

3.9 GEOLOGY, SOILS, LAND CAPABILITY, AND COVERAGE

This section contains an evaluation of the potential impacts to geology, soils, land capability, and coverage associated with the implementation of the Project. The analysis includes a description of existing conditions and an analysis of changes to geologic conditions, relevant soil properties, and associated elements of land capability and coverage. Comments received in response to the Notice of Preparation related to geology, soils, land capability, and coverage requested that the document include an analysis of impacts related to soils and the potential effects of an increase in land coverage.

Regulations and guidelines established by the Tahoe Regional Planning Agency (TRPA) and local jurisdictions, along with the California Environmental Quality Act (CEQA) statute and guidelines, provide the regulatory background that guides the assessment of potential environmental effects to these resources. Other sources of information used in the preparation of this section include the California Geological Survey (CGS) and U.S. Geological Survey (USGS) technical guides, the Natural Resources Conservation Service (NRCS) 2007 Soil Survey, TRPA's 2010 aerial LIDAR data, TRPA regulations and planning documents, background reports prepared for plans and projects in the vicinity, and other published geologic literature.

Because the extraction of mineral resources or the use of septic tanks is not permitted within the Tahoe Basin, this analysis does not address potential impacts related to these issues. Similarly, the proposed Project site and Alternative A site are not located near the backshore or shorezone of Lake Tahoe; therefore, the analysis does not evaluate changes to natural littoral processes or evaluate risks associated with seiche or tsunami. Additionally, because the Project site (for both the proposed Project and Alternative A) does not contain expansive soils or soils that are susceptible to lateral spreading, subsidence, or liquefaction (NRCS 2007), these issues are dismissed from further discussion.

The value or importance of different fossil groups varies depending on the age and depositional environment of the rock unit that contains the fossils, their rarity, the extent to which they have already been identified and documented, and the ability to recover similar materials under more controlled conditions (such as for a research project). Marine invertebrates are generally common; the fossil record is well developed and well documented, and generally they would not be considered a unique paleontological resource. Identified vertebrate marine and terrestrial fossils are generally considered scientifically important because they are relatively rare. Some invertebrate fossils have been found on the south shore of Lake Tahoe; however, there are no documented occurrences of vertebrate fossils within the Lake Tahoe Basin (U.C. Berkeley Museum of Paleontology [UCMP] 2016). Additionally, the Project vicinity has been heavily influenced by the Pleistocene era glaciations, which scoured the mountain slopes; mixing, and transported granitic and volcanic debris, and further minimizing the potential for fossils to be present in these locations. Isolated remnants of ancient, metamorphosed sedimentary deposits exist within the Lake Tahoe Basin, but do not occur within the Project area (Sylvester et al. 2012). The metamorphosed remnant located closest to the Project area is found approximately 12.5 miles to the north west near Mount Lincoln and Sugar Bowl resort. For these reasons, impacts to unique paleontological resources are dismissed from further discussion.

Changing the pattern of ownership of parcels as part of the larger land exchange being contemplated by TCPUD and the Conservancy by itself would have no impact on geology, soils, land capability, and coverage. The potential environmental effects from construction and operation of the proposed Project on a portion of APN 093-160-064, currently owned by the Conservancy, are assessed in this section and other resource sections in Chapter 3, "Environmental Setting, Environmental Impacts, and Mitigation Measures," and in Chapter 5, "Other CEQA-Mandated Sections," of this EIR. The purpose of the land exchange is to consolidate ownership and increase land management efficiencies for the agencies and no other physical changes are proposed for the affected parcels.

Water quality and stormwater issues are addressed in Section 3.10, "Hydrology and Water Quality."

3.9.1 Regulatory Setting

Regulations protecting the soil resources in the Tahoe Region are enforced by TRPA, the Lahontan Regional Water Quality Control Board (RWQCB) (through water quality regulations), and Placer County. Other regulations aid in the establishment of safe structures to ensure minimal, if any, impact on earth resources. The following discussion provides the background for applicable earth resource requirements in the Tahoe Region.

FEDERAL

National Earthquake Hazards Reduction Act

In October 1977, the U.S. Congress passed the Earthquake Hazards Reduction Act to reduce the risks to life and property from future earthquakes in the United States. To accomplish this, the act established the National Earthquake Hazards Reduction Program (NEHRP). The mission of NEHRP includes improved understanding, characterization, and prediction of hazards and vulnerabilities; improved building codes and land use practices; risk reduction through post-earthquake investigations and education; development and improvement of design and construction techniques; improved mitigation capacity; and accelerated application of research results. The NEHRP designates the Federal Emergency Management Agency (FEMA) as the lead agency of the program and assigns several planning, coordinating, and reporting responsibilities.

TAHOE REGIONAL PLANNING AGENCY

Thresholds

TRPA has established threshold carrying capacity standards and indicators for soil conservation. TRPA threshold standards are minimum standards of environmental quality to be achieved in the Tahoe Region. Every 4 years, TRPA evaluates the attainment status of all TRPA threshold standards. The 2015 Threshold Evaluation contains the most current information on the status of the threshold standards (TRPA 2016a).

TRPA has two soil conservation threshold standard indicator reporting categories, as follows:

- ▶ Land Coverage (impervious cover) Threshold Standard to comply with allowable land coverage limitations established in the Land Capability Classification of the Tahoe Basin. This threshold standard indicator reporting category consists of nine different standards for the nine separate land capability districts (LCDs). All soils within the region have been assigned an LCD based on their ability to tolerate disturbance and development while retaining their natural function. LCDs 1a to 3 are considered sensitive and LCD 7 is considered the most tolerant. Additional discussion of land coverage and LCDs is included in Section 3.9.2, "Environmental Setting."
- ▶ Stream Environmental Zone (SEZ) Threshold Standard to restore 25 percent of the SEZ lands that have been identified as disturbed, developed or subdivided to attain a 5 percent increase in the area of naturally functioning SEZ lands.

See Table 3.9-1 for the 2015 status of the soil conservation threshold standards.

