, and state design criteria, or with other accepted non-building structure standards, to reduce the primary and secondary risks associated with seismically induced groundshaking. The City would be responsible for ensuring all required seismic safety measures are incorporated into project design prior to issuance of any permits to construct project features.

Based on the potential seismic risks in Auburn and the existing regulatory framework that addresses earthquake safety issues, including the requirements of the Building Code and road and utility design standards, seismically induced groundshaking would not be considered a substantial hazard.
in the project site. In view of the above, the proposed project would have a **less-than-significant impact** regarding exposing people or structures to damage resulting from strong seismic groundshaking.

**Mitigation Measure**

*None required.*

<table>
<thead>
<tr>
<th>Impact</th>
<th>The proposed project would require cut and fill to develop some building sites, which would alter topography.</th>
</tr>
</thead>
</table>

**Full BRSP**

Figure 5.5-1 illustrates the topographic contours and slopes at the project site. Some areas have flat to gently-rolling terrain (0-10 percent, shown in white in Figure 5.5-1), while others have steeper topography (11 to 20 percent and more than 20 percent, shown in light green and green, respectively), particularly along the edges of Baltimore Ravine and Dutch Ravine.

The BRSP would require onsite grading to prepare the project site for construction. It is anticipated that no soil would be imported or exported, because the soil would be used onsite to provide level building areas. However, if there are soils that contain hazardous levels of metals they may need to be removed from the site, see Section 5.6, Hazards, Hazardous Materials, and Public Safety for more information. Soils used for fill locations would be obtained from onsite processing (crushing) of excavated materials, if testing shows they can be reused (see Impact 5.6-2 in Section 5.6). As noted in the Environmental Setting, some of the rock materials would require extensive effort to remove, likely involving the need for hydraulic rams. Based on tests performed by the applicant it is anticipated that blasting would not be required for the project. Use of hydraulic rams, if required, could cause excessive noise or physical hazards or dust generation. The reader is referred to Section 5.8, Noise, and Section 5.2, Air Quality, for an evaluation of potential impacts related to construction methods.

The BRSP has been designed to work with the existing topography of the project site in order to reduce significant cut and fill. As stated in the Specific Plan, areas identified for development have generally been limited to those locations with existing slopes of less than 20 percent to minimize disruption of the natural terrain. In addition, measures have been incorporated in the BRSP Development Standards and Design Guidelines that limit grading in low density/urban low density residential areas to the first 80 feet from back of curb.

In general, the flat to gently rolling topography of the areas proposed for development (i.e., all land uses except open space) would change compared to existing conditions. The project proposes to mass grade primarily the flatter areas of the site for the MDR, UHDR, and commercial uses, while grading only level pads for the ULDR and LDR to reduce the amount of cut and fill. Cuts associated with grading to prepare building pads would lower the elevation of some locations, while other areas could be filled, which could raise the elevations. The gently rolling terrain that characterizes the western portions of both Plan Area 1 and Future Plan Area 2 would become less apparent, but the change in overall topography would not be substantial. Further, locations with steeper terrain that define the ridgetops and ravines (i.e., slopes greater than 20 percent) would remain as open space, so there would be little or no change in topography.

The BRSP Design Guidelines include hillside development guidance for direction and clarification about grading. Two site grading scenarios are shown in the Design Guidelines, which are intended
to illustrate how grading could occur in response to the steepness of the topography without substantially changing the topography. Grading, drainage, and the siting, foundation, and design of homes would vary, depending on the steepness of the land.

The offsite infrastructure improvements, including improvements to Werner Road and Rogers Lane, would comply with the County’s grading, erosion and sediment control ordinance, which has design requirements for slopes, fill, grading, and drainage.

Because the BRSP project would not substantially alter the topography of the project site, the impact would be considered **less than significant**.

**Study Areas**

Development of the Study Areas assumes a density of one unit per two acres. This would not be likely to involve a substantial amount of cut and fill or topographic alteration. At this low density individual residential building pads could be accommodated within the existing topography with little grading. Therefore, the impact would be **less than significant**.

**Mitigation Measure**

None required.

