12.0
GEOLOGY AND SOILS

12.0 GEOLOGY AND SOILS

This section considers and evaluates the potential impacts of the proposed project on geology and soils. Soil conditions on the site are described in terms of suitability and constraints. Seismic hazards and topographic conditions of the project site are evaluated, and the project is evaluated against applicable Placer County General Plan and Martis Valley Community Plan policies. Mitigation measures are identified that would adequately address the impact.

12.1 EXISTING SETTING

12.1.1 REGIONAL GEOLOGY

The project site is located in the northern Sierra Nevada physiographic province and near the western margin of the Basin and Range physiographic province. The Sierra Nevada range was formed by large intrusions of molten granitic rock during Mesozoic time. Subsequent faulting and volcanic activity during Tertiary time raised the mountain range to its present position. The Basin and Range was formed by numerous north–south-trending normal faults that formed the mountains and valleys of most of Nevada. Most of the displacement on these faults occurred during Tertiary time, although earthquake activity continues to the present in much of the Basin and Range, as well as in the Sierras.

The project site is located within a complex of Pliocene and Pleistocene andesite and latite volcanic rock that separates the Truckee Basin from the Lake Tahoe Basin to the south. The Truckee Basin is a fault-controlled intermountain basin also underlain by Upper Tertiary age volcanic rocks. Numerous volcanic vents are located in the area, such as Bald Mountain and Mt. Pluto. The Lake Tahoe Basin is a graben formed by faults along the easterly and westerly borders of Lake Tahoe.

Repeated Pleistocene age glaciations occurred in the higher ranges west of the site that resulted in glacial outwash, debris flows, and flood materials being deposited in the Truckee and Lake Tahoe Basins. Recent unconsolidated deposits (Quaternary age alluvium) are located along present-day drainage channels as the result of stream outwash carried down from the surrounding mountain streams and the Truckee River (Marvin E. Davis & Associates 2008).

12.1.2 LOCAL GEOLOGY AND TOPOGRAPHY

The Northstar resort covers areas on Lookout Mountain and Mt. Pluto at the south end of the Martis Valley in Placer County. The proposed improvements are located in Sections 6 & 7, Township 16 North, Range 17 East, Mt. Diablo Base and Meridian.

SITE GEOLOGY

The geologic units are described below and are based on a review of geologic mapping:

- **Qg** – Pleistocene and Holocene undivided glacial till deposits. Includes Tioga and Tahoe age deposits as well as pre-Tahoe and possibly younger (Holocene) glacial deposits.
- **Pva** – Unnamed Pliocene andesite and basaltic andesite flows. Light to dark gray, fine-grained porphyritic, massive to locally flow-banded andesite and basaltic andesite flows.

- **Pia** – Unnamed Pliocene andesitic dikes and intrusive. Flow-banded to massive, fine- to coarse-grained hornblende andesite dikes and altered intrusive andesite and andesite breccias in vent areas.

- **Mva** – Unnamed Miocene undivided andesitic and dacitic lahars, flows, breccias, and volcaniclastic sediments. Undivided andesite, trachyandesite, basaltic andesite and dacite lahars, flows, breccias, and volcaniclastic sediments; local basalt flows. May include rocks of Pliocene age. Locally included rhyolite tuff.

- **Mvaf** – Unnamed Miocene andesite and dacite flows. Massive to platy andesite, includes hornblende- and pyroxene-andesite flows and dacite flows. Locally includes andesite and dacite domes; may be Pliocene age. May locally include trachybasalt and basalt flows. The condition of these units varies between locations (fresh or moderately weathered).

Surface Conditions of Proposed NMMP Project-Level Components

The site conditions at each of the proposed improvements are described below.

- **C Lift and Associated Improvements** – The proposed lift would follow northeast-sloping terrain with a total relief of approximately 1,000 feet. On average, the slope gradient of the proposed alignment ranges from 12 percent to 34 percent. Both the upper and lower terminal locations are underlain by Mva with portions of the alignment crossing Mvaf. The proposed top terminal location is on a large talus slope consisting of loosely piled angular cobbles and boulders. The alignment area drains via overland flow. No springs or seeps were observed near the top terminal area.

- **J Lift and Associated Improvements** – The average topographic slope gradient along the alignment ranges from 8 percent along the lower alignment to 28 percent past the Ritz-Carlton hotel area. The alignment would have an approximate relief of 1,500 feet. The upper terminal and the upper 1,400 feet of the proposed alignment are underlain by Pva. The bottom terminal would be constructed over Qg. The remainder of the alignment is generally underlain by Mva and Mvaf. The lower terminal would be located near the south end of the Village North Condominiums. Several pines are leaning (some J-hooked), an indication that the slope has moved slightly. A majority of the alignment is heavily vegetated with pine and fir trees. Portions of the surface are hummocky. The alignment drains via overland flow. No springs or seeps were observed near the top terminal area. In the vicinity of the Ritz-Carlton hotel area, the lift would be located on the western edge of the 900 road, an area generally devoid of vegetation. The topsoil consists of silty sand with gravel and cobbles, and scattered boulders. No springs or seeps were observed. The Dollar Point fault crosses the proposed alignment approximately 3,200 feet from the lower terminal.

- **V Lift and Associated Improvements and Backside Warming Hut** – The terrain of the proposed alignment ranges from 20 percent near the upper terminal to 44 percent along the remainder of the alignment. The alignment and both terminals would be underlain by Pva. The top terminal would be located atop a small knoll. The area just north of the proposed terminal consists of a steep talus slope and is sparsely vegetated with pines and other low bushes. The alignment would then follow a northeast-trending ridge line to the bottom terminal, located in an area adjacent to a tributary to Martis Creek that includes a riparian/wetland area. This area is considered to be an environmentally sensitive area due

to the presence of meadow and wetland vegetation. The proposed Backside Warming Hut would be located in similar conditions near the bottom terminal.