Table 3.9-1 2011 Status of the Soil Conservation Threshold Standards

| Threshold Standard | Status and Trend |
|-------------------------------------|--|
| Land Coverage | |
| Land Capability District 1a | Considerably Better than Target, Little to No Change |
| Land Capability District 1b | Considerably Worse than Target, Moderate Improvement |
| Land Capability District 1c | Somewhat Better than Target, Little to No Change |
| Land Capability District 2 | Somewhat Better than Target, Little to No Change |
| Land Capability District 3 | Considerably Better than Target, Little to No Change |
| Land Capability District 4 | Considerably Better than Target, Little to No Change |
| Land Capability District 5 | Considerably Better than Target, Little to No Change |
| Land Capability District 6 | Considerably Better than Target, Little to No Change |
| Land Capability District 7 | Somewhat Better than Target, Little to No Change |
| Stream Environment Zone Restoration | Considerably Worse than Target, Moderate Improvement |

Source: TRPA 2016a

Goals and Policies

Goals and policies applicable to geology, soils, land capability, and coverage are included in several elements and subelements of the Goals and Policies document of the Regional Plan. The Natural Hazards Subelement addresses risks from natural hazards (e.g., flood, fire, avalanche, and earthquake). Specifically, Goal 1, Policy 2 prohibits new construction on, or disturbance of land within, the 100-year floodplain and in the area of wave run-up except as necessary to implement the goals and policies of the Regional Plan; and requires all public utilities, transportation facilities, and other necessary public uses located in the 100-year floodplain and area of wave run-up to be constructed or maintained to prevent damage from flooding and to not cause flooding. The Water Quality Subelement includes goals to reduce loads of sediment and algal nutrients to Lake Tahoe; meet sediment and nutrient objectives for tributary streams, surface runoff, and subsurface runoff; and restore 80 percent of the disturbed lands and specifies that the implementation of best management practices (BMPs) shall be required as a condition of approval for all projects. The Soils Subelement addresses soil erosion and loss of soil productivity through policies pertaining to coverage, including allowable coverage for categories of land uses in specific LCDs. This subelement also addresses special regulations regarding construction and soil disturbing activities occurring between October 15 and May 1.

Goals and policies of the Regional Plan that are related to erosion and coverage are located in the Conservation Element. Relevant excerpts are included below.

GOAL S-1: Minimize soil erosion and the loss of soil productivity.

- ▶ **Policy S-1.1:** Allowable impervious land coverage shall be consistent with the Threshold Standard for impervious land coverage.
- ▶ **Policy S-1.2:** No new land coverage or other permanent disturbance shall be permitted in LCDs 1-3 (exceptions provided for some single-family dwellings, public outdoor recreation, and public service uses).
- ▶ **Policy S-1.6:** Maintain seasonal limitations on ground-disturbing activities during the wet season (October 15 to May 1) and identify limited exceptions for activities that are necessary to preserve public health and safety or for erosion control.
- ▶ **Policy S-1.7:** All existing natural functioning SEZs shall be retained as such and disturbed SEZs shall be restored whenever possible and may be treated to reduce the risk of catastrophic wildfires.

Code of Ordinances

The TRPA Code of Ordinances (Code) implements the Regional Plan Goals and Policies. The following TRPA Code provisions are most relevant to the geology, soils, land capability, and coverage aspects of the Project.

Chapter 30 - Land Coverage Standards

Since the late 1970s, TRPA has used the land capability classification system known as the Bailey System (*Land-Capability Classification of the Lake Tahoe Basin, California-Nevada: A Guide to Planning* [Bailey 1974]) to guide land use planning, policy formulation related to the impacts of development on soil erosion and permitting of development. The Bailey System was developed as a threat assessment and planning tool to identify and mitigate adverse impacts to water quality and stream systems that occur from surface runoff and erosion related to development. The Bailey System is the basis of the land coverage standards and limitations set forth in Chapter 30 of the TRPA Code.

Coverage is defined by TRPA as a human-built structure or other impervious surface that prevents normal precipitation from directly reaching the surface of the land underlying the structure, therefore precluding or slowing the natural infiltration of water into the soil (Chapter 90 of the Code). TRPA further defines coverage as impervious surface (hard coverage) or compacted soil (soft coverage). Research has established the connection between impervious surfaces and water quality. Specifically, coverage may affect water quality as it reduces the amount of soil available to infiltrate water and has the potential to result in surface runoff, erosion, and delivery of pollutants to receiving waters.

To determine the level of coverage that would be appropriate in the Region, TRPA adopted the Bailey Land Classification system (Bailey 1974). The system assigns LCDs based primarily on soil characteristics and slope. The LCDs reflect the amount of development the site can support without experiencing soil or water quality degradation. The LCDs range from 1 to 7, with 1 being the most environmentally sensitive and 7 being most suitable for supporting development (see Table 3.9-2). Under this system, TRPA allows landowners to cover 1, 5, 20, 25, or 30 percent of their parcel with impervious surfaces depending on its environmental sensitivity as defined by the Bailey classification system. Higher amounts of land coverage are allowed in town centers, where an area plan has been adopted.

Table 3.9-2 Land Capability Districts for Lake Tahoe Region

| Capability Levels | Tolerance for Use | Slope Percent | Relative Erosion Potential | Runoff Potential | Disturbance Hazards |
|-------------------|--|---------------|----------------------------|-------------------------|-----------------------|
| 7 | Most | 0-5 | Slight | Low to moderately low | Low hazard |
| 6 | | 0-16 | | Moderately high to high | |
| 5 | | 0-16 | | Low to moderately low | |
| 4 | | 9-30 | Moderate | Moderately high to high | Moderate hazard lands |
| 3 | | 9-30 | | Low to moderately low | |
| 2 | | 30-50 | High | Moderately high to high | High hazard lands |
| 1a | Least | 30+ | | Low to moderately low | |
| 1b | (Poor Natural Drainage, Fragile Flora and Fauna) | Varies | | | |
| 1c | | — | | | |

Source: Bailey 1974

In general, for a parcel of up to 20 acres the area used to determine the amount of allowable coverage (referred to as the “Project site”) is based on the parcel size. However, as described in TRPA Code Section 30.4.1.C.b, highways, streets, roads, and the easements or rights-of-way allowing potential land coverage for linear public facilities, highways streets, and roads is not included within a project site.

Property owners who have used less than their allotted amount of coverage (or none at all) may sell that “potential” coverage to other property owners. In some instances, coverage in excess of the allowable coverage amount can be

verified as legally existing, thereby becoming a marketable right. In other words, such coverage is “grandfathered in” because it was established before the existence of TRPA. Property owners who have already exceeded their allocated amount (i.e., base allowable coverage) and seek new permits from TRPA are said to have “excess coverage” and are required to remove a portion of the excess coverage, retire coverage off site, or pay an excess coverage mitigation fee.

Chapter 60 - Water Quality

Chapter 60 of the TRPA Code sets forth requirements for installation of BMPs for the protection or restoration of water quality and attainment of minimum discharge standards. Projects shall comply with temporary and permanent BMP programs as a condition of project approval.

Chapter 33 - Grading and Construction

Chapter 33 of the TRPA Code describes the various standards and regulations that protect the environment against significant adverse effects from excavation, filling, and clearing, because of such conditions as exposed soils, unstable earthworks, or groundwater interference.

Placer County Tahoe Basin Area Plan

The Placer County Tahoe Basin Area Plan, a joint TRPA/Placer County plan, was adopted in 2016. The plan incorporates TRPA goals and regulations but also includes the following additional goal related to land coverage:

- ▶ **Policy S-P-4:** Update parking standards to more efficiently utilize parking lots and minimize land coverage.

STATE

Alquist-Priolo Earthquake Fault Zoning Act

The Alquist-Priolo Earthquake Fault Zoning Act of 1972 (Public Resources Code [PRC] Section 2621-2630) intends to reduce the risk to life and property from surface fault rupture during earthquakes by regulating construction in active fault corridors, and by prohibiting the location of most types of structures intended for human occupancy across the traces of active faults. The act defines criteria for identifying active faults, giving legal support to terms such as active and inactive, and establishes a process for reviewing building proposals in Earthquake Fault Zones. Under the Alquist-Priolo Act, faults are zoned and construction along or across these zones is strictly regulated if they are “sufficiently active” and “well-defined.” A fault is considered sufficiently active if one or more of its segments or strands shows evidence of surface displacement during Holocene time (defined for purposes of the act as within the last 11,000 years). A fault is considered well defined if its trace can be clearly identified by a trained geologist at the ground surface or in the shallow subsurface, using standard professional techniques, criteria, and judgment (Bryant and Hart 2007). Before a project can be permitted in a designated Alquist-Priolo Earthquake Fault Zone, cities and counties must require a geologic investigation to demonstrate that proposed buildings would not be constructed across active faults. The law addresses only the hazard of surface fault rupture and is not directed toward other earthquake hazards.

Seismic Hazards Mapping Act

The intention of the Seismic Hazards Mapping Act of 1990 (PRC Section 2690–2699.6) is to reduce damage resulting from earthquakes. While the Alquist-Priolo Act addresses surface fault rupture, the Seismic Hazards Mapping Act addresses other earthquake-related hazards, including ground shaking, liquefaction, and seismically induced landslides. The act’s provisions are similar in concept to those of the Alquist-Priolo Act. The State is charged with identifying and mapping areas at risk of strong ground shaking, liquefaction, landslides, and other corollary hazards, and cities and counties are required to regulate development within mapped Seismic Hazard Zones. Under the Seismic Hazards Mapping Act, permit review is the primary mechanism for local regulation of development.

California Building Code

The California Building Code (CBC) (California Code of Regulations, Title 24) is based on the International Building Code. The CBC has been modified from the International Building Code for California conditions, with more detailed and/or more stringent regulations. Specific minimum seismic safety and structural design requirements are set forth

in Chapter 16 of the CBC. The CBC identifies seismic factors that must be considered in structural design. Chapter 18 of the CBC regulates the excavation of foundations and retaining walls, while Chapter 18A regulates construction on unstable soils, such as expansive soils and areas subject to liquefaction. Appendix J of the CBC regulates grading activities, including drainage and erosion control. The CBC contains a provision that provides for a preliminary soils report to be prepared to identify "...the presence of critically expansive soils or other soil problems which, if not corrected, would lead to structural defects." (CBC Chapter 18, Section 1803.1.1.1).

Lahontan Regional Water Quality Control Board

The nine regional water quality control boards within California provide regional specific water quality standards and control measures to implement the federal Clean Water Act. Lahontan RWQCB is responsible to surface and ground water quality within the Project site. The water quality control plan for the Lahontan region (LRWQCB 2015) establishes water quality objectives enforced through federal National Pollutant Discharge Elimination System (NPDES) permits. NPDES permits are intended to address land uses and activities that could create erosion or sediment transportation and potentially degrade water quality. Compliance with these permits requires implementation of erosion control BMPs and preparation of a storm water pollution prevention plan (SWPPP) to minimize erosion and sediment transport adjacent to waterbodies. Refer to Section 3.10, "Hydrology and Water Quality," for a more detailed discussion.

California Tahoe Conservancy

The mission of the California Tahoe Conservancy (Conservancy) is to preserve, protect, restore, enhance and sustain the unique and significant natural resources and recreational opportunities of the Tahoe Region (California Government Code - Title 7.42, Sections 66905.0 to 66908.3). The Conservancy's jurisdiction extends throughout the California side of the Lake Tahoe Region, as defined in California Government Code Section 66905.5. In 1987, the Conservancy authorized staff to develop and implement a Land Coverage (Land Bank) Program. Through this program, the Conservancy acquires properties eligible for purchase through willing sellers. The development potential on these properties is retired. All rights and credits acquired by the Conservancy are stored in a Land Bank. Through a Memorandum of Understanding (MOU) with TRPA, the Conservancy is authorized to receive disbursements of TRPA excess coverage mitigation fees to perform coverage reduction through its Land Bank. The MOU also authorizes the Conservancy to sell coverage rights on the open market and conduct SEZ restoration or mitigation for private or public service projects through the Land Bank.

The benefits of the Conservancy's Land Coverage Program include: acquisition and restoration of developed areas that have become degraded and that to contribute, or have the potential to contribute to water quality problems; protecting land before development activity generates the need for mitigation; ongoing management to ensure that resource benefits are sustained; assisting property owners in complying with Regional land coverage policies so they may construct or rehabilitate homes and businesses; and simplifying and expediting public and private projects.

LOCAL

Placer County General Plan

The Natural Resources Element and Health and Safety Element of the Placer County General Plan include a number of goals and policies intended to reduce soil erosion and to minimize injury to people and damage to property from exposure to seismic and geologic hazards. Specific policies require that development projects near stream environments do not cause or worsen erosion or sedimentation (Policies 6.A.4 and 6.A.10). The Placer County General Plan also requires projects to include a variety of technical reports and plans that demonstrate that the project will minimize the risk of exposure of people or property to seismic hazards, unstable soils, landslides, and avalanche (Policies 8.A.1, 8.A.2, 8.A.4, 8.A.5, 8.A.6, 8.A.9, 8.A.10, 8.A.11, 8.A.12, and 8.H.2).

Placer County Grading Ordinance

Placer County Code Article 15.48, "Grading, Erosion and Sediment Control," contains ordinances enacted for the purpose of regulating grading on property within the unincorporated area of Placer County to safeguard life, limb,

health, property and public welfare; to avoid pollution of watercourses with hazardous materials, nutrients, sediments, or other earthen materials generated on or caused by surface runoff on or across the permit area; and to ensure that the intended use of a graded site is consistent with the Placer County General Plan, any specific plans, and applicable Placer County ordinances. The most common activities requiring a grading permit within the Placer County portion of the Tahoe Basin include the following: fill or excavation greater than three cubic yards, and cuts exceeding four feet in depth; fills exceeding three feet in depth; cuts or fills exceeding 200 square feet (sq. ft.) in area; structural retaining walls exceeding four feet in total height, as measured from the bottom footing to the top of the wall and/or supporting a surcharge; soil or vegetation disturbances exceeding 1,000 sq. ft.; grading within or adjacent to a drainage course or wetland; or grading within a floodplain.

3.9.2 Environmental Setting

REGIONAL GEOLOGY

The Tahoe Basin is located in the northern Sierra Nevada geomorphic province, between the Sierra crest to the west and the Carson Range to the east and is one of the most prominent mountain ranges in California. Faulting and volcanism created the Tahoe Basin over 2 million years ago, and as a result, the basin contains granitic, metamorphic, and volcanic rock (Saucedo 2005). The predominant bedrock in the Tahoe Basin is Cretaceous granodiorite of the Sierra Nevada batholith. Cretaceous rock formed during the later period of the Mesozoic Era, characterized by the development of flowering plants and ending with the sudden extinction of the dinosaurs and many other forms of life. Pre-Cretaceous metamorphic rocks are found in localized areas.

Over the past 1.5 million years, the Tahoe Region has been altered by glacial activity, and most of the landforms surrounding the lake are a result of glaciation. During glacial activities, valley glaciers dammed the Truckee River Canyon, raising the water level of Lake Tahoe. Lakebed sediments were deposited in the bays and canyons around the lake as a result of the rising lake levels. The faulting, folding, and in some cases overturning of rock formations that has taken place during various periods of geologic activity, in combination with erosion, deposition, and subsequent cementation of rock materials that occurred during relatively quiet periods, have left a complex arrangement of geologic rock types and structures in the area. However, the extraordinary clarity of Lake Tahoe is related to the prevalence of resistant granitic bedrock in the Tahoe Basin and the unusually small drainage basin relative to the size of Lake Tahoe.

LOCAL GEOLOGY, TOPOGRAPHY, AND DRAINAGE

The Project is located near Dollar Point on a terrace roughly 400 feet above Lake Tahoe. The terrace was formed by the deposition of ancient volcanic mudflows and more recent stream and lake deposits (Saucedo 2005; Sylvester et al. 2012). Overall, the proposed Project site and Alternative A site each slope gently (2-10 percent slopes) to the north and west, steepening to the south and east at the edge of the terrace. Drainage varies between the proposed Project and Alternative A sites due to their location on the point. The Alternative A site drains to the east toward Dollar Creek and the west shoreline of Dollar Point. The proposed Project site drains to the south and east toward Lake Forest Creek and the south shoreline of Dollar Point.

SOIL PROPERTIES

The Project is located in the Tahoe Very Cobble Sandy Loam map unit, as identified by the 2007 Soil Survey of the Lake Tahoe Basin (NRCS 2007). The Tahoma soil formed in colluvium (material that has been moved downhill by gravity) weathered from volcanic rock. Typical vegetation includes mixed conifer forest overstory with an understory of greenleaf manzanita, western serviceberry, creeping snowberry. These soils are described as well drained with a surface runoff class of "low." Their coarse texture and high rock content also makes these soils resistant to compaction. Additionally, because of their low clay content, Tahoma soils have low shrink-swell potential and are considered non-expansive.

Erosion is the process by which surface soils are detached and transported by water and/or wind. Erosion has a detrimental effect on soil productivity because erosion begins with the upper horizons of a soil profile, which contain organic matter and microbial communities vital to supporting plant growth. Factors that influence the erosion potential of a soil include: vegetative cover; soil properties such as soil texture, structure, rock fragments and depth; steepness and slope length; and climatic factors such as the amount and intensity of precipitation. The NRCS soil surveys provide a rating of erosion hazard resulting from disturbance of non-road areas. The Tahoma soils are assigned an erosion hazard rating of "slight," which indicates that erosion is unlikely under ordinary conditions (NRCS 2007).

LAND CAPABILITY AND COVERAGE

Since the late 1970s, TRPA has used a land capability classification system based on the ability of areas of soil to tolerate use without resulting in environmental damage (Bailey 1974). As explained above, this system assigns LCDs based primarily on soil characteristics and slope. The LCDs reflect the amount of development a site can support without experiencing soil or water quality degradation. The LCDs range from 1 to 7, with 1 being the most environmentally sensitive and 7 being most suitable for supporting development. LCD 1b is applied to land that is influenced by surface water or high groundwater and is also referred to as SEZ. The amount of compacted or impervious surface, known as Coverage, allowed with a given parcel is limited by its LCD. TRPA manages land coverage at the parcel level.

The proposed Project and Alternative A sites each contain portions of three different parcels (Table 3.9-3). These parcels are predominately mapped as LCD 5 (which allows up to 25 percent coverage) and LCD 6 (which allows up to 30 percent land coverage); however, the Alternative A site contains approximately 6,021 sq. ft. of LCD 1b (allowing only 1 percent land coverage). On the proposed Project site, land capability has been verified for the Project development portion on two of the parcels, but no verification has been completed for the third parcel. Land capability verifications have been completed for the entirety of two of the Alternative A site parcels, while land capability on the third parcel has only been completed for the Project development area. (TRPA 2011a, TRPA 2011b, TRPA 2016b, TRPA 2019).