<table>
<thead>
<tr>
<th>Impact</th>
<th>The proposed project could increase erosion and/or subject development to unstable soil on slopes in the project site.</th>
</tr>
</thead>
</table>

**Full BRSP**

Soil erosion is the process by which soil particles are removed from a land surface by wind, water, or gravity. Most natural erosion occurs at slow rates; however, the rate of erosion increases when land is cleared of vegetation or structures, or otherwise altered and left in a disturbed condition. Erosion can occur as a result of, and can be accelerated by, site preparation activities associated with development. Vegetation removal in pervious landscaped areas could reduce soil cohesion, and disrupt the buffer provided by vegetation from wind, water, and surface disturbance, which could render the exposed soils more susceptible to erosive forces.

Excavation or grading of the BRSP area could result in erosion during construction activities, irrespective of whether hardscape previously existed at the construction site, because bare soils would be exposed and could be eroded by wind or water. The effects of erosion are intensified with an increase in slope (as water moves faster, it gains momentum to carry more debris), and the narrowing of runoff channels (which increases the velocity of water). Surface structures, such as paved roads and buildings, decrease the potential for erosion. Once covered, soil is no longer exposed to wind or water erosion.

The following analysis focuses on the potential geotechnical effects of erosion related to BRSP development. For a discussion of potential effects on water quality due to erosion and sedimentation caused by construction activities or urban runoff, please see Section 5.7, Hydrology and Water Quality.

The Geotechnical Feasibility Report noted there was no observed evidence of landslides or slope instability, based on limited geologic mapping and subsurface exploration. However, some

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development would occur on hillsides in the project site with slopes in excess of 20 percent (see Figure 5.5-1 for locations of areas where steep slopes are present). As illustrated by the information compiled in Table 5.5-1, most of the project site soils exhibit moderate to high erosion potential, along with constraints related to slope and depth to rock. The shallowness of soil cover over the geologic units also makes soils susceptible to erosion, even though the underlying rock units are stable.

As indicated in Table 5.5-1, most site soils are susceptible to erosion. Exposed soils on steep slopes could become subject to erosion or soil instability. During construction, construction contractors would be required to comply with the City’s Grading, Erosion, and Sediment Control Ordinance. To comply with the ordinance preliminary grading plans submitted to the City for approval must include identify proposed provisions for storm drainage control (section 155.056[k]), and a conceptual plan for erosion and sediment control including both temporary facilities and long-term site stabilization features such as planting or seeding for the area affected by proposed grading (section 155.056[l]). Final grading plans must show specific locations and construction details for temporary and permanent sediment control structures and facilities (section 155.057[B][7]) and a revegetation plan (section 155.057[B][8]). The code contains additional requirements for erosion and sediment control from grading operations in sections 155.114 through 155.116.

Additionally, all excavations and trenches must be properly shored in accordance with OSHA regulations and applicable CBC standards. The City would be responsible for periodic inspections of the project site to ensure that all standards are being met. The County also has requirements for construction on slopes and erosion control, which would apply to offsite infrastructure. Therefore, during construction, the likelihood for slopes to erode or otherwise become unstable is minimal.

Upon completion of the project, structures, roadways, and landscaping or revegetated areas would eventually cover any soils exposed during construction; thus, no long-term new erodible soils would be created as a result of the proposed project in areas developed with impervious surfaces such as homes and commercial/retail uses. However, as described in Impact 5.7-4 in Section 5.7, Hydrology and Water Quality, some locations in the project site will remain as open space with unpaved trails. Soils and slopes in these areas, which are steeper than other portions of the site, could be prone to erosion or instability due to human use. Therefore, erosion and slope stability impacts for the BRSP are considered significant.

**Study Areas**

As described in Impact 5.5-2, minimal grading would be required for residential land uses that could be developed in the Study Areas. Any grading that did occur would be subject to the City’s Grading, Erosion and Sediment Control Ordinance, discussed above. As a result, the potential for substantial erosion occurring within the Study Areas would be minimal. Impacts would be less than significant.

**Mitigation Measure**

Compliance with Mitigation Measure 5.5-3 would reduce erosion and slope stability impacts to a less-than-significant level by ensuring that trails are not allowed to erode substantially.

**PA1/PA2**

5.5-3 Implement Mitigation Measure 5.7-4 (Section 5.7, Hydrology and Water Quality), which requires periodic inspection of unpaved trails for signs of erosion and the long-term maintenance of trails to minimize the potential for increased erosion as a result of trail use.
5.5 Geology, Soils, and Mineral Resources

Impact

5.5-4 The project site is located on property under which there are known abandoned mine pits, shafts, and adits, which could present a human health and/or property hazard.