- **W Lift and Associated Improvements** – The proposed alignment would generally follow a ridgeline with a slope gradient ranging from 21 percent to 44 percent with an approximate relief of 1,300 feet. The entire alignment would be underlain by Pva. Due to access constraints, the site conditions in the proposed upper terminal area were not field studied. However, it is likely that, based on site geology, the conditions should be similar to those of the V lift. A Quaternary age landslide deposit (scree slope) adjacent and southeast of the ridgeline of the alignment starts about 450 feet downslope of the area proposed for the top terminal, ending about halfway down the alignment in a spring area. The bottom terminal would be in a wide area that slopes toward a creek in a wet meadow. The soil in the area is soft and moist. The meadow is covered by low grasses and shrubs directly upslope from the creek and is lined with willows and other riparian vegetation. Several small drainage channels were observed in the vicinity.

- **Z Lift and Associated Improvements** – The proposed alignment would be underlain by Pva and would have a total relief of approximately 525 feet with an average slope gradient of 32 percent. Some of the trees in the proposed area of the top terminal are J-hooking, an indication of shallow slope movement. The proposed location of the upper terminal is underlain by glacial outwash deposits several feet in thickness, as indicated by a road cut adjacent to the site. This material is not well indurated, and erosion control will be necessary. The deposit is generally silty sand with gravel and numerous cobbles. The area proposed for the bottom terminal is located on an old logging road that forms a bench above a gentle slope toward a creek and is heavily vegetated with pines and firs with scattered boulders. The surface soil in this area consists of soft weathered volcanic soil. There are no obvious outcrops or bedrock.

- **Skiers Bridges 1, 2, 3, and 5** – These areas would have very similar conditions to the bottoms of the Backside lift, S lift, V lift, and W lift. The proposed bridges would cross over drainages that may experience some flooding during certain periods of the year.

- **Skier Bridge 4** – Conditions in this area are similar to the Village Express and Big Springs Gondola. Skier Bridge 4 would overlie a transition zone between Qg and Mva. It appears that the bridge would cross a drainage that may experience some flooding during certain periods of the year.

- **Existing Summit Deck and Grille Improvements** – The area of the proposed Summit Deck and Grille expansion is underlain by Pia in an area that is relatively flat at an elevation of approximately 8,600 feet. The area was cleared and graded to accommodate the upper terminals and related infrastructure.

Subsurface Conditions

Native soils encountered in the project area generally consist of medium dense to very dense silty sand, clayey sand, and sandy silt with varying amounts of gravel, cobbles, and boulders overlying andesitic bedrock. Fines are predominantly non-plastic, but are slightly plastic in the vicinity of the upper Big Springs Gondola terminal. Bedrock has been encountered at various depths across the project area, ranging from 2 feet in the Lookout Mountain area to greater than 44 feet in the area of the Ritz-Carlton. The underlying bedrock is generally moderately weathered and moderately strong, becoming slightly weathered to fresh and strong at depth.

The interception of groundwater during project construction would be more likely in the lower terminal locations that are located within subdrainages and the area of the Ritz-Carlton. Groundwater and soil moisture conditions may vary depending on precipitation, land use, and/or runoff conditions not apparent at the time of the field investigation. Seasonal (winter and early spring) saturation of near-surface soils overlying shallow bedrock at isolated areas along the project alignments is anticipated..

Detailed descriptions of the subsurface conditions encountered during the field investigations are associated with the geotechnical study prepared for the proposed project. Following are descriptions of field exploration locations that were performed in relatively close proximity to the proposed locations of the Warming Hut, the Summit Deck and Grille expansion, and the J lift alignment.

- Warming Hut – A test pit was excavated as part of a previous investigation near the lower terminal of the existing S lift located approximately 200 feet west of the proposed location of the Warming Hut. This test pit log indicates that soils consist of silty sand with gravel to a depth of approximately 8.5 feet below the ground surface overlying sandy lean clay to the maximum depth of exploration of 10 feet. No groundwater encounter was observed during the exploration, and soil moisture conditions were slightly moist to moist.

- Summit Deck and Grille Expansion – Test Pit TP-4 was excavated near the proposed site of the restaurant expansion just north of the existing structure as part of a previous investigation. The test pit log indicates that site soils in the test pit consisted of about 0.5 feet of silty clayey sand with gravel overlying silty sand with gravel and cobbles. Boulders were encountered at 2.5 feet below the ground surface. The excavation was terminated at a depth of 9 feet due to the presence of large boulders.

- J Lift – Three field exploration locations were conducted near the bottom, middle, and top of the proposed J lift alignment as part of a previous investigation. Based on the test pit log near the proposed location of the lower terminal, soils consist of silty sand with gravel to a depth of 17 feet overlying andesite rock with varied weathering to the maximum depth of exploration of 22 feet. A boring drilled approximately 450 feet east of the proposed location of the middle portion of the J lift alignment indicates that soils consist of silty sand to clayey sand to a depth of 17 feet overlying highly weathered andesite rock to the maximum depth of the exploration of 24 feet. Soils underlying the proposed site of the upper terminal consisted of silty sand with gravel to silty gravel to the maximum depth of exploration of 8 feet. No groundwater was observed within any of the explorations.

12.1.3 SEISMICITY AND FAULTING

The Modified Mercalli Intensity (MMI) scale has a range of values from I to XII, with the lowest value representing the least intense amount of damage resulting from a seismic event. On the other hand, a seismic event generating a MMI value of XII represents total damage to man-made improvements and the ability to see seismic waves migrate over the ground surface. **Table 12-1** outlines the generalized relationship between the Richter Magnitude and Modified Mercalli Scales.

TABLE 12-1
MODIFIED MERCALLI INTENSITY SCALE FOR EARTHQUAKES

Richter Magnitude Scale $M_s = 1+2/3\ I_o$	Modified Mercalli Scale	Effects of Intensity
1.67 (0.1–0.9)	I	Not felt except by a very few under especially favorable circumstances.
2.33 (1.0–2.9)	II	Felt by only a few persons at rest, especially on upper floors of buildings. Delicately suspended objects may swing.
3.0 (3.0–3.9)	III	Felt quite noticeably indoors, especially on upper floors of buildings, but many people do not recognize it as an earthquake. Standing cars may rock slightly. Vibration like passing a truck. Duration estimated.
3.67 (4.0–4.5)	IV	During the day felt indoors by many, outdoors by few. At night some awakened. Dishes, windows, doors disturbed; walls make creaking sound. Sensation like heavy truck striking building. Standing cars rocked noticeably.
4.33 (4.6–4.9)	V	Felt by nearly everyone, many awakened. Some dishes, windows, and so on broken; cracked plaster in a few places; unstable objects overturned. Disturbances of trees, poles, and other tall objects sometimes noticed. Pendulum clocks may stop.
5.0 (5.0–5.5)	VI	Felt by all, many frightened and run outdoors. Some heavy furniture moved; a few instances of fallen plaster and damaged chimneys. Damage slight.
5.67 (5.6–6.4)	VII	Everyone runs outdoors. Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable in poorly built or badly designed structures; some chimneys broken. Noticed by persons driving cars.
6.33 (6.5–6.9)	VIII	Damage slight in specially designed structures; considerable in ordinary substantial buildings with partial collapse; great in poorly built structures. Panel walls thrown out of frame structures. Fall of chimneys, factory stacks, columns, monument, and walls. Heavy furniture overturned. Sand and mud ejected in small amounts. Changes in well water. Persons driving in cars disturbed.
7.0 (7.0–7.4)	IX	Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb; damage great in substantial buildings, with partial collapse. Buildings shifted off foundations. Ground cracked conspicuously. Underground pipes broken.
7.67 (7.5–7.9)	X	Some well-built structures destroyed; most masonry and frame structures destroyed with foundations; ground badly cracked. Railway lines bent. Landslides considerable from river banks and steep slopes. Shifted sand and mud. Water splashed, slopped over banks.
8.33 (8.0–8.4)	XI	Few, if any (masonry) structures remain standing. Bridges destroyed. Broad fissures in ground. Underground pipelines completely out of service. Earth slumps and land slips in soft ground. Rails bent greatly.
9.0 (8.5+)	XII	Total damage. Waves seen on ground. Lines of sight and level distorted. Objects thrown into the air.

M_s = Surface wave magnitude.
I_o = Epicentral intensity

The project site is located in a potentially active seismic area. It may be subjected to ground motions from relatively large earthquakes (moment magnitude 6.6 or larger) in eastern California and central or western Nevada. Seismicity is dominated by activity along the Sierra Nevada-Great Basin Boundary Zone (SNGBZ), a sub-province within the Walker Lane Belt. The SNGBZ is a

seismic belt formed by a nearly continuous north- to northwest-trending zone of earthquakes extending from the Garlock fault in Southern California along the eastern Sierra to the Lake Almanor region in Northern California. Earthquakes in the zone tend to concentrate along the east flank of the Sierra Nevada. The zone trends in a northwest direction, very near the project site. This seismicity zone coincides with the Mohawk Valley fault zone and has been recently referred to as the Tahoe-Medicine Lake Trough. The SNGBZ is located about 15 miles east of the project site.

The referenced geologic map shows three faults trending northwest-southeast through the eastern side of Northstar. The nearest fault in this fault zone trends northwest-southeast through both the proposed J lift and C lift alignments. These faults are associated with the Dollar Point Fault Zone. The referenced preliminary study conducted by URS indicates that these faults are younger than originally believed. URS has named this the West Tahoe-Dollar Point Fault Zone and has listed the fault zone as Holocene-aged. A second fault system has also been identified by URS in the project vicinity and is listed as the Truckee Fault Zone. This fault zone is listed as a late Quaternary age fault zone. The most southerly fault trace in this fault zone is located approximately 1,000 feet northwest of the proposed Z lift.

The criteria for evaluation of Quaternary earthquake faults has been formulated by the State of California Alquist-Priolo Earthquake Fault Zoning Act, which defines active faults as those with evidence of displacement within the past 10,000 years (Holocene time). Those faults with evidence of displacement during Pleistocene time (10,000 to 2,000,000 years before present) are classified as potentially active. The late Quaternary period does not necessarily exclude the Holocene epoch, therefore, based on the referenced fault map, the faults in the vicinity of the project may be considered active (Marvin E. Davis & Associates 2008).

12.1.4 GEOLOGIC CONDITIONS AND HAZARDS

Bedrock and Rock Outcrops

The presence of bedrock, rock outcrops, boulders, or soil is important for many reasons, including pad stability and ease of construction to include rippability. Some observed conditions can provide a clue as to rippability of the bedrock, such as whether or not the material is fresh to weathered or fractured to massive.

Slope Instability

Slope instability includes landslides, debris flows, and rockfalls. In addition to actually seeing slide areas, other site characteristics give clues as to the potential for instability. These would include leaning trees, especially with a J-hook, and the presence of springs and clay layers in outcrops or along slopes.

Avalanche Potential

Avalanche refers to downslope movement of a mass of snow and/or ice and other materials such as rocks, soil, and organic matter (trees). The combination of steep slopes, abundant snow, cold weather, snowpack, and an impetus to cause movement could create an avalanching episode. Avalanche hazards are most directly related to topographical conditions. Steep slopes are the main factor in the creation of a potential avalanche hazard. Others factors include exposure, snowpack composition, wind, temperature, rate of snowfall, and other interacting factors (Placer

County 2004). In addition, avalanches typically occur on northerly- or easterly-facing slopes (Marvin E. Davis & Associates 2008).

As movement becomes much more rapid because of lower cohesion, higher water content, and steeper slopes, the avalanche can grade from debris slides to debris flows and from debris slides to debris avalanche. Debris slides and, less commonly, debris avalanches may have slump blocks at their heads. In debris slides, the moving mass breaks up into smaller and smaller particles as it advances toward the foot of the slope, and the movement is usually slow. In a debris avalanche, progressive failure is more rapid, and the whole mass, either because it is quite wet or because it is on a steep slope, liquefies at least in part and flows and tumbles downhill. These movements are common along a stream channel and may advance well beyond the foot of the slope. Debris avalanches generally take place within and along long narrow drainageways and often leave a serrated or V-shaped scarp tapering uphill at the head in contrast to the horseshoe-shaped scarp of a slump.

The Northstar area has a typically maritime climate with generally deep snowpacks, warm temperatures, and strong south/southwest storm winds. These conditions tend to result in a well-bonded snowpack during most winter months. In addition, there have been no records of avalanches occurring in the area. However, direct action avalanches from new snow accumulating on older snowpacks may occur on steep slopes. More specifically, the minimum steepness required for a typical avalanche occurrence is 29 degrees or greater. At higher elevations within Northstar, some slopes are over 30 degrees (Placer County 2004). These slopes are generally densely forested, except for the ski runs, indicating that they are not active avalanche areas (Marvin E. Davis & Associates 2008).

Liquefaction Potential

Hazards associated with soil liquefaction are not expected to be present at the site. Liquefaction is a loss of soil shear strength that can occur during a seismic event as cyclic shear stresses cause excessive pore water pressure between the soil grains. This phenomenon is generally limited to unconsolidated, clean to silty sand (up to 35 percent non-plastic fines) lying below the ground water table. The higher the ground acceleration and the longer the shaking caused by a seismic event occurs, the more likely liquefaction will take place. Severe liquefaction can result in catastrophic settlements of large civil structures. Because the site area is underlain by dense granular soils and bedrock, only localized amplification of ground motion would be expected during an earthquake. Liquefaction is not considered to be a potential hazard.

The potential for seismic settlement or seismically induced differential compaction is also considered low due to the laterally consistent, coarse-grained, and medium dense to very dense granular and stiff to very stiff cohesive nature of many of the near-surface soils. For the same reasons, the potential for ground lurching, lateral spreading, or seismically induced slope instability is also considered low for this general area.

Surface Water and Groundwater

The presence or potential for surface water and groundwater can pose significant challenges to construction and/or the competency of structures over time. Surface water and groundwater levels and quantity will vary depending on precipitation, runoff, and other factors. The conveyance, detention, and infiltration of both surface water and groundwater need to be addressed during project design. Impacts to a project can include flooding, erosion, ice wedging, and safety concerns, to name a few.

Shallow groundwater may be encountered in the lower portions of the proposed J lift alignment and the proposed location of Skier Bridge 4. Shallow groundwater may also be encountered near the proposed lower terminal of the W lift due to the presence of a riparian/wetland area. It should be noted that fluctuations in the level of the groundwater and soil moisture contents may occur due to variations in precipitation and other factors. In addition, the presence of springs is prevalent in the project area (Marvin E. Davis & Associates 2008).

Volcanic Eruptions

The last known volcanic activity to occur in the Northstar area was several thousand years ago. Present-day volcanic centers are located to the north near Mount Lassen and to the south in the Long Valley/Mammoth Lakes area. Due to the distance of the project site from these volcanic centers, relatively minor volcanic ash outfall is the most likely hazard associated with volcanic eruptions.

12.1.5 MINERAL RESOURCES

California Geological Survey (CGS) (formerly California Department of Conservation, Division of Mines and Geology) (1995) mineral resource classifications for Placer County indicate the subject site and adjacent surrounding area have been classified for their mineral resource potential. The property is underlain by bedrock consisting of undifferentiated andesitic mudflows, volcanic breccias, pyroclastic deposits, and lava flows and this area has been classified in the MRZ-4 category for its mineral potential. Sites described with this classification are considered to be in "areas of no known mineral occurrences where geologic information does not rule out either the presence or absence of significant mineral resources." It must be emphasized that MRZ-4 classification does not imply there is little likelihood for the presence of mineral resources, but rather there is a lack of knowledge regarding the mineral occurrence.

12.2 REGULATORY FRAMEWORK

12.2.2 STATE

Alquist-Priolo Earthquake Fault Zoning Act

The Alquist-Priolo Earthquake Fault Zoning Act was passed in 1972 (originally enacted as the Alquist-Priolo Special Studies Zones Act and renamed in 1994) and is intended to reduce the risk to life and property from surface fault rupture during earthquakes. The main purpose of the law is to prevent the construction of buildings used for human occupancy on the surface trace of active faults. The law only addresses the hazard of surface fault rupture and is not directed toward other earthquake hazards. The Alquist-Priolo Act requires the State Geologist to establish regulatory zones known as Earthquake Fault Zones around the surface traces of active faults and to issue appropriate maps. The maps are distributed to all affected cities, counties, and state agencies for their use in planning efforts. Local agencies must regulate most development projects within the zones. Projects include all land divisions and most structures for human occupancy. There are no Earthquake Fault Zones subject to the Alquist-Priolo Earthquake Fault Zoning Act in the project area.

Seismic Hazards Mapping Act

The Seismic Hazards Mapping Act addresses nonsurface fault rupture earthquake hazards, including liquefaction and seismically induced landslides. Passed by the California Legislature in

1990, this law was codified in the California Public Resources Code as Division 2, Chapter 7.8A, and became operative in April 1991. The act resulted in a mapping program that is intended to reflect areas that have the potential for liquefaction, landslide, strong earth ground shaking, or other earthquake and geologic hazards.

California Building Code

The State of California provides minimum standards for building design through the California Building Code (CBC [California Code of Regulations, Title 24]). The CBC is based on the Uniform Building Code, which is used widely throughout the United States (generally adopted on a state-by-state or district-by-district basis), and has been modified for conditions within California. Seismic zones range from 0 to 4, with Zone 0 being the least active and Zone 4 the most active. The Martis Valley Community Plan area is located in Seismic Zone 3 (moderate seismic risk zone). All structures built in Placer County must comply with CBC requirements for this zone.

12.2.3 LOCAL

Placer County General Plan

The Placer County General Plan Policy Document was adopted by the Placer County Board of Supervisors in 1994. **Table 12-3** lists the General Plan policies that relate to geologic resources and the proposed project and provides an analysis of the project's consistency with these policies. While this Draft EIR analyzes the project's consistency with the Placer County General Plan pursuant to State CEQA Guidelines Section 15125(d), the determination of the project's consistency with this General Plan rests with the Placer County Board of Supervisors. Any environmental impacts associated with any inconsistency with General Plan policies are addressed under the impact discussions of this EIR.

TABLE 12-3
PLACER COUNTY GENERAL PLAN CONSISTENCY ANALYSIS – GEOLOGY AND SOILS

Policies	Consistency Determination	Analysis
Policy 8.A.1: The County shall require the preparation of a 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).	Consistent	A geotechnical investigation report was prepared for the proposed project by Marvin E. Davis & Associates, Inc., on June 10, 2008, and April 3, 2013. In addition, mitigation measures in this section require further geological investigation prior to approval of improvement plans for the project.
Policy 8.A.3: The County shall prohibit the placement of habitable structures or individual sewage disposal systems on or in critically expansive soils unless suitable mitigation measures are incorporated to prevent the potential risks of these conditions.	Consistent	Expansive soils generally have high clay content, making them capable of absorbing water and increasing in volume. According to the geotechnical investigation report, the soils underlying the project site are not clayey. Regardless, proposed sewage disposal systems would be required to comply with existing County standards, which include soil sampling to ensure the underlying soils are capable of supporting such systems. The project does not propose any new habitable structures.
Policy 8.A.4: The County shall ensure that areas of slope instability are adequately investigated and that any development in these areas incorporates appropriate design provisions to prevent landsliding.	Consistent	The geotechnical investigation report prepared for the proposed project addressed potential slope instability on the project site and determined that with implementation of design recommendations, the proposed improvements could be safely constructed on the site without increasing risk of slope instability.
Policy 8.A.5: In landslide hazard areas, the County shall prohibit avoidable alteration of land in a manner that could increase the hazard, including concentration of water through drainage, irrigation, or septic systems; removal of vegetative cover; and steepening of slopes and undercutting the bases of slopes.	Consistent	The geotechnical investigation report prepared for the proposed project concluded that the proposed improvements could be developed as planned, with implementation of the recommended measures contained in the report. These measures include slope ratio limitations and revegetation. In addition, the Northstar Habitat Management Plan (HMP) provides design and management practices to minimize the alteration of the site's natural topography, hydrology and vegetation and to promote soil stabilization. Mitigation measures in this section provide further requirements to ensure slope stability.
Policy 8.A.6: The County shall require the preparation of drainage plans for development in hillside areas that direct runoff and drainage away from unstable slopes.	Consistent	The project applicant has provided preliminary drainage reports that address drainage impacts (see Section 13.0, Hydrology and Water Quality). Drainage plans for the proposed improvements will be required to conform to the provisions of the County Grading Ordinance (Article 15.48 of the Placer County Code) and will be submitted with the project Improvement Plans. In addition, the recommendations provided in the geotechnical investigation report prepared for the proposed project include measures to divert drainage

Policies	Consistency Determination	Analysis
		flows away from slope faces.
Policy 8.A.9: The County shall require that the location and/or design of any new buildings, facilities, or other development in areas subject to earthquake activity minimize exposure to danger from fault rupture or creep.	Consistent with Mitigation	Active faults could be located within the proposed alignments of the J lift and C lift. Mitigation measures in this section require the preparation of a geologic investigation to confirm the location of any active faults and provide necessary setbacks and other design parameters to minimize risks of fault rupture or creep in accordance with the Alquist-Priolo Earthquake Fault Zoning Act. In addition, all proposed improvements would be designed and constructed in accordance with CBC requirements that address structural seismic safety.
Policy 8.A.10: The County shall require that new structures permitted in areas of high liquefaction potential be sited, designed, and constructed to minimize the dangers from damage due to earthquake-induced liquefaction.	Consistent	All proposed improvements would be designed and constructed in accordance with the CBC requirements that address structural seismic safety.
Policy 8.A.11: The County shall limit development in areas of steep or unstable slopes to minimize hazards caused by landslides or liquefaction.	Consistent	There are steep slopes (exceeding 29 degrees) at higher elevations within the project site such as the proposed location of the V lift. However, the proposed project does not propose any habitable structures in these locations. Further, the geotechnical investigation report prepared for the proposed project concluded that the proposed improvements could be constructed as planned with implementation of the recommendations contained in the report without risk of slope instability.
Policy 8.H.2: The County shall require new development in areas of avalanche hazard to be sited, designed, and constructed to minimize avalanche hazards.	Consistent	Steep, unforested areas of the project site could be at risk of avalanche. However, improvements proposed in these areas are limited to ski lift towers, which would be designed and constructed to withstand an avalanche.
Policy 8.H.3: The County shall not issue permits for new development in potential avalanche hazard areas (PAHA) as designated in the Placer County Avalanche Management Ordinance unless project proponents can demonstrate that such development will be safe under anticipated snow loads and conditions of an avalanche.	Consistent	Steep, unforested areas of the project site could be at risk of avalanche. However, improvements proposed in these areas are limited to ski lift towers, which would be designed and constructed to withstand an avalanche.

Martis Valley Community Plan

Table 12-4 lists the Martis Valley Community Plan policies that relate to geologic resources and the proposed project and provides an analysis of the project's consistency with these policies. While this Draft EIR analyzes the project's consistency with the Martis Valley Community Plan pursuant to State CEQA Guidelines Section 15125(d), the determination of the project's consistency with the Community Plan rests with the Placer County Board of Supervisors. Any

environmental impacts associated with inconsistency with Community Plan policies are addressed under the impact discussions of this DEIR.

TABLE 12-4
MARTIS VALLEY COMMUNITY PLAN CONSISTENCY ANALYSIS – GEOLOGY AND SOILS

Policies	Consistency Determination	Analysis
Policy 9.A.1: The County shall require the preparation of a soils or geologic investigation prior to permitting development in areas of known or suspected geological or seismic hazards (i.e., seismically induced ground shaking, landslides, liquefaction, critically expansive soils, avalanche).	Consistent with Mitigation	A geotechnical investigation report was prepared for the proposed project by Marvin E. Davis & Associates, Inc., on June 10, 2008, and April 3, 2013. In addition, mitigation measures in this section require further geological investigation prior to approval of improvement plans for the project.
Policy 9.A.3: The County shall prohibit the placement of habitable structures or individual sewage disposal systems on or in critically expansive soils unless suitable mitigation measures are incorporated to prevent the potential risks of these conditions.	Consistent	Expansive soils generally have a high clay content, making them capable of absorbing water and increasing in volume. According to the geotechnical investigation report, the soils underlying the project site are not clayey. Regardless, proposed sewage disposal systems would be required to comply with existing County standards, which include soil sampling to ensure the underlying soils are capable of supporting such systems. The project does not propose any new habitable structures.
Policy 9.A.4: The County shall ensure that areas of slope instability are adequately investigated and that any development in these areas incorporates appropriate design provisions to prevent landsliding.	Consistent	The geotechnical investigation report prepared for the proposed project addressed potential slope instability on the project site and determined that with implementation of design recommendations, the proposed improvements could be safely constructed on the site without increasing risk of slope instability.
Policy 9.A.5: In landslide hazard areas, the County shall prohibit alteration of land in a manner that could increase the hazard, including concentration of water through drainage, irrigation, or septic systems; removal of vegetative cover; and steepening of slopes and undercutting the bases of slopes.	Consistent with Mitigation	The geotechnical investigation report prepared for the proposed project concluded that the proposed improvements could be developed as planned, with implementation of the recommended measures contained in the report. These measures include slope ratio limitations and revegetation. In addition, the Northstar HMP provides design and management practices to minimize the alteration of the site's natural topography, hydrology, and vegetation and to promote soil stabilization. Mitigation measures provide further requirements to ensure slope stability.
Policy 9.A.6: The County shall require drainage plans for development in mountainous and sloping areas that direct runoff and drainage away from unstable slopes.	Consistent	The project applicant has provided preliminary drainage reports that address drainage impacts (see Section 13.0, Hydrology and Water Quality). Drainage plans for the proposed improvements will be required to conform to the provisions of the County Grading Ordinance (Article 15.48 of the Placer County Code) and will be submitted with the project Improvement Plans. In addition, the recommendations provided in the geotechnical

Policies	Consistency Determination	Analysis
		investigation report prepared for the proposed project include measures to divert drainage flows away from slope faces.
Policy 9.A.8: The County shall require that the location and/or design of any new buildings, facilities, or other development in areas subject to earthquake activity minimize exposure to danger from fault rupture or creep.	Consistent with Mitigation	Active faults could be located within the proposed alignments of the J lift and C lift. Mitigation measures in this section require the preparation of a geologic investigation to confirm the location of any active faults and provide necessary setbacks and other design parameters to minimize risks of fault rupture or creep in accordance with the Alquist-Priolo Earthquake Fault Zoning Act. In addition, all proposed improvements would be designed and constructed in accordance with CBC requirements that address structural seismic safety.
Policy 9.A.9: The County shall limit development in areas of steep (in excess of 30% or in some cases between 20 and 30%) or unstable slopes to minimize hazards caused by landslides or liquefaction and to reduce grading and disturbance to such slopes.	Consistent with Mitigation	There are steep slopes (exceeding 29 degrees) at higher elevations within the project site such as the proposed location of the V lift where project features (lift structures and trails) are proposed. The proposed project does not propose any habitable structures in these locations. Further, the geotechnical investigation report prepared for the proposed project concluded that the proposed improvements could be constructed as planned with implementation of the recommendations contained in the report without risk of slope instability. Mitigation measures identified in this section would further ensure slope stability.
Policy 9.B.2: The County shall require new development in areas of avalanche hazard to be sited, designed, and constructed to minimize avalanche hazards.	Consistent	Steep, unforested areas of the project site could be at risk of avalanche. However, improvements proposed in these areas are limited to ski lift towers, which would be designed and constructed to withstand an avalanche. In addition, Northstar would continue to manage the ski resort for avalanche hazards, such as closing of avalanche areas or removal of conditions susceptible to avalanches.
Policy 9.B.3: The County shall not issue permits for new development in potential avalanche hazard areas (PAHA) as designated in the Placer County *Avalanche Management Ordinance* unless project proponents can demonstrate that such development will be safe under anticipated snow loads and conditions of an avalanche.	Consistent	Steep, unforested areas of the project site could be at risk of avalanche. However, improvements proposed in these areas are limited to ski lift towers, which would be designed and constructed to withstand an avalanche.

Placer County Avalanche Management Program

The County's avalanche management program defines Potential Avalanche Hazard Areas (PAHAs) as those areas where the minimum probability of avalanche occurrence is greater than 1 in 100 per year or where avalanche damage has already occurred. Property owners who rent their

property to the public are required to post information, described below, in facilities located in PAHAs explaining avalanche hazards and available emergency services. The following are relevant Placer County General Plan policies related to avalanche hazards.

According to the County Avalanche Management Ordinance (Ordinance No. 4331-B), specific project-related information must include:

- Information that a structure is within a PAHA;
- A warning that avalanche control work, including the use of explosives, may be carried out and that avalanche control personnel may provide special advisories or instructions;
- A warning that authorities may attempt to contact property owners during periods of severe storm events, but that it is the responsibility of the occupants to use good judgment during such events; and
- Identification of local radio stations that provide weather information, phone numbers of the Office of Emergency Services and other local emergency offices, and available brochures about avalanches.

Placer County On-Site Sewage Ordinance (Article 8.24)

The County's On-Site Sewage Ordinance established the Placer County On-Site Sewage Manual as the guidance document for the siting, design, installation, component quality, operation, monitoring, and maintenance of on-site sewer systems in the county. The ordinance includes site evaluation requirements, requirements for land use projects including soils testing, and sewage system requirements including permitting requirements and abandonment/destruction requirements.

12.3 IMPACTS

12.3.1 STANDARDS OF SIGNIFICANCE

The impact analysis provided below is based on the following California Environmental Quality Act (CEQA) Guidelines Appendix G thresholds of significance:

1) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving
   a. Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault.
   b. Strong seismic ground shaking.
   c. Seismic-related ground failure, including liquefaction.
   d. Landslides.
2) Result in substantial soil erosion or the loss of topsoil.
3) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse.

4) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property.
5) Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater.

Impacts associated with erosion and loss of topsoil are discussed in Section 13.0, Hydrology and Water Quality, while septic system impacts are addressed in Section 14.0, Public Services.

12.3.2 METHODOLOGY

The following impact analysis is based entirely on the Geotechnical Investigation Report prepared for the proposed project by Marvin E. Davis & Associates, Inc., dated June 10, 2008, as well as Addendum 1 to this report dated August 29, 2008. Proposed grading plans for the project are located in **Appendix 3.1**.