Table 3.9-3 Land Capability and Existing Coverage

| Land Capability District | Total Area (sq. ft.) | Base Allowable Coverage | Allowable Coverage (sq. ft.) | Existing Coverage ¹ (sq. ft.) | Available Coverage (sq. ft.) |
|--|----------------------|-------------------------|------------------------------|--|------------------------------|
| Proposed Project (APNs 093-164-036⁵, 093-160-064⁵, and 093-600-001⁴) | | | | | |
| 5 | 600,324 | 25% | 150,081 | 30,435 | 119,646 |
| 6 | 756,221 | 30% | 226,866 | 12,334 ³ | 214,532 |
| Alternative A (APNs 093-160-040⁵, 093-260-001⁶, and 093-350-010⁶) | | | | | |
| 1b | 6,021 | 1% | 60 | 0 | 60 |
| 6 | 974,344 | 30% | 292,303 | 76,455 | 215,848 |

¹ Existing coverage includes compacted soil areas on trails and impervious surfaces as shown by the 2010 TRPA LiDAR data.

² Coverage has not been verified by TRPA.

³ Includes approximately 1,831 sq. ft. of natural surface trails through the Lake Forest Creek drainage, which is currently mapped as LCD 6. It is expected that a portion of the drainage would be mapped as LCD 1b through the TRPA LCD verification process.

⁴ No existing land capability verification.

⁵ Land capability verification completed for Project portion of parcel.

⁶ Land capability verification completed for entire parcel.

Source: Prepared by Ascent Environmental in 2019

Land coverage has not been determined by TRPA for the Project parcels; however, existing land coverage for the Alternative A site was estimated using TRPA’s 2010 high resolution LiDAR data set. Coverage in this dataset includes compacted soil areas such as trails and staging areas as well as areas covered with impervious materials such as

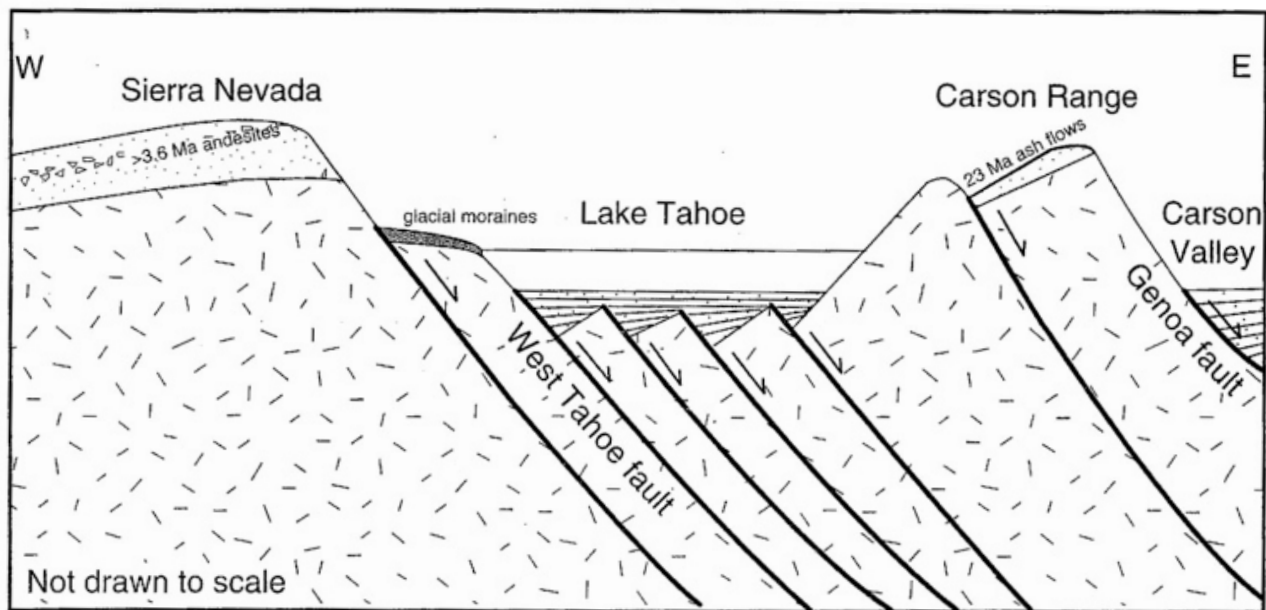
paving or roofs. Based on this data, the three proposed Project site parcels contain 30,435 sq. ft. of coverage in LCD 5 (5 percent of the LCD 5 land area) and 12,334 sq. ft. of coverage in LCD 6 (2 percent of the LCD 6 land area). Land coverage estimates for proposed Project and Alternative A parcels are shown in Table 3.9-3. The Alternative A site parcels contain approximately 76,455 sq. ft. of existing land coverage (8 percent of the parcel area), all of which is located in LCD 6.

SEISMICITY

An earthquake is classified by the amount of energy released, which traditionally has been quantified using the Richter scale. Recently, seismologists have begun using a moment magnitude (M) scale because it provides a more accurate measurement of the size of large earthquakes. For earthquakes of less than M 7.0, the moment and Richter magnitude scales are nearly identical. For earthquakes greater than M 7.0, readings on the moment magnitude scale are slightly higher than the corresponding Richter magnitude.

The intensity of seismic shaking, or strong ground motion, during an earthquake is dependent on the distance and direction from the epicenter of the earthquake, the magnitude of the earthquake, and the geologic conditions of the surrounding area. Ground shaking could potentially result in the damage or collapse of buildings and other structures. Most earthquakes occur along faults, which are fractures or geological areas of weakness, along which rocks on one side have been displaced with respect to those on the other side. Most faults are the result of repeated displacement that may have taken place suddenly and/or by slow creep (Bryant and Hart 2007: 3).

Faulting was a key element in the formation of Lake Tahoe. The Tahoe Basin lies in a graben (a trench between two faults) between the Sierra Nevada and the Carson Range (as shown in Figure 3.9-1). The outlet of the Tahoe Basin was repeatedly dammed by volcanic eruptions and glacial ice dams (Schweickert et al. 2000).



Source: Schweickert et al. 2000

Figure 3.9-1 Model of Lake Tahoe Basin Half-Graben

The nature of the seismic hazard in the Tahoe Region was not appreciated for many years because the active faults within the Tahoe Basin are covered by the lake itself. The portions of the Tahoe Basin faults that show the greatest activity and strain are underwater, with activity diminishing as they move on-shore (Seitz and Kent 2004). Additionally, recent work analyzing sediment cores from the bottom of Lake Tahoe show that local earthquakes trigger landslides in the Lake (Seitz 2013). It is likely that many of the landslides evident with the Tahoe Basin (including the ancient, catastrophic, 5-mile wide landslide that formed McKinney Bay) were triggered by earthquakes (Dingler 2007).

The State Mining and Geology Board defines an active fault as one that has had surface displacement within the last 11,000 years (California Geological Survey [CGS] 2008). Three active faults occur within the Tahoe Basin: The West Tahoe-Dollar Point Fault (the longest at 45 kilometers long); the Stateline-North Tahoe Fault; and the Incline Village Fault (Brothers et al. 2009). Recent studies indicate that all three of these faults have experienced large rupture events within recent geologic time (Dingler 2007; Seitz and Kent 2004). Of the three faults, the West Tahoe-Dollar Point Fault has the fastest slip rate (the rate at which two faults pass each other or build tension) and its most recent confirmed rupture event was approximately 4,000 years ago (Brothers et al. 2009). The high slip rate, the height of scarps (earthquake generated breaks in topography) and the length of time since the last event indicate that the West Tahoe-Dollar Point Fault could generate an earthquake with a magnitude greater than 7.0 (Brothers et al. 2009). The height of scarps along the Incline Village fault show that this fault has experienced several magnitude 7.0 events and that it last ruptured approximately 575 years ago. (Schweickert et al. 2000; Seitz et al. 2005)

The main West Tahoe-Dollar Point Fault line passes approximately 1,800 feet east of the Alternative A site and approximately 1 mile east of the proposed Project site. A smaller finger of the fault passes between the two sites, approximately 500 feet east of the proposed Project.

East of the Tahoe Basin, the Carson Range fault system, one of the Region's largest, runs for 60 miles along the east face of the Carson Range from Reno to Markleeville. The probability of at least one magnitude ≥ 6.0 event occurring in the Reno-Carson City urban corridor over a 50-year period is estimated to be between 34 percent and 98 percent, the probability of a magnitude ≥ 6.6 event between 9 percent and 64 percent, and the probability of a magnitude ≥ 7.0 event between 4 percent and 50 percent. These probabilities are relatively high and are similar to many parts of California (dePolo et al. 1997: 3).

The nearest mapped Alquist-Piolo Earthquake Fault Zone is located in the Minden-Gardnerville, NV area, approximately 30 miles south-east of both the proposed Project and Alternative A sites (CGS 2010).

3.9.3 Environmental Impacts and Mitigation Measures

METHODS AND ASSUMPTIONS

The evaluation of coverage changes and potential geologic and soil impacts is based on a review of documents pertaining to the Project study area, including CGS and U.S. Geological Survey (USGS) technical guides, the NRCS 2007 Soil Survey, TRPA regulations and planning documents, environmental impact reports, background reports prepared for plans and projects in the vicinity, and published and unpublished geologic literature. The information obtained from these sources was reviewed and summarized to understand existing conditions and to identify potential environmental effects, based on the thresholds of significance. In determining the level of significance, the analysis assumes that the proposed Project and Alternative A would comply with relevant, federal, state, and local laws, regulations, and ordinances.

SIGNIFICANCE CRITERIA

CEQA Criteria

In accordance with Appendix G of the State CEQA Guidelines, a geology and soils impact would be considered significant if implementation of the Project would do any of the following:

- ▶ directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving rupture of a known earthquake fault, strong seismic shaking, or seismic-related ground failure; or
- ▶ result in substantial soil erosion or the loss of topsoil.

TRPA Criteria

The "Land" criteria from the TRPA Initial Environmental Checklist were used to develop significance criteria to evaluate the geology, soils, land capability, and coverage impacts of the Project. Impacts would be significant if the Project would:

- ▶ substantially increase exposure of people or property earthquake hazards;
- ▶ change the topography or ground relief features in a manner inconsistent with the natural surrounding conditions, substantially change undisturbed soil or native geologic substructures, or increase wind or water erosion of soils; or
- ▶ compact or cover soil with impervious surfaces beyond that limits allowed by the land capability districts.

ENVIRONMENTAL EFFECTS OF THE PROJECT

Impact 3.9-1: Potential for Substantial Erosion, Loss of Topsoil, or Modifications to Natural Topography

Implementation of the proposed Project and Alternative A could expose soils to adverse effects from soil erosion during construction activities related to construction of the Schilling Lodge. Grading and earthmoving activities would be required to obtain grading and excavation permits and approvals in accordance with TRPA Code Chapter 33 and the Placer County grading ordinance. Adherence to existing, standard regulations and permit requirements would maintain the potential for substantial soil erosion or loss of topsoil for the proposed Project and Alternative A at a **less-than-significant** level.

Proposed Project

The proposed Project would require grading and excavation to prepare the site for new construction. The proposed Project site is currently undeveloped but has previously been disturbed through use as a snow-storage area and during forest fuel reduction activities. Implementation of the proposed Project would result in 152,243 sq. ft. (3.50 acres) of ground disturbance, including clearing, excavating, filling, grading, and temporary stockpiling of soils, all of which could expose soils to wind and water erosion, particularly during a storm event. Rain of sufficient intensity and duration could dislodge soil particles, generate runoff, and cause localized erosion. Soil disturbance during the summer months could result in loss of topsoil because of wind erosion and runoff from thunderstorm events. No construction or ground-disturbing activities are proposed at the Highlands Community Center as part of the proposed Project.

As discussed above, the NRCS erosion hazard rating for the soils of the proposed Project site is "slight." This means that substantial erosion would be unlikely under normal conditions. In addition, the BMPs required by TRPA and Lahontan RWQCB as conditions of construction permits would control soil erosion and protect adjacent SEZ areas. One condition in the Lahontan RWQCB NPDES permit is a SWPPP, prepared by a qualified SWPPP practitioner. This plan would detail the BMPs that would be implemented to minimize erosion, reduce sediment transport, and control stormwater flow from the proposed Project site and includes a site-specific construction site monitoring and reporting plan. In addition, the SWPPP would address grading and slope stabilization methods, as well as construction waste disposal methods. Typical temporary BMPs include properly installed silt fences, sediment logs, detention basins, and inlet protection. Temporary BMPs would be installed before beginning site grading and would be maintained throughout construction until permanent erosion control features are functioning. The required elements of a SWPPP are discussed in greater detail under "National Pollutant Discharge Elimination System Permits" and Impact 3.10-1 in Section 3.10, "Hydrology and Water Quality." After construction is completed, temporarily disturbed areas would be stabilized and revegetated in accordance with TRPA Code Section 61.4.

Because the proposed Project site is nearly level, the Project would not require alteration of topography that is inconsistent with the surrounding area. However, excavation would be required for utilities, drainage systems, and the Schilling Lodge basement and foundation. The TRPA Code prohibits excavation deeper than 5 feet below ground surface or where there exists a reasonable possibility of interference or interception of a water table except in limited

circumstances (see Section 33.3.6.B of the TRPA Code). Where an exception is allowed, and where excavation beyond 5 feet is necessary, TRPA requires the following:

1. A Soils/Hydrologic report prepared by a qualified professional that demonstrates that no interference or interception of groundwater will occur.
2. The excavation must be designed such that no damage occurs to mature trees except where tree removal is allowed.
3. Excavation material is disposed of properly and the area's natural topography is maintained.

Because construction of the Schilling Lodge requires excavation deeper than 5 feet, a Soils/Hydrology report would be prepared demonstrating that excavation would not intercept or interfere with groundwater (in the manner described in Section 33.3.6.A of the TRPA Code) and submitted to TRPA for review and approval before TRPA permit acknowledgement. If the Soils/Hydrology report indicates that interception of the seasonal groundwater table cannot be avoided, TRPA may approve an exception provided that the circumstances authorizing such an exemption are present (see Section 33.3.6.A.2). In addition, the Project would be required to meet the other conditions of TRPA Code Section 33.3.6.B, including protection of mature trees, proper disposal of excavated material, and maintenance of groundwater flows to avoid adverse impacts to SEZ vegetation and to prevent any groundwater or subsurface water flow from leaving the proposed Project site as surface flow.

Because (1) the soils of the proposed Project site are not highly susceptible to erosion, (2) temporary and permanent BMPs would be installed as requirements of the necessary TRPA and LRWQCB permits, (3) excavation greater than 5 feet in depth would take place in accordance with the TRPA Code, and (4) areas of temporary disturbance would be revegetated and regraded to match the natural topography of the site, the potential for the proposed Project to increase erosion or adversely affect the topography of the area would be **less than significant**.

Alternative A

Alternative A would result in 125,811 sq. ft. (2.89 acres) of ground disturbance, including demolition of the Existing Lodge, clearing, excavating, filling, grading, and temporary stockpiling of soils, all of which could expose soils to wind and water erosion, particularly during a storm event. Of the total disturbance area, approximately 28,700 sq. ft. is currently developed (the site of the Highlands Parks and Community Center) and the entire Alternative A site has experienced moderate to high levels of disturbance. The topography of the Alternative A site is gentle, and the Project would not alter the topography of the site in a way that is inconsistent with the surrounding area. As discussed above, the NRCS erosion hazard rating for the Alternative A site is "slight," indicating that substantial erosion is unlikely. Alternative A would be subject to the same permit conditions and TRPA, Lahontan RWQCB, and Placer County regulations as described for the proposed Project. For the same reasons discussed in the proposed Project analysis, Alternative A would have a **less-than-significant** impact relative to erosion and topography.

Mitigation Measures

No mitigation is required for this impact.

Impact 3.9-2: Risk to People and Structures from Strong Seismic Shaking

The proposed Project and Alternative A sites are located in a seismically active area and could experience strong shaking in the event of a nearby earthquake. However, the rehabilitation and reuse of the historic Schilling residence would comply with the seismic design and retrofit requirements of the CBC. These measures would reduce the potential threat to life and property from strong seismic ground shaking resulting from implementation of the proposed Project and Alternative A to a **less-than-significant** level.

Proposed Project

The proposed Project site abuts the West Tahoe-Dollar Point Fault which is capable of generating earthquakes with a magnitude greater than 7.0 (Brothers et al. 2009). The Schilling Lodge would be located in a seismically active area which could experience strong ground shaking in the event of a large earthquake. The Schilling residence was constructed in the 1930s before modern earthquake-resistant building provisions were included in building codes and

could be damaged by an earthquake. However, rehabilitation and reuse of the historic building would be completed in accordance with the CBC. This would require a full seismic analysis and design in accordance with CBC Chapter 34, Existing Structures, Section 3417, "Earthquake Evaluation and Design for Retrofit of Existing Buildings." As required by state law, the Schilling Lodge would be designed to resist stresses produced by lateral forces caused by earthquakes and would meet the minimum seismic safety and structural design requirements described in Chapter 16 of the California Building Standards Code. As described in Impact 3.4-1, in Section 3.4, "Archeological, Historical, and Tribal Cultural Resources," the proposed reuse of the structure and associated retrofit requirements would comply with the preservation measures recommended by the State Historical Preservation Officer (SHPO). No changes are proposed at the Highlands Community Center as part of the proposed Project that would increase the risk to people and structures from strong seismic shaking. For these reasons, the potential seismic threats to life and property from the implementation of the proposed Project would be a **less-than-significant** impact.

Alternative A

Alternative A is located adjacent to the West Tahoe-Dollar Point Fault and the site could experience strong ground shaking the event of an earthquake. As discussed above in relation to the proposed Project, Alternative A would include the reconstruction and expansion of the historic Schilling residence, which was constructed before the adoption of modern seismic building codes. However, rehabilitation and reuse of the historic building would be completed in accordance with the CBC so that the Schilling Lodge would resist stresses produced by lateral forces caused by earthquakes and would meet the minimum seismic safety and structural design requirements described in Chapter 16 of the California Building Standards Code. These measures would reduce the potential seismic threats to life and property from the implementation of Alternative A to a **less-than-significant** level.

Mitigation Measures

No mitigation is required for this impact.

Impact 3.9-3: Potential for Compaction or Land Coverage Beyond TRPA Limits

The proposed Project and Alternative A would result in an increase in land coverage relative to existing conditions. However, the proposed Project and Alternative A would be required to comply with TRPA land coverage regulations as a condition of permit approval. Therefore, the implementation of the proposed Project and Alternative A would have a **less-than-significant** impact relative to compaction and land coverage

Proposed Project

Implementation of the proposed Project would create new land coverage in accordance with TRPA land coverage regulations within LCD 6. Table 3.9-4 provides a summary of preliminary coverage increases for lodge site associated with the proposed Project. The preliminary coverage numbers would be refined as the design process progresses and before TRPA permit acknowledgement. The information presented here, although preliminary, is an accurate representation of the nature of the land coverage changes associated with the proposed Project and is sufficient for environmental impact analysis. No changes in the coverage are proposed at the Highlands Community Center. Based on preliminary design, the proposed Project would create an additional 81,593 sq. ft. of land coverage.

Table 3.9-4 Project Proposed Land Coverage

| Proposed Land Coverage | Coverage (sq. ft.) |
|-------------------------|--------------------|
| Asphalt | 61,379 |
| Building Footprint | 5,457 |
| Walkways/Concrete | 13,178 |
| Miscellaneous Utilities | 1,579 |
| Total | 81,593 |

Source: Prepared by Ogilvy Consulting in 2019

As shown in Table 3.9-3, the available land coverage within the three proposed Project parcels is approximately 334,178 sq. ft. for LCDs 5 and 6 and the total allowable land coverage is 376,947 sq. ft. Existing coverage within LCD 5 is created by natural surface trails and is estimated at 30,435 sq. ft. (approximately 5 percent of the LCD 5 land area). All land coverage associated with the proposed Project would be placed in LCD 6. Currently, coverage within LCD 6 on the proposed Project site is created by natural surface trails and is estimated at 12,334 sq. ft. (approximately 2 percent of the LCD 6 land area). Implementation of the proposed Project would bring the total LCD 6 coverage to 93,927 sq. ft. (approximately 12 percent), which is well within TRPA coverage limits. The proposed Project site parcels can accommodate an additional 119,646 sq. ft. of additional land coverage in LCD 5. In addition to these coverage changes, the proposed Project would retain the existing 76,455 sq. ft. associated with the Highlands Community Center. The total coverage for the proposed Project, including existing coverage on the proposed Project site, new coverage associated with the Schilling Lodge, and retaining the Highlands Community Center, would be 200,817 sq. ft., within the TRPA coverage limits.

As described above, the proposed Project would result in an increase in land coverage relative to existing conditions. Because the Project would comply with TRPA land coverage regulations, implementation of the proposed Project would have a **less-than-significant** impact relative to compaction and land coverage.

Alternative A

Alternative A would create new land coverage in accordance with TRPA land coverage regulations within LCD 6. Table 3.9-5 provides a summary of preliminary coverage increases for Alternative A. Based on preliminary design, this alternative would create an additional 67,619 sq. ft. of land coverage.

Table 3.9-5 Alternative A Proposed Land Coverage

| Proposed Land Coverage | Coverage (sq. ft.) |
|-------------------------|--------------------|
| Asphalt | 49,446 |
| Building Footprint | 5,457 |
| Walkways/Concrete | 11,128 |
| Miscellaneous Utilities | 1,588 |
| Total | 67,619 |

Source: Prepared by Ogilvy Consulting in 2019

As shown in Table 3.9-3, the available land coverage within the three Alternative A parcels is approximately 215,908 sq. ft. for LCDs 1b and 6. All land coverage associated with Alternative A would be placed in LCD 6. The Existing Lodge and the natural surface trail network create the existing coverage on Alternative A parcels, all of which is located in LCD 6. Existing coverage is estimated at 76,455 sq. ft. (approximately 8 percent of the LCD 6 land area). Implementation of Alternative A would bring the total LCD 6 coverage to 144,074 sq. ft. (approximately 15 percent), which is well within TRPA coverage limits.

As described above, the Project would result in an increase in land coverage relative to existing conditions. Because the Project would comply with TRPA land coverage regulation, implementation of Alternative A would have a **less-than-significant** impact relative to compaction and land coverage.

Mitigation Measures

No mitigation is required for this impact.

CUMULATIVE IMPACTS

Cumulative impacts to soil compaction and land capability are considered in the geographic context of the Lake Tahoe Basin. Impacts related to seismic and other geologic hazards (Impact 3.9-2) are localized in nature; they do not accumulate to cause broader environmental consequences and cumulative impacts would not occur. Therefore, these issues are not discussed further.

The proposed Project, Alternative A, and many of the cumulative projects would create additional land coverage within the cumulative analysis area. However, all projects within the Tahoe Basin would be required to comply with TRPA land coverage regulations. In cases where excess coverage is permitted (such as within Town Centers or for linear public facilities, public health and safety facilities, or water quality control facilities), all coverage exceeding the base allowable would be purchased and transferred from within hydrologically connected areas or retired from sensitive lands. In addition, all land coverage within LCD 1b must be mitigated at a ratio of 1.5 acres of restoration for every 1 acre of disturbance (TRPA Code Section 30.5.3).

The proposed Project, Alternative A, and the cumulative projects would result in grading and excavation, and soil disturbances that could cause erosion. However, all construction projects in the Tahoe Region must meet requirements and regulations of the TRPA, Lahontan RWQCB, Placer County, and federal, other state, and local agencies. The TRPA Code restricts grading, excavation, and alteration of natural topography (TRPA Code Chapter 33). In addition, all construction projects located in California with greater than one acre of disturbance are required, by Lahontan RWQCB, to submit an NPDES permit which includes the preparation of a SWPPP that includes site-specific construction site monitoring and reporting. Project SWPPPs are required to describe the site, construction activities, proposed erosion and sediment controls, means of waste disposal, maintenance requirements for temporary BMPs, and management controls unrelated to stormwater. Temporary BMPs to prevent erosion and protect water quality would be required during all site development activities, must be consistent with TRPA requirements, and would be required to ensure that runoff quality meets or surpasses TRPA, state, and federal water quality objectives and discharge limits.

The robust regulatory requirements of TRPA and other federal, state, and local agencies ensure that the proposed Project, Alternative A, and the cumulative projects would meet land coverage limitations and would implement erosion and sediment controls such that site preparation and construction of individual projects would not create grading or excavation that conflicts with TRPA policies or contribute to a significant increase in soil erosion. Cumulative impacts are less than significant. Therefore, the contribution by the proposed Project or Alternative A related to geology, soils, land capability, and coverage **would not be cumulatively considerable**.

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