Full BRSP/Study Areas

As described in the Environmental Setting, evidence of historic mining is present throughout the project site. Identified surface features include prospect pits and open-pit mine workings. Observed and reported surface features range in depth from a few feet to approximately 50 feet deep. Review of the available information suggests subsurface mining activities were more prevalent than surface mining activities at the site. Portions of the site could contain abandoned mines other than the ones already identified and shown on Figure 5.5-2. Thus, the extent of subsurface workings at the site is unknown.

Footings and foundations associated with known mining features have been identified on the site. Footings and foundations, in and of themselves, do not represent a geotechnical hazard. However, their presence could indicate features that may be a hazard such as an abandoned shaft under a former head frame or tailings at an abandoned mill site.

The hazards posed by underground workings are primarily related to subsidence or collapse of the ground surface overlying the workings. Whether the collapse of an underground working would result in a surface feature likely to pose a hazard to people or structures would depend on several factors, including depth to the workings, height and width of the workings, and the nature and competency of the overburden.

Subsidence features have not been positively identified in Plan Area 1 or Future Plan Area 2, but, according to the mine hazard evaluation report, could be present. Additionally, underground workings that have not collapsed to date could collapse in the future, resulting in new surface features that could pose a hazard.

The proposed project would add a considerable amount of weight onto the currently undeveloped site where there are known remnants of historic mining activities, including pits, shafts, and adits. Heavy equipment, building pads and roadways, and structures would all contribute to this increased weight. Additionally, landscape irrigation systems can contribute greater water infiltration on the site than currently exists. Irrigation water percolating through the soil could affect groundwater conditions in rock fractures. Consequently, there is the potential for development of structures on unstable soils or rock units, unless appropriate geotechnical engineering, design, and construction methods are implemented. This is considered a potentially significant impact.

Mitigation Measure

The following explains the mitigation strategy to address potential geotechnical impacts associated with former mining features on the project site to reduce the potential for underlying, potentially unstable, rock and/or soil to collapse, as identified in the mine hazards evaluation report prepared by Geocon.

This mitigation would reduce the geotechnical impact associated with mine hazards, which could include the removal of historic mining features, to a less-than-significant level. However, the removal of certain features (e.g., surface pits, underground workings, or foundations) to reduce potential ground stability hazards could result in a substantial adverse change in the significance of...
the Baltimore Ravine Mining District. This cultural resources impact is evaluated in greater detail in Impact 5.4-2 in Section 5.4, Cultural and Paleontological Resources.

As noted in the Environmental Setting, the standard approach to identifying, and mitigating, specific hazards at the project site must be implemented on a case-by-case basis. Mine hazard mitigation strategies are dependent on the type of mine feature being addressed and the actual or proposed land use scenario for the site on which the feature is located. Implementation of mine mitigation measures on the BRSP site should be conducted with input from a Professional Engineer (P.E.) or Certified Engineering Geologist (C.E.G.) and verified by the project geotechnical engineer of record.

PA1/PA 2

5.5-4 a) The following shall be implemented under the direction of a Professional Engineer (P.E.) or Certified Engineering Geologist (C.E.G.) and verified by the project geotechnical engineer of record to manage the surface openings and underground workings associated with historic mining at the project site to minimize potential ground stability problems. The project geotechnical engineer of record shall provide documentation to the City of Auburn demonstrating compliance with this mitigation measure, and shall advise City staff immediately if conditions warrant additions to, or modifications of, the specific methods identified in this mitigation measure in order to protect public safety. The City shall monitor implementation of this mitigation measure by ensuring grading permits are conditioned appropriately and through the inspection process.

The mitigation approaches are divided into four categories, corresponding to the four general types of mine hazards at the site: underground workings, subsidence or collapse, surface features (e.g., excavations), and footing and foundations. The project geotechnical engineer of record shall determine which of the categories apply to specific situations, to the extent such a determination can be made prior to approval of final grading plans by the City. In the event such a determination cannot be made prior to issuance grading permits (e.g., heavy vegetation that has not yet been removed), the geotechnical engineer of record shall observe grading activities to determine whether underground workings, subsidence/collapse features, excavations, or foundations/footings could be disturbed. If such features are encountered and the specific methods outlined in this mitigation measure have not been previously incorporated into grading permit specifications, work shall stop immediately, and the feature shall be assessed by a C.E.G. or P.E. to determine appropriate geotechnical engineering methods to remediate the hazard. All remedial measures shall be implemented under the direction of a C.E.G. or P.E.

i) Underground Workings

Plugging of Openings to Underground Workings: Openings to underground workings in areas designated as ULDR, MDR, UHDR, or that in the opinion of the site owner or geotechnical engineer of record pose a significant risk to people or infrastructure, including those that are partially or completely blocked with undocumented fill, shall be plugged. Plugs for openings shall be designed by and installed under the direction of a C.E.G. or P.E. working with the geotechnical engineer of record for the site. When plugging openings, undocumented fill shall be removed and an engineered plug installed as directed by the responsible Geotechnical Engineer. In those instances where it is necessary to plug openings that provide critical habitat for species of concern, the plugging shall be conducted in coordination with the project biologist, and in such a manner as to minimize disturbance to the species of concern.
Fencing to Restrict Access: Openings in areas designated as LDR, open space, or right-of-way that in the opinion of the site owner or geotechnical engineer of record do not pose a significant risk to people or infrastructure shall be fenced to restrict access. Fencing shall consist of six-foot high open fencing and posted with warning signs.

Wildlife Access Structures: Openings that are designated by the project biologist as providing access for bats, and that are in areas designated as ULDR, LDR, OS, right-of-way or that in the opinion of the site owner or geotechnical engineer of record do not pose a significant risk to people or infrastructure shall be covered by a wildlife access structure (e.g., bat gate) to restrict human access, without significantly decreasing access for the particular species of concern. Wildlife access structures shall be constructed in accordance with specifications prepared by or for the United States Department of the Interior, United States Army Corps of Engineers, California Department of Conservation, and/or Bat Conservation International.

ii) Subsidence or Collapse

During grading, in the event a suspected subsidence or collapse feature is encountered, work shall stop immediately, and the construction contractor shall notify the geotechnical engineer of record. The feature shall be assessed by a C.E.G. or P.E. to determine appropriate geotechnical engineering methods to remediate the hazard. All remedial measures shall be implemented under the direction of a C.E.G. or P.E.

iii) Surface Mining Features (Excavations)

For the following, a distinction is made between excavations that are less than five feet deep and those that are at least five feet or deeper, where applicable. The five-foot depth is established as the criterion because it is the minimum depth at which excavations must shored in accordance with Cal-OSHA regulations, should personnel enter them.

Placement of Engineered Fill: Areas designated as LDR, MDR, ULDR, UHDR, mixed-use, or that in the opinion of the site owner or geotechnical engineer of record pose a significant risk to people or infrastructure (regardless of the five-foot-depth criterion), shall be filled with engineered fill. The design and placement of engineered fills shall be conducted under the supervision of the project geotechnical engineer of record to comply with the requirements of the project geotechnical report.

If an excavation less than five feet deep that in the opinion of the site owner or geotechnical engineer of record does not pose a significant risk to people or infrastructure is located in an area designated as open space (OS) or right-of-way, it shall be filled, fenced to restrict access, or avoided.

Fencing of Excavations Less Than Five Feet in Depth to Restrict Access: Excavations less than five feet deep in areas that in the opinion of the site owner or geotechnical engineer of record do not pose a significant risk to infrastructure and with sides sloped at or greater than one horizontal to one vertical (1H:1V) may be fenced to restrict access instead of being filled. Fencing shall consist of six-foot high open fence.

Fencing of Excavations Five Feet or More in Depth to Restrict Access: Excavations five feet or more in depth in areas that in the opinion of the site owner or geotechnical engineer of record do not pose a significant risk to infrastructure may be fenced to restrict access instead of being filled. Fencing
shall consist of six-foot high open fence and shall be posted with signs warning unauthorized people to keep out.

Avoidance of Excavations Less Than Five Feet Deep: If an excavation less than five feet deep is located in an area that in the opinion of the site owner or geotechnical engineer of record does not interfere with or pose a significant risk to people or infrastructure, it shall be avoided without backfilling or fencing. However, if the sides of an unfenced excavation are sloped at or greater than 1H:1V, the sides shall be regraded to an angle less than 1H:1V. Avoidance shall not be used to manage excavations five feet or more in depth.

iv) **Footings and Foundations**

Footings and foundations associated with historic mining shall be avoided. If avoidance is not possible, footings and foundations shall be removed as follows:

- If footings and foundations are found in areas designated as LDR, MDR, ULDR, UHDR, mixed-use, or right-of-way, the footing or foundation shall either be removed or development performed in a manner that does not disturb the footing or foundation. Footings and foundations in areas designated as open space (OS) should not be disturbed.
- If foundations are to be removed, the applicant shall implement Mitigation Measure 5.4-1(a).

5.5-4 b) i) As part of the geotechnical report prepared for a tentative subdivision map or building permit for development in the Study Areas, determine if mines are present in the subject area. If no mine adits, shafts or other features are present, no further mitigation would be required.

ii) If any mine features are present, implement Mitigation Measure 5.5-4(a)(i) through (iv).

| Impact 5.5-5 | The proposed project would result in the loss of, or loss of access to, mineral resources identified in a Mineral Resource Zone by the California Geological Survey. |

**Full BRSP/Study Areas**

The project site is designated MRZ-2b for gold, which indicates that gold resources could still be present. The project site was mined historically, but no mining activity has occurred there since the 1940s. As required by law when considering permitting low- or high-density development in a MRZ-2b zone, the City has prepared a draft Statement of Reasons (see Appendix O), which must be adopted by the City and forwarded to the State Mining and Geology Board for review prior to permitting any development. The City’s Statement of Reasons for allowing the project to proceed even though mineral resources are present includes the following:

- As shown on Figure 5.5-4, the MRZ-2b zone extends south of Interstate 80 over a portion of south Auburn, including the majority of the project site, and is adjacent to unincorporated Placer County. The eastern and southeastern edges of the MRZ-2b zone include areas within Auburn that already have been developed with low-density residential uses. Rural residential development is located in the western portion of the MRZ-2b zone. Land uses immediately east and south of the zone have extensively developed. Because mining
activities would already be incompatible with these developed areas due to noise, dust, traffic and other nuisances, the project site should not be developed with mining uses.

- The project site’s economic value as a mineral resource is limited. The existing mining facilities have not been in use since the early to mid 1900s and are in disrepair, nor have there been any known attempts to revive mining on the project site since. The Auburn area contains a number of historic mines, as does greater Placer County, reflecting the region’s once-active gold mining industry. However, mining no longer makes up a substantial portion of industrial activity in the county. For example, in 2004, Natural Resources and Mining composed approximately 0.1 percent of industrial activity in Placer County. Because the likelihood of use of the property for mining purposes is so low, and because mining activity is not significant in the region, the loss of the resources present on the project site would not have an adverse economic effect on the County, the City or the region.

- The project site is the only large contiguous area available to accommodate growth in the city. The remainder of the city is largely built out. The project site has been recognized as a potential area for development for several decades. The project site is located in an area of the city designated by both the 1978 and the 1993 General Plans as Urban Reserve. The Urban Reserve designation recognizes that the area will eventually be developed, but requires a Specific Plan prior to development beyond the existing zoning. The development of the Specific Plan would provide up to 725 units, which would serve a substantial portion of the demand anticipated to occur over the next 20 years. Further, development of the BRSP area as proposed would assist the City in meeting its affordable housing goals. The Specific Plan was identified in the City’s Housing Element as a means to achieve its housing affordability goals.

- There is no indication that mining would occur on the project site if it were to remain undeveloped. The City has not received an application to conduct any mining activities since the land has been within the city boundaries, even when gold prices rose. The City is unaware of anyone who has expressed interest in mining the site. Given the costs of mining, the surrounding land uses, and the likely value of the remaining gold reserves, it is unlikely that commercial mining activity would occur on the project site.

- The project applicant considered extracting the remaining gold on the project site prior to or instead of developing the property with residential and commercial uses. However, it would not be commercially or economically viable to do so, because of the location of the site among residential areas, the need for deep shafts and off-hauling of secondary materials in order to obtain gold ores, and the difficulties of obtaining required state and federal permits.

For these reasons, the loss of access to remaining mineral resources on the project site is considered a **less-than-significant impact**.

**Mitigation Measure**

*None required.*

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34 Sacramento Regional Research Institute, *Placer County Industry Structure Study*, March 2006, Figure 1.
Cumulative Impacts and Mitigation Measures

The geographic context for the analysis of impacts resulting from geologic hazards generally is site-specific, rather than cumulative in nature, because each project site has a different set of geologic considerations that would be subject to uniform site development and construction standards. As such, the potential for cumulative impacts to occur is limited, but is assumed to encompass Placer County.

Cumulative development in Placer County would involve excavation and trenching, mass grading and cut-and-fill construction methods to create building pads, roadways, and infrastructure. The potential for topographic alteration and resulting erosion and/or slope instability would be site-specific and generally would not combine with similar effects elsewhere, unless sites with high erosion hazard and/or slope instability problems are contiguous and appropriate engineering methods are not employed to stabilize soils and slopes. There are no planned or approved projects contiguous with the proposed project with which the proposed project could combine that would involve cuts and fills on steep slopes, implementation of fuel management plans, or other activities that would expose soils or slopes to increased erosion potential as a result of topographic changes, from a geotechnical perspective. Therefore, this issue is not addressed in the cumulative analysis. In addition, there would be no project impacts related to fault rupture, landslide hazards, or loss of topsoil. Therefore, there would be no cumulative impacts, and these issues are not further evaluated.

Cumulative development in Placer County, including the proposed project, would increase the number of people and structures that could be exposed to hazards associated with seismic activity, primarily groundshaking in the lower foothills, but with a potential for liquefaction in alluvial areas in western/southern Placer County. Placer County is expected to experience lower levels of shaking less frequently (than other areas in California), but very infrequent earthquakes could still cause strong shaking in the county. Based on scientific and historic information, while the risk to Placer County from earthquakes is moderate, the vulnerability is low. There are no populations in Placer County that are located in a High Seismic Hazard Zone, as delineated in the California Draft Multi-Hazard Mitigation Plan. Therefore, cumulative conditions without the project are not considered significant.

Further, buildings and facilities in Placer County must be sited and designed in accordance with appropriate geotechnical and seismic guidelines and recommendations consistent with the requirements of the California Building Code. Adherence to all relevant plans, codes, and regulations with respect to project design and construction would provide adequate levels of safety.

The proposed project would not result in a considerable contribution to cumulative impacts regarding seismic groundshaking and ground failure because all project structures, roads, bridges, and infrastructure would be designed to meet the applicable seismic safety standards established by the City, which are at least as stringent as state standards. There are no aspects of the proposed project that would materially change or adversely affect regional or local seismic conditions under the cumulative scenario and the project’s contribution to any cumulative effect would not be considerable. Therefore, impacts would be less than significant.
Mitigation Measure

None required.

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The State Geologist has classified a total of 28 separate areas covering a combined area of approximately 71 square miles within Placer County (approximately five percent of the total land area) as containing, or are likely to contain significant mineral deposits (i.e., classified as MRZ-2). Of the 71 square miles and with respect to gold deposits, eight areas covering approximately 20.5 square miles of land are classified as containing significant precious metal (e.g., gold) and base metal (e.g., zinc, copper) resources. Five areas covering about 41 square miles (over 25,000 acres) are classified as containing significant placer gold resources. The project site contains approximately 188 acres of MRZ-2 land, a small portion of the County total. Although some quartz vein systems and placer localities have been mined extensively, a considerable amount of lode and placer gold is believed to still exist within the county. Consequently, continued exploration and proposed development of all types of gold deposits in the county can be expected to continue, especially as the price of gold increases. However, the State Geologist also concluded that although the Ophir district has been classified as containing significant inferred reserves, because much of the land (within the district) is already urbanized or in process of being urbanized, it is questionable that notable production would occur in the future.36

The City of Auburn General Plan EIR did not identify any significant project or cumulative effects related to the potential loss of availability of or access to important mineral resources.37 The Placer County General Update EIR concluded development under the Placer County General Plan land use diagram could result in the potential for urban development over known deposits of valuable minerals, specifically noting the Auburn/Bowman Community Plan Area (which includes the project site), thus effectively precluding the use of the mineral resources. However, the Placer County General Plan Update EIR concluded that such effects would not be cumulatively significant.38 Therefore, cumulative impacts (without the project) would not be considered significant.

The project’s contribution would not be considerable; therefore, the project’s cumulative impact is considered less than significant.

Mitigation Measure

None required.

37  City of Auburn, General Plan Modified Final EIR, p. 4-18.
38  Placer County, Placer County General Plan Update, Draft EIR (SCH #93082012), October 1993, p. 8-21.