12.3.3 IMPACTS AND MITIGATION MEASURES

IMPACT 12.1: Rupture of a Known Earthquake Fault

As described previously, the project site is located in a potentially active seismic area, and there are a number of faults in the project area. In particular, fault traces of the Dollar Point Fault Zone have been identified in the vicinity of the proposed alignments of the J lift and C lift. Although the proposed improvements at these locations do not include any structures for human occupancy, the presence of an active fault could expose employees and skiers to risk of loss, injury, or death involving fault rupture. Therefore, this impact is **potentially significant**.

MITIGATION MEASURE 12-1 Require Lift Design to Avoid Fault Hazard

The Improvement Plan submittal for either the J or C lift shall include a geologic investigation produced by a California registered civil engineer or geotechnical engineer to determine if any active faults cross the proposed lift alignments. If an active fault is identified, the geologic investigation shall establish necessary setbacks (generally 50-foot minimums) and other design parameters for proposed lift terminals as required by the Alquist-Priolo Earthquake Fault Zoning Act.

SIGNIFICANCE AFTER MITIGATION

Implementation of mitigation measure 12-1 would reduce this impact to a **less than significant** level by ensuring that, if an active fault exists within the proposed alignment of either the J lift or the C lift, these improvements are modified to comply with the setback requirements of the Alquist-Priolo Earthquake Fault Zoning Act and that associated risks to structures and public safety are minimized. Mitigation measures associated with land disturbance (e.g., biological resources, soil erosion, and water quality) identified in this Draft EIR would apply to the C lift even if its alignment is modified.

IMPACT 12.2: Hazards Associated with Seismic Ground Shaking and Seismic-Related Ground Failure

The potential for seismic activity in the project area is moderate. However, all proposed improvements would be designed and constructed in accordance with CBC requirements that address structural seismic safety. As described previously, based on the site geology, the liquefaction potential is low and is not considered to be a potential hazard. The potential for

seismic settlement or seismically induced differential compaction, ground lurching, lateral spreading, and seismically induced slope instability is also considered low due to the characteristics of the near-surface soils. Therefore, this impact would be **less than significant**.

IMPACT 12.3: Slope Instability, Soil Erosion, and Changes in Site Topography

Slope instability includes landslides, debris flows, and rockfalls. The potential for slope instability in the project area is generally considered low; however, in areas of steep slopes (greater than 29 degrees) and minimal forestation, the potential is moderate. At higher elevations within Northstar, some slopes are over 30 degrees. With the exception of the ski runs, these slopes are generally densely forested and are therefore at a low risk for slope instability. Slopes in the vicinity of the proposed location of the V lift are up to approximately 44 percent. In addition, several leaning pines (some J-hooked) were observed in the proposed location of the J lift, an indication that the slope has moved slightly (Marvin E. Davis & Associates 2008).

Construction of the proposed NMMP project- and program-level components could result in soil erosion and introduce sediments into stormwater runoff, potentially resulting in the degradation of downstream surface water quality. As identified in Section 3.0, Project Description, the project and Northstar HMP include several measures to address potential soil erosion. The reader is also referred to Section 13.0, Hydrology and Water Quality, for an analysis of water quality impacts from project construction.

However, the geotechnical investigation report prepared for the proposed project concluded that the proposed improvements could be developed as planned, with implementation of the recommended measures contained in the report. These measures include the use of engineered fill and mechanical stabilization techniques, slope ratio limitations, provision of adequate drainage, and implementation of erosion best management practices (BMPs) such as sediment retention barriers and revegetation. In addition, the Northstar Habitat Management Plan (HMP) provides design and management practices to minimize the alteration of the site's natural topography, hydrology, and vegetation; minimize soil erosion; and promote soil stabilization, which would further minimize the potential for slope instability. The reader is referred to Section 3.0, Project Description, for further discussion of the Northstar HMP and to Table 4-1 of the Northstar HMP for a full list of design and management practices and their application to each resource management zone. This impact would be **potentially significant**.

MITIGATION MEASURE 12-3a Provide Final Geotechnical Subsurface Investigation

The Improvement Plan submittal shall include a final geotechnical engineering report produced by a California registered civil engineer or geotechnical engineer for Placer County Engineering and Surveying Department (ESD) review and approval. The report shall address and make recommendations on the following:

A) Road, pavement, and parking area design (if applicable);

B) Structural foundations, including retaining wall design (if applicable);

C) Grading practices;

D) Erosion/winterization;

E) Special problems discovered on-site (i.e., groundwater, expansive/unstable soils, etc.);

F) Slope stability.

Once approved by the ESD, two copies of the final report shall be provided to the ESD and one copy to the Building Services Division for its use. It is the responsibility of the developer to provide for engineering inspection and certification that earthwork has been performed in conformity with recommendations contained in the report. If the soils report indicates the presence of critically expansive or other soils problems that, if not corrected, could lead to structural defects, a certification of completion of the requirements of the soils report will be required.

MITIGATION MEASURE 12-3b Submit Improvement Plans for Review and Approval

The applicant shall prepare and submit Improvement Plans, specifications, and cost estimates (per the requirements of Section II of the Land Development Manual [LDM] that are in effect at the time of submittal) to the Engineering and Surveying Division (ESD) for review and approval of each project phase. The plans shall show all physical improvements as required by the conditions for the project as well as pertinent topographical features both on- and off-site. All existing and proposed utilities and easements, on-site and adjacent to the project, which may be affected by planned construction, shall be shown on the plans. The applicant shall pay plan check and inspection fees with the first Improvement Plan submittal. (Note: Prior to plan approval, all applicable recording and reproduction cost shall be paid.) It is the applicant's responsibility to obtain all required agency signatures on the plans and to secure department approvals. If the Design/Site Review process and/or Development Review Committee (DRC) review is required as a condition of approval for the project, said review process shall be completed prior to submittal of Improvement Plans. Record drawings shall be prepared and signed by a California registered civil engineer at the applicant's expense and shall be submitted to the ESD in both hard copy and electronic versions in a format to be approved by the ESD prior to acceptance by the County of site improvements.

Any Building Permits associated with this project shall not be issued until, at a minimum, the Improvement Plans are approved by the Engineering and Surveying Department.

Prior to the County's final acceptance of the project's improvements, the applicant shall submit to the Engineering and Surveying Department two copies of the Record Drawings in digital format (on compact disc or other acceptable media) in accordance with the latest version of the Placer County Digital Plan and Map Standards, along with two blackline hardcopies (black print on bond paper) and two PDF copies. The digital format is to allow integration with Placer County's Geographic Information System (GIS). The final approved blackline hardcopy Record Drawings will be the official document of record.

MITIGATION MEASURE 12-3c Grading, Revegetation, and Winterization Requirements

The Improvement Plans shall show all proposed grading, drainage improvements, and vegetation and tree removal, and all work shall conform to provisions of the County Grading Ordinance (Ref. Article 15.48, Placer County Code) and Stormwater Quality Ordinance (Ref. Article 8.28, Placer County Code) that are in effect at the time of submittal. No grading, clearing, or tree disturbance (except per the current timber harvest plan) shall occur until the Improvement Plans are approved and all temporary construction fencing has been installed and inspected by a member of the Development Review Committee (DRC). All cut/fill slopes shall be at a maximum of 2:1 (horizontal: vertical) unless a soils report supports a steeper slope and the Engineering and Surveying Department (ESD) concurs with said recommendation. Fill slopes shall not exceed 1.5:1 (horizontal: vertical).

The applicant shall revegetate all disturbed areas. A winterization plan shall be provided with project Improvement Plans. It is the applicant's responsibility to ensure proper installation and maintenance of erosion control/winterization before, during, and after project construction. Soil stockpiling or borrow areas shall have proper erosion control measures applied for the duration of the construction as specified in the Improvement Plans. Provide for erosion control where roadside drainage is off of the pavement, to the satisfaction of the Engineering and Surveying Department (ESD).

The applicant shall submit to the ESD a letter of credit or cash deposit in the amount of 110 percent of an approved engineer's estimate for winterization and permanent erosion control work prior to Improvement Plan approval to guarantee protection against erosion and improper grading practices. Upon the County's acceptance of improvements, and satisfactory completion of a one-year maintenance period, unused portions of said deposit shall be refunded to the project applicant or authorized agent.

If, at any time during construction, a field review by County personnel indicates a significant deviation from the proposed grading shown on the Improvement Plans, specifically with regard to slope heights, slope ratios, erosion control, winterization, tree disturbance, and/or pad elevations and configurations, the plans shall be reviewed by the DRC/ESD for a determination of substantial conformance to the project approvals prior to any further work proceeding. Failure of the DRC/ESD to make a determination of substantial conformance may serve as grounds for the revocation/modification of the project approval by the appropriate hearing body.

MITIGATION MEASURE 12-3d Water Quality Permit Coverage

Prior to Improvement Plan approval, the applicant shall obtain a State Regional Water Quality Control Board National Pollutant Discharge Elimination System (NPDES) construction stormwater quality permit and shall provide to the Engineering and Surveying Department evidence of a state-issued Waste Discharge Identification (WDID) number or filing of a Notice of Intent and fees.

MITIGATION MEASURE 12-3e Implementation of Best Management Practices

The Improvement Plans shall show that water quality treatment facilities/best management practices (BMPs) shall be designed according to the guidance of the California Stormwater Quality Association Stormwater Best Management Practice Handbooks for Construction, for New Development/Redevelopment, and for Industrial and Commercial (or other similar source as approved by the Engineering and Surveying Department (ESD) such as the Stormwater Quality Design Manual for the Sacramento and South Placer Regions).

Construction (temporary) BMPs for the project include, but are not limited to, waterbars, hydroseeding (EC-4), silt fence (SE-1), construction fencing, wind erosion control (WE-1), stabilized construction entrance (TC-1), storm drain inlet protection (SE-10), staging areas, dripline trenches, and revegetation techniques.

MITIGATION MEASURE 12-3f Improvement Plan Measures for Water Quality Protection

The Improvement Plan submittal shall include the following requirements:

A) There shall be no grading or other disturbance of ground between October 15 of any year and May 1 of the following year, unless a Variance has been granted by the Lahontan Regional Water Quality Control Board (RWQCB) and the Placer County ESD.

B) Truck routes are to be located across existing logging roads and constructed seasonal spur roads proposed with this project.

C) Existing drainage patterns shall not be significantly modified.

D) During construction, temporary gravel, straw bale, earthen, or sandbag dikes and/or nonwoven filter fabric fence shall be used as necessary to prevent discharge of earthen materials from the site during periods of precipitation or runoff.

E) Revegetated areas shall be continually maintained in order to assure adequate growth and root development. Erosion control facilities shall be installed with a routine maintenance and inspection program to provide continued integrity of erosion control facilities.

SIGNIFICANCE AFTER MITIGATION

Implementation of the above mitigation measures, as well as with the Northstar HMP practices noted above, would ensure full and complete assessment of subsurface conditions across the site and help ensure the proposed grading and utility plan is feasible, minimize uncertainties associated with adverse conditions, address potential slope stability and soil erosion issues, and increase quality control in design of improvements, thus reducing the potential impacts related to geologic stability to **less than significant**.

IMPACT 12.4: Avalanche Hazards

The potential for the occurrence of avalanches in the project area is generally considered low; however, in areas of steep slopes (greater than 29 degrees) and minimal forestation, the potential is moderate. For example, in the vicinity of the proposed location of the V lift, steep slopes (up to approximately 44 percent) and the northerly exposure of the terrain indicate the potential for avalanches. Northstar currently manages the ski resort for hazards, including avalanche hazards, and skier safety and would either close areas of such hazards or remove conditions susceptible to avalanches. Given current operations of the ski resort, this impact would be **less than significant**.

IMPACT 12.5: Volcanic Eruption

As described previously, the last known volcanic activity to occur in the Northstar area was several thousand years ago, and due to the distance of the project site from present-day volcanic centers, it is not likely that any significant hazards would occur at the site should eruption occur. Therefore, this impact would be **less than significant**.