4.2 GEOLOGY AND EARTH RESOURCES

This section discusses the geologic, seismic, soil and land capability impacts from the Project. The Environmental Setting sub-section provides information on the physical characteristics of the project area, including geology, soils, existing land coverage, faults and history of earthquakes. The Regulatory Setting outlines the regulatory framework of the TRPA Code of Ordinances and the Washoe County Comprehensive Plan pertaining to geology, soils, land capability and land coverage. The Impact Evaluation Criteria are based on the planning guidelines established by TRPA and Washoe County and the TRPA thresholds for land coverage. Analysis of potential environmental impacts from the Project and the standard engineering practices and recommended mitigation measures are presented in the Environmental Impact and Recommended Mitigation section, followed by an analysis of cumulative impacts.

ENVIRONMENTAL SETTING

Physiography and Geology

The Lake Tahoe Basin lies in a region of complex terrain within the eastern portion of the Sierra Nevada geomorphic province. The project area is located in Crystal Bay, Nevada at the northern end of Lake Tahoe. A general overview of the project area indicates that the topography consists of near-level fill areas, as modified in the 1940's when the site was developed to the current configuration of structures and land coverage. Mountain slope landforms are located to the west and east of the project area. The 16.26-acre project area is located on the Kings Beach USGS 7.5-minute quadrangle map within an approximate elevation range of 6,400 to 6,540 feet above mean sea level (msl), in Township 16 North, Range 18 East, Section 30. Figure 2-3 reflects the existing configuration of structures and land coverage of the project area.

The Lake Tahoe Basin was formed two to three million years ago by geologic block faulting between the northwest-trending Sierra Nevada to the west and the north-trending Carson Ridge to the east. Lake Tahoe occupies the depression, or graben, between the convergences of these two up-faulted mountain ranges. During the past two million years glaciers played an active roll in shaping the Sierra Nevada Mountains and Lake Tahoe. Alpine glaciers extended below the current lake level along the west shoreline and Emerald Bay. Glaciers carved the large U-shaped valleys that display typical glacial features such as polished rock, lateral moraines and glacial lakes or tarns (Lumos and Associates 2008). The northern end of the Lake Tahoe Basin consists of lakebed deposits, glacial outwash, and glacial moraines, bounded by high peaks composed of granite and metamorphic rocks. There are two main types of geology in the Tahoe Basin, igneous intrusive rocks (typically granodiorite) and igneous extrusive rocks (typically andesitic lahar). Small amounts of metamorphic rock occur in the Spooner Summit and Desolation Wilderness areas (NRCS 2007).

The Nevada Bureau of Mines and Geology (George J. Saucedo) mapped the surface geology of the project area in 2005. Mapping indicates that granodiorite and granite from the Cretaceous period (Kgr) underlie the project area. These deposits are part of the unnamed granitic rock of the Sierra Nevada Batholith. In the geotechnical investigations Lumos and Associates (2008) states that glacial deposits cover the project area.

Faults and Seismicity

The Lake Tahoe Basin is located in a seismically active region, as evidenced by the features and historical data published in the *Natural Hazards of the Lake Tahoe Basin* (Cooper, Clark and Associates 1974). The primary north-south fault zone that separates the eastern edge of the Sierra Nevada from the parallel fault block mountains of Nevada and Utah is located about six miles east of the Lake Tahoe Basin. Lawson (1912) observed that this Sierra Nevada frontal fault experienced 44 feet of vertical ground displacement during an earthquake some time within the last 200 years.

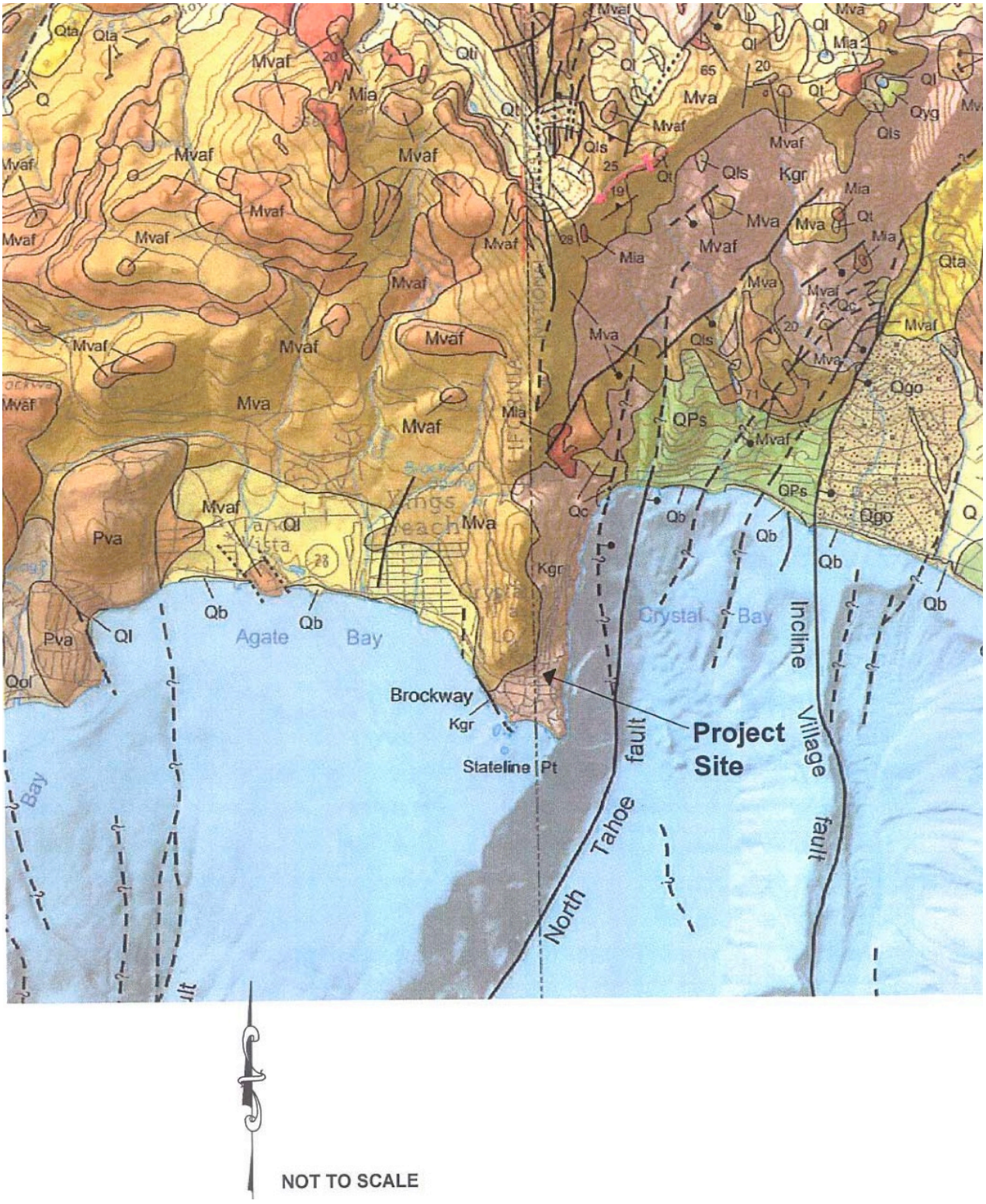
A catalog search of the United States Geological Survey (USGS) National Earthquake Information Center revealed no additional earthquakes greater than 5.0 magnitudes within the project area, Tahoe Basin, or Reno/Carson City basins (latitude 38.6 to 39.3 and longitude –120.1 to –119). Approximately 518 minor earthquakes of less than 5.0 magnitude and six major earthquakes of magnitude 5.0 or greater have occurred since 1974 (http://neic.usgs.gov. Accessed on 9/9/2009).

The Lake Tahoe Basin is classified as Zone III (major) on the State of California's Earthquake Epicenters, Faults, and Intensity Zone Map. This is the highest intensity zone, with a probable maximum earthquake intensity of IX or X on the Modified Mercalli Scale, detailed in Table 4.2-1 (Burnett 1973). The Uniform Building Code's (UBC) Seismic Zone Map of the United States places Washoe County, including the project area, within Seismic Hazard Zone 3 corresponding to an area that may experience damage due to earthquakes having moderate intensities of V or more on Modified Mercalli Scale (Washoe County 2006).

The potential for seismic activity relates to the proximity of faults, active and inactive. Active faults are those faults that have been active within the last 10,000 years (Holocene period) and inactive faults are those faults that have no evidence of activity within the last 10,000 years. Figure 4.2-1 illustrates known faults in the vicinity of the project area (solid lines are known locations and dashed lines are inferred locations). Crystal Bay is located within the Sierra Nevada-Great Basin seismic belt and at least two major earthquakes with magnitude 6.0 have occurred historically within 30 miles of the project area (DePolo and DePolo 1999). Geotechnical field studies and published maps provide no evidence of Holocene faulting, in the project area. However, the inactive North Tahoe Fault (Saucedo 2005) runs approximately 2000 feet east of the project area and beneath Lake Tahoe. Although inactive, the North Tahoe Fault is estimated to be capable of generating an earthquake of magnitude 7.0 (Jennings 1994).

Seismic events of magnitude 5 or greater have not occurred within a close enough vicinity of the project area in recent history (200 years) to cause damage to structures and facilities. However, faults near the project area, particularly the surface trace Genoa Fault, are capable of producing earthquakes with a maximum moment magnitude of 6.9. The Genoa Fault is the largest active fault in the project vicinity and has reported activity within the last 500 years. The likelihood of a magnitude 6+ event along the Genoa fault within the next 50 years is very high although portions of this fault are over 22 miles from the project area, a high magnitude event could cause cracking and leaks in infrastructure as a result of ground shaking or other earthquake-related activity (California Department of Conservation 1998).

Figure 4.2-1 Fault Map



Source: Kleinfelder, 2007

Geologic Hazards

Earthquakes and their associated effects are the primary geologic hazards associated with the Project (Lumos and Associates 2008). Common effects of earthquakes that could occur in the project area are ground shaking and surface rupture/ground displacement along a fault.

Earthquakes present direct and indirect hazards, also termed primary and secondary hazards, both of which can occur locally or at locations distant from the earthquake source. Direct, local earthquake hazards include damage caused by fault displacements either by ground surface rupture or gradual fault creep. The damage caused by ground shaking is also a direct effect that can occur locally or at distant locations. Indirect hazards presented by earthquakes include liquefaction of soil and earthquake-induced landslides, both of which are triggered by ground shaking. The portions of the project area that are located on or near steep terrain could also be subject to slope instability (land sliding) hazards. Distribution roads, structures, pipelines, utilities lines and embankments could be subject to this hazard. Analysis of these hazards is based on an understanding of the potential for any or all of these events to occur in the project area.

Fault Rupture and Creep

No evidence of active faulting was found in the field or on published fault maps that would indicate faulting on the project area and the potential for surface rupture at or near these faults is inferred to be low (Lumos and Associates 2008).

Ground Shaking

The severity of ground shaking due to an earthquake is determined by several factors including the size of the earthquake, fault rupture characteristics, and proximity of the earthquake to the site of interest. Additionally, the type of soil or bedrock beneath the site will determine the strength of ground shaking.

Ground shaking is described by two methods: ground acceleration as a fraction of the acceleration of gravity (g) or the Modified Mercalli scale, which is a more descriptive method involving 12 levels of intensity denoted by Roman numerals. The lower degrees of the Modified Mercalli scale generally deal with the manner in which the earthquake is felt by people. The higher numbers of the scale are based on observed structural damage. Modified Mercalli intensities range from I (shaking that is not felt) to XII (total damage). The project area is mapped as having a probable maximum earthquake intensity of IX or X on the Modified Mercalli scale (Lumos and Associates 2008). Intensity IX involves violent ground shaking and heavy damage. The effects of Intensity IX are described as "considerable damage to designed structures; well designed frame structures thrown out of plumb; great in substantial buildings, with partial collapse; underground pipes may be broken". Damage under Intensity X is even greater, with "some well built wooden structures destroyed; most masonry and frame structures destroyed with foundations; ground badly cracked" (Burnett 1973).

Ground shaking intensities for the project area are estimated based on activity of the Genoa Fault using a maximum credible earthquake with a moment magnitude of 6.9 (Clark et al 1984). Peak ground acceleration (PGA) has been calculated by the USGS at various grid points in California and Nevada and published on the USGS website (2002). The probability of PGA exceedance is

Table 4.2-1

Modified Mercalli Intensity Scale

Rating	Description of Damage or Human Perception
I.	Not felt except by a very few under especially favorable circumstances.
II.	Felt only by a few persons at rest, especially on upper floors of buildings. Delicately suspended object may swing.
III.	Felt quite noticeably indoors, especially on upper floors of buildings, but many people do not recognize it as an earthquake. Standing motorcars may rock slightly. Vibration like passing of truck. Duration estimated.
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 motorcars rocked noticeably.
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 notices. Pendulum clocks may stop.
VI.	Felt by all, many frightened and run outdoors. Some heavy furniture moved; a few instances of fallen plaster and damaged chimneys. Damage slight.
VII.	Everybody 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.
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, monuments, walls. Heavy furniture overturned. Sand and mud ejected in small amounts. Changes in well water. Persons driving cars disturbed.
IX.	Damage considerable in specially designed structures; well designed frame structures thrown out of plumb; great in substantial buildings, with partial collapse. Buildings shifted off foundations. Ground cracked conspicuously. Underground pipes broken.
X.	Some well built wooden structures destroyed; most masonry and frame structures destroyed with foundations; ground badly cracked. Rails bent. Landslides considerable from river banks and steep slopes. Shifted sand and mud. Water splashed, slopped over banks.
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.
XII.	Damage total. Waves seen on ground surface. Lines of sight and level distorted. Objects thrown into the air.

RICHTER MAGNITUDE	INTENSITY (Maximum expected Modified Mercalli)
3.0 – 3.9	II -III
4.0 – 4.9	IV - V
5.0 – 5.9	VI - VII
6.0 – 6.9	VII - VIII
7.0 – 7.9	IX – X
8.0 – 8.9	XI - XII

Source: Burnett 1973; U.S. Geological Survey 1974

typically modeled over a period of 50 years. For example, a 10% probability of exceedance in 50 years indicates that there is a 10% chance that the region will experience or exceed its PGA within the next 50 years. The USGS 2002 website states that for the region the ground motion corresponding to a 10% probability of exceedance in 50 years is .34g and the ground motion corresponding to a 2% probability of exceedance in 50 years is .59g (Lumos and Associates 2008). This level of PGA, indicating the severity of the area earthquake hazards, is considered moderate (Gasch and Associates 2008).

Lumos and Associates mapped maximum considered earthquake spectral response acceleration at short periods in accordance with 2006 International Building Code (IBC) design for Site Class C (IBC Table 1615.1.1) and recommends a PGA of 0.39g be used for the Project design (International Code Council 2008).

Liquefaction

Liquefaction occurs in water-saturated sediments that are shaken by moderate to large earthquakes. The liquefied soil loses shear strength when subjected to cyclic loading and may become unstable and fail, causing damage to all types of structures. Liquefaction was responsible for much of the damage during the 1906 San Francisco earthquake and the 1989 Loma Prieta earthquake. Liquefaction hazard analysis involves understanding the potential for ground shaking combined with the physical properties and conditions of the soil. In order for liquefaction to occur, two criteria must be met. First, there must be an opportunity for earthquake-induced ground shaking to occur, and second, the soil must be susceptible to liquefaction.

As stated in the Geotechnical Investigation Report prepared by Lumos and Associates (2008), groundwater was not encountered and the sands encountered were dense to very dense during field exploration. Investigations of existing soil conditions of the project area determined the potential for liquefaction to be negligible.

Earthquake-Induced Landslides and Avalanches

Landslides and debris flows triggered by earthquake ground shaking have historically been the cause for a great deal of property damage and loss of life. Areas most susceptible to earthquake-induced landslides are generally on steep slopes or adjacent to existing landslide deposits. Both landslide and debris flows are hazards in the Tahoe Planning Area of Washoe County (Washoe County 1994).

The project area is outside the impact area of the Crystal Bay avalanche path and is determined to be in a low hazard area (Penniman, 1993). Likelihood of avalanche activity damaging structures on the site is very low because the Crystal Bay Avalanche Path is 0.75 miles from the project area. Lumos and Associates mapped no landslides or debris flows during geotechnical evaluations (2008).

Soils

Soils in the Lake Tahoe Region are mapped by the United States Department of Agriculture's (USDA) Natural Resource Conservation Service (NRCS) and are described in the *Soil Survey of the Tahoe Basin Area, California and Nevada* (USDA 2007). Lake Tahoe Basin soils are complex and diverse. Variability in relief, vegetative cover, and climate are major factors influencing the region's soil diversity. Great differences in soil properties can occur within short distances. Some soils are seasonally wet or

subject to flooding, some are willow to bedrock and some are too unstable to be used as a foundation for buildings or roads. A high water table makes a soil poorly suited to basements or underground installations.

Lumos and Associates completed the Soils and Hydrologic Scoping report in August 2008. The Soils and Hydrologic report is attached in Appendix I along with revisions that were provided in February 2009. Based on the NRCS Soil Survey (2007) in concert with soil samples collected in the project area by Lumos Engineering (2008), there are two primary soil series in the project area, Cagwin and Cassenai, which are described below:

- Cagwin-Rock Outcrop (15 to 30% Slope) – These soils have a parent material consisting of colluvium over grus derived grandodiorite. The surface runoff is medium and shrink/swell potential is low. Permeability can be very slow, while the drainage class is excessive. The available water holding capacity is 2.1 inches. The erosion hazard is high. Cagwin soil series consist of loamy coarse sand underlain by coarse sand that overlies weathered granitic rock.

- Cassenai (5 to 15% and 15 to 30% Slope) – These soils have a parent material of colluvium derived from granodiorite and consist of gravelly loamy coarse sand. The surface runoff is medium and the shrink/well potential is low. Permeability is moderately rapid, while the drainage class is excessively drained. The available water holding capacity is 4.4 inches.

Subsurface Conditions

The Geotechnical Investigation (Lumos and Associates 2008) is attached as Appendix N. Within the project area, six test pits were excavated to a maximum depth of 12 feet below ground surface (bgs) and nine borings were advanced to a maximum of 55 feet bgs. Subsurface materials were continuously logged and visually classified in accordance with the Unified Soil Classification System (USCS). Borings to 55 feet bgs found no evidence of groundwater. Groundwater is discussed in Section 4.3, Hydrology and Water Quality.

Land Classification System and Existing Land Coverage

The TRPA has established a land capability system based upon the Bailey Land Classification System methodology. Land capability is "the level of use an area can tolerate without sustaining permanent (environmental) damage through erosion or other causes" (Bailey 1974). Land capability classification delineates the amount of impermeable development coverage (e.g. base allowable land coverage) that may exist within a land capability district (LCD). Land Capability Districts were derived by analyzing the land capability according to the frequency and magnitude of hazards that could be encountered and by considering the type and intensity of uses suitable for each class. Limits to land-surface modifications for each LCD, expressed as a percentage of area permitted to be used as impervious coverage, integrate LCDs and land use suitability (TRPA 2000).

Land Coverage is defined in Chapter 2 of TRPA Code of Ordinances as a man-made structure, improvement or covering, that prevents normal precipitation from directly reaching the surface of the land underlying the structure, improvement or covering. Hard coverage typically describes structures, improvements or coverings that inhibit more than 75% of precipitation from directly reaching the soil or inhibits the growth of vegetation included in TRPA's most current approved species list. Soft coverage describes compacted areas without structures, improvements or coverings.

Table 4.2-2 displays runoff potential, disturbance hazards, and base percent allowable coverage for each LCD. Lands in districts 4 through 7 are considered suitable for development. LCDs 1 to 3 are more

sensitive to development, with LCD 1 being the most environmentally fragile and sensitive to development. LCD 1b, also known as Stream Environment Zone or SEZ, is assigned whenever land is influenced by a stream or high groundwater.

Table 4.2-2

Bailey System Basis of Capability for Lake Tahoe Basin Lands

Land Capability District	Tolerance for Use	Slope	Runoff Potential	Runoff Potential	Disturbance Hazards	Base Allowable Coverage
7	Greatest	0-5%	Slight	Low to moderately low	Low hazard lands	30%
6		0-16%	Slight	Low to moderately low	Low hazard lands	30%
5		0-16%	Slight	Moderately high to high	Low hazard lands	25%
4		9-30%	Moderate	Low to moderately low	Moderate hazard lands	20%
3		9-30%	Moderate	Moderately high to high	Moderate hazard lands	5%
2		30-50%	High	Low to moderately low	High hazard lands	1%
1a	Least	30+	High	Moderately high to high	High hazard lands	1%
1b			Poor natural drainage		High hazard lands	1%
1c			Fragile flora and fauna		High hazard lands	1%

Source: Land Capability Classification of the Lake Tahoe Basin, California – Nevada, Bailey 1974

The Land Capability Verifications (LCV) were completed by TRPA Land Capability Staff and a verification letter was issued in September 2009. The LCVs and verification letter are provided in Appendix D along with land capability maps. The project area is mapped as LCD 4, 2, and 1a. The existing land coverage in the 16.26-acre project area is 399,884 square feet (56.4 percent of total project area), composed of 77,076 square feet of LCD 1a coverage and 322,808 square feet of LCD 4 coverage. Table 4.2-3 presents the existing project area and TRPA verified land coverage according to LCD. Base allowable land coverage for the project area is 73,998 square feet. Presently, the project area exceeds the TRPA base allowable coverage by 325,886 square feet. Excess land coverage is the difference between the Existing Verified Land Coverage and the TRPA Allowable Base Coverage.

Table 4.2-3

Land Capability and Existing Land Coverage Determinations

Land Capability District (LCD)	LCD Percent Impervious Surface	Gross Project Area	Project Area Within TRPA Parcels	Existing Verified Land Coverage within Parcels	Project Area within Public ROW	Existing Verified Coverage within ROW	Total Existing Verified Coverage	TRPA Allowable Base Coverage* (excludes ROW)	TRPA Project Coverage Allowed On Site**
1a	1%	221,548	206,306	70,229	15,242	6,847	77,076	2,063	132
2	1%	63,111	63,111	0	0	0	0	631	0
4	20%	423,779	356,521	266,136	67,258	56,672	322,808	71,304	13,472
Totals		708,438	625,938	336,365	82,500	63,519	399,884	73,998	87,602

Source: TRPA land capability verifications, Boulder Bay Project Coverage Calculations Table September 1, 2009, and Hauge Brueck Associates 2009

Note:

* TRPA Code Section 20.3.D(2)(a)(ii) outlines calculations for allowable and maximum base coverage. TRPA Code Section 20.3.D(1)(b) excludes land beneath right-of-ways from inclusion in the project area or the calculation of base allowable coverage.

** Includes TRPA allowable base coverage for areas that are currently public ROW, but will be abandoned for Project.

Maximum allowable land coverage for the portion of the project area in the North Stateline Community Plan (NSCP) is 50 percent. Maximum allowable coverage for commercial facilities within community plans is defined as the base allowable coverage plus transferred coverage by the TRPA Code of Ordinances, Chapter 20. Existing land coverage in the project area is 56.4 percent, which is greater than the allowable land coverage for project areas within the NSCP. However, because the project proposes to reduce land coverage, no transferred coverage is necessary for the Project.

REGULATORY SETTING

TRPA, Nevada Department of Environmental Protection (NDEP) and Washoe County enforce regulations for the protection of soils and earth resources of the project area. The following sub-sections discuss the regulatory framework pertaining to the Project.

Tahoe Regional Planning Agency

Chapter 2 of the TRPA Code of Ordinances defines land coverage. Land coverage standards are set forth in Chapter 20 of the TRPA Code of Ordinances and apply land capability classes to allowable land coverage. Section 20.3 of the Code outlines the process for determining base land coverage as defined by these land capability districts. Section 20.5 of the Code outlines the regulations and requirements for mitigating excess land coverage. Section 20.5.C outlines the regulations and requirements for the relocation of existing land coverage on the same parcel or project area. Removed and relocated coverage must be restored pursuant to Subsection 20.4.C. Best Management Practice requirements, natural hazard standards, and design standards are presented in Code of Ordinance Chapters 25, 28 and 30, respectively.

TRPA Community Enhancement Program and North Stateline Community Plan

The majority of the project area, 12.2 acres, is located within the NSCP. The goals, policies and action programs of the NSCP are applicable to these portions of the project area. The remainder of the project area is governed by the Sierra Park Settlement Agreement dated June 22, 1981, as amended, and plan area statement (PAS) 034. Figure 4.2-2 depicts the project area boundary, the NSCP boundary, and a comparison of the land coverage associated with existing conditions and Alternative C.

The NSCP sets forth policy NSCP.10.4 pertaining to land coverage:

NSCP.10.4 Utilize an incentive system containing tradeoffs between land coverage and other units of use and environmental threshold-related and other community improvements recommended by the Plan. Make incentive system available to both new and existing land uses.

Projects in the NSCP must comply with the TRPA land capability coefficients set forth in Chapter 20 of the TRPA Code of Ordinances, but community plans permit greater amounts of land coverage on parcels or project areas within the plan area. With transfers, a maximum of 50 percent coverage is permitted on developed parcels within the NSCP area.

The NSCP land coverage reduction target is to restore and revegetate 12,000 square feet of existing hard and soft land coverage within the plan area. The Project has a land coverage reduction target within the NSCP of up to 68,317 square feet. As a condition of approval, the NSCP requires excess coverage mitigation consistent with Section 20.5, TRPA Code of Ordinances.

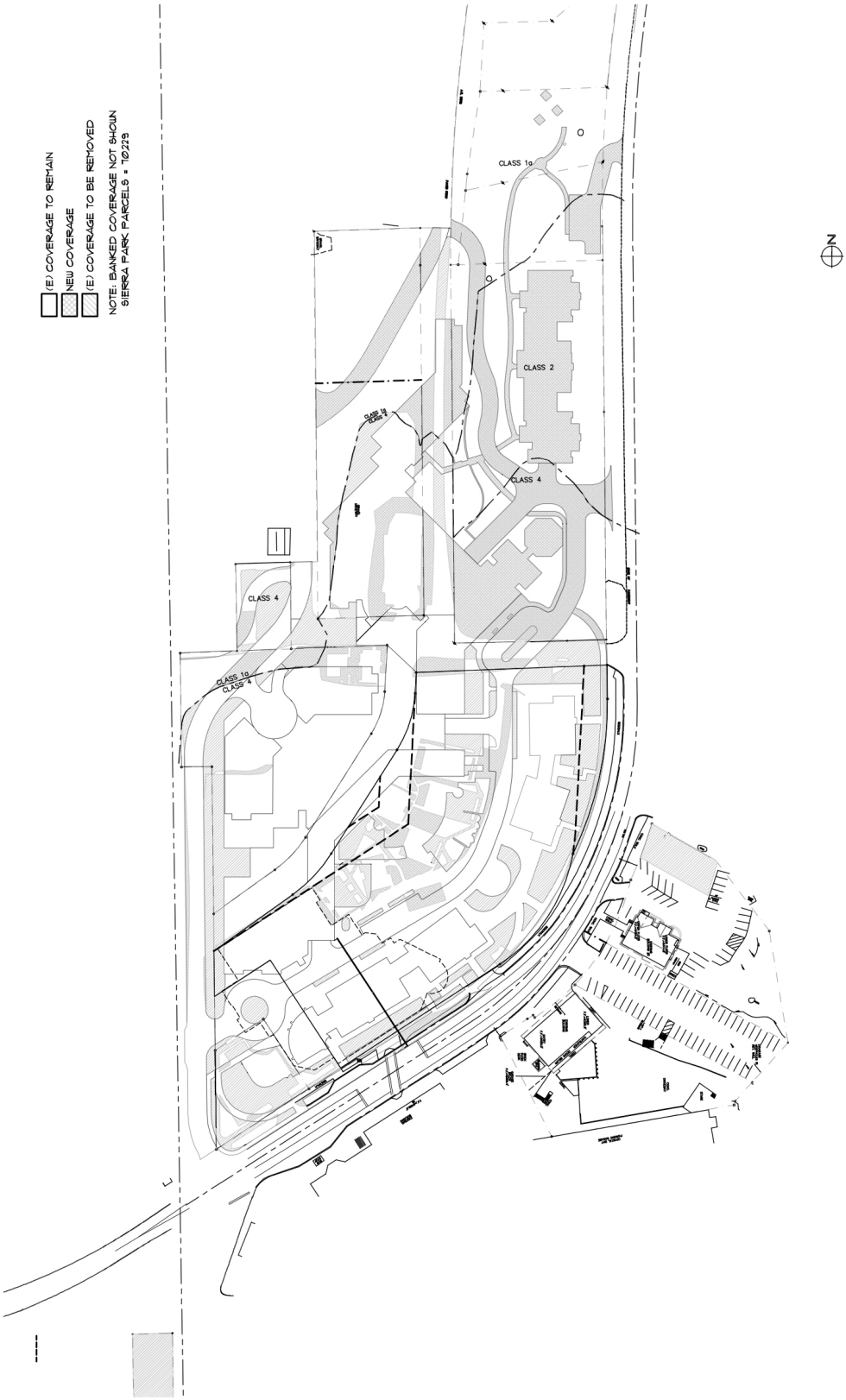
The NSCP also has the community plan target of restoring and revegetating 1.6 acres of existing disturbed lands at the Tahoe Mariner site. The Tahoe Mariner site is part of the project area and the Project proposes to preserve and manage up to 4.78 acres of open space and 1.27 acres as a public park in fulfillment of the Sierra Park Settlement agreement.

The Project is a participant in the TRPA CEP, as stated in the February 4, 2008 *Resolution 2008 Exhibit 6 memorandum* that outlines the CEP requirements as they apply to the Project. TRPA requires that Boulder Bay, LLC specify the percentage of land coverage reduction proposed for the overall Project. An increase in density and height should result in an overall reduction in land coverage. The CEP requires a land coverage reduction of at least 5 percent. Alternative C proposes an overall land coverage reduction target of 15.8 percent.

TRPA Grading Requirements

There are grading standards set forth in Chapters 20 and 64 of the TRPA Code of Ordinances. Limitations include no excavation, filling, or clearing of vegetation or other disturbance of the soil between October 15 and May 1 of each year, unless approval is granted by TRPA. Grading and construction schedules are established in Chapter 62 of the Code of Ordinances. A grading plan is required by TRPA prior to project approval and project construction.

Figure 4.2-2. Existing and Proposed Land Coverage within the Project Area and NSCP



Nevada Bureau of Mines and Geology

The Nevada Bureau of Mines and Geology (NBMG) is a research and public service unit of the University of Nevada and is the state geological survey. The NBMG is not a regulatory entity. NBMG scientists conduct research and publish reports on mineral resources, engineering geology, environmental geology, hydrogeology, and geologic mapping. NBMG cooperates with numerous state and federal agencies in conducting research and in providing geologic and resource information. Earthquake fault zones are established by the NBMG to regulate development near active faults to mitigate the hazards of surface rupture.

Nevada Department of Environmental Protection

In Nevada the NDEP manages the promulgated regulations of the Environmental Protection Agency (EPA). The EPA requires the permitting of storm water generated pollutions under the National Pollutant Discharge Elimination System (NPDES). An operator must obtain a General Permit under the NPDES Storm water Programs for all construction activities that cause ground disturbance of one-acres of greater pursuant to these federal regulations. The General Permit issued by NDEP requires the implementation of best management practices (BMPs) to reduce pollutant loads and to control and contain erosion onsite. A Storm Water Pollution Prevention Plan (SWPPP) must be prepared that addresses water pollution control during construction activities such as clearing, grading and excavating.

Washoe County

The Washoe County Department of Building and Safety enforces nationally recognized codes and ordinances adopted by the Board of County Commissioners to assure that buildings are safe by providing plan checks and inspection services for construction. The current codes include:

- 2006 International Building Code;
- 2006 International Residential Code;
- 2006 International Existing Building code;
- 2006 International Energy Conservation Code;
- 2006 Uniform Plumbing Code;
- 2006 Uniform Mechanical Code; and
- 2005 National Electric Code.

Amendments by the Washoe County Building Department to the above codes were updated on March 10, 2008 and are outlined in Chapter 100 of the Washoe County Codes.

The Conservation Element and the Tahoe Area Plan of the Washoe County Comprehensive Plan (1994) outline the constraints on development from soils, erosion hazards, building limitations, topography, earthquake hazards, landslides and debris flows and avalanche hazards. The Tahoe Area Plan is intended to serve as a guide for the Board of County Commissioners, the Washoe County Planning Commission and the community on matters of growth and development within the Tahoe planning area. The Washoe County Policies and Action Program that are applicable to geologic and earth resources for the project area include: C.2.1; C.2.3; C.2.9; T.2.1.3; T.2.4 and T.2.6.

EVALUATION CRITERIA WITH POINTS OF SIGNIFICANCE

Based on the TRPA Code of Ordinances and Washoe County Building Codes, a project impact is considered significant if conditions presented in Table 4.2-4 are met or exceeded.

Table 4.2-4

Evaluation Criteria with Point of Significance – Geology and Earth Resources

Evaluation Criteria*	As Measured by	Point of Significance	Justification
GEO-1. Will the Project result in compaction or covering of the soil beyond the limits allowed by TRPA land capability classifications?	TRPA base allowable coverage TRPA maximum land coverage for commercial facilities within community plans	Greater than 0 percent exceedance of TRPA coverage allowances per land capability district	TRPA Initial Environmental Checklist (1a); TRPA Code of Ordinances Chapter 2 and 20
GEO-2. Will Project facilities be subject to ground rupture due to location near a surface trace of an active fault or expose people or property to geologic hazards such as earthquakes, landslides, avalanches, mudslides, ground failure, or similar hazards?	Soil/rock risk potential Structural and geotechnical design and construction not in conformance with requirements of applicable building codes Location of facilities within an active fault zone	Ground shaking rating of moderate to high for the project area Construction not in conformance with requirements of applicable building codes and geotechnical practices Any portion of facilities within an active fault zone	TRPA Initial Environmental Checklist (1g); TRPA Code of Ordinances, Chapter 28; International Building Code as amended locally (Washoe County); Earthquake fault zones established by the Nevada Bureau of Mines and Geology to regulate development near active faults to mitigate the hazards of surface rupture
GEO-3. Will construction or operation of the Project cause erosion, loss of topsoil, changes in topography, undisturbed soil or native geologic substructures, or unstable soil conditions from excavation, grading or filling?	Construction activities not in compliance with requirements of the TRPA Code of Ordinances	Change in topographic features of the project area inconsistent with the surrounding conditions Changes in undisturbed soil or native geologic substructures in excess of 5 feet	TRPA Initial Environmental Checklist (1b, 1c, 1d, 1e); TRPA Code of Ordinances Chapter 64 and Chapter 20; TRPA 208 Plan; Washoe County Comprehensive Plan – Tahoe Area Plan

Source: Hauge Brueck Associates 2009

Notes:

* TRPA Initial Environmental Checklist item 1f (Changes in deposition or erosion of beach sand, or changes in siltation, deposition or erosion, including natural littoral processes, which may modify the channel of a river or stream or the bed of a lake?) is not applicable to the project.

ENVIRONMENTAL IMPACTS AND RECOMMENDED MITIGATION

The following impact analyses are based on review of the Geotechnical Investigation Report for Boulder Bay (Lumos and Associates 2008), Revised Soils/Hydrologic Scoping Report for Boulder Bay Resort (Lumos and Associates 2009), TRPA land capability verifications, and regional geologic and seismic maps and publications.

IMPACT: GEO-1: Will the Project result in compaction or covering of the soil beyond the limits allowed by TRPA land capability classifications?

The project area was originally developed in the late 1940's and prior to adoption of the TRPA Regional Plan. The project area, including the existing Washoe County public ROWs that are proposed for abandonment, is 708,438 square feet or 16.26 acres. TRPA verified existing land coverage for the project area is 399,884 square feet. Land coverage calculations according to LCDs and totals are provided in Table 4.2-3 in the Environmental Settings section above.

Following the base land coverage requirements set forth in section 20.3 of the TRPA Code of Ordinances, the allowable base land coverage for the project area, which excludes lands currently within the public ROW for onsite roadways, totals 73,998 square feet. Verified existing land coverage for the project area exceeds the TRPA base allowable land coverage by 325,886 square feet.

Proposed land coverage for all Alternatives will be in excess of the allowable base land coverage. Table 4.2-5 outlines proposed land coverage and net land coverage changes, if any, associated with Alternatives A through E. Proposed land coverage calculations include land coverage within the current Washoe County public ROW. Net land coverage reductions include removal of offsite coverage within the NSCP (associated with the State Route 28 and California parcel 090-305-016) but not included in the project area. Each alternative is discussed below.

Analysis: *Significant Impact; Alternatives A and B*

Alternative A. Alternative A will maintain existing conditions and will not result in a reduction in land coverage within the project area. The existing structures, parking, and uses will remain and will be retrofitted with BMPs as required by TRPA regulations, but the existing land coverage will not be removed. Under Alternative A, offsite land coverage within the NSCP will not be removed, and land coverage will not be relocated from low capability lands to higher capability lands.

The verified existing land coverage in the project area is 399,884 square feet and exceeds the TRPA allowable base land coverage by 325,886 square feet. Excess land coverage is a significant impact. TRPA's excess coverage mitigation program (Code Section 20.5) will not apply to Alternative A because this alternative does not include a discretionary action by TRPA. Therefore, Alternative A will not achieve land coverage reduction goals, and the impact is considered significant and unavoidable.

Table 4.2-5

Proposed Land Coverage By Alternative (square feet)

Alternative	Total Proposed Land Coverage in the Project Area [1]	Land Coverage Reduction in Project Area	Net Land Coverage Reduction including NSCP [2]	Relocation of Land Coverage from Low Capability LCD to Higher Capability LCD [3]
Alternative A	399,884	0 (no reduction)	0 (no reduction)	No
Alternative B	399,884	0 (no reduction)	0 (no reduction)	No
Alternative C	356,043	43,841 (-11%)	68,317 (-15.8%)	Yes
Alternative D	377,875	22,009 (-5.5%)	41,974 (-9.7%)	Yes
Alternative E	399,884	0 (no reduction)	0 (no reduction)	No

Source: HBA 2009 as based on Boulder Bay Project Calculation Workbook dated 9/01/2009 and TRPA LCVs

Notes:

[1] TRPA allowable base land coverage for the project area is 73,998 square feet.

[2] Land Coverage reduction when including offsite land coverage located within the NSCP – including the California Parcel APN 090-305-016 and SR 28 ROW land coverage to be removed.

[3] Banked land coverage to be relocated from LCD 1a (associated with the former Tahoe Mariner) to LCD 2 and LCD 4, as based on site-specific LCVs.

Alternative B. Alternative B will maintain existing site conditions and does not result in a reduction in land coverage within the project area. The existing structures will remain in their present configuration and existing hotel units will be converted to hotel design timeshare units (e.g., less than 10% will have kitchens). Existing structures and parking will be retrofitted with BMPs as required by TRPA regulations, but existing land coverage will not be removed. Under Alternative B, offsite land coverage within the NSCP will not be removed, and land coverage will not be relocated from low capability lands to higher capability lands.

The verified existing land coverage in the project area is 399,884 square feet and exceeds the TRPA allowable base land coverage by 325,886 square feet. Excess land coverage is a significant impact. TRPA's excess coverage mitigation program (Code Section 20.5) will not apply to Alternative B because Article VI(f)(2) of the TRPA Compact states: "Except as provided in paragraph (3), internal modification, remodeling, change in use or repair of a structure housing gaming under a nonrestricted license is not a project and does not require the review or approval of the agency (TRPA)". This alternative does not include a discretionary action by TRPA. Therefore, Alternative B will not achieve land coverage reduction goals, and the impact is considered significant and unavoidable.

Mitigation: No mitigation is available.

After Mitigation: *Significant and Unavoidable Impact; Alternatives A and B*

Under Alternatives A and B, the Project will not comply with base land coverage requirements set forth in TRPA Code of Ordinances Chapter 20. Because Alternatives A and B do not require discretionary action by the TRPA, the Excess Land Coverage Mitigation Program outlined in Code section 20.5 does not apply as an appropriate mitigation measure. The impact of verified existing land coverage exceeding base allowable coverage remains significant and is considered unavoidable for Alternatives A and B.

Analysis: *Significant Impact; Alternatives C, D and E*

Alternative C. Verified existing land coverage within the project area (including existing Washoe County ROW that will be abandoned) is 325,886 square feet above the TRPA allowable base land coverage. Excess land coverage is a significant impact that must be mitigated in accordance with Code Section 20.5 to reduce the impact to a less than significant level. Under Alternative C, existing Washoe County public ROWs (Reservoir Drive, Wassou Road, and Lakeview Drive) will be reconfigured into the project area and an additional 32,575 square feet of land coverage will be removed, as reflected in Table 4.2-6. This land coverage reduction is not directly reflected in the calculation for excess land coverage because TRPA Code of Ordinance section 20.3.B requires that "land coverage associated with existing linear public facilities, highways, streets and roads shall not be considered in the calculation of land coverage". These reductions, however, are taken into consideration through compliance with the excess coverage mitigation program (Code section 20.5), which is discussed below.

With the reconfiguration of Washoe County roads and integration of the roadway areas into the project area, Alternative C land coverage is reduced to 50.3 percent and will almost meet the maximum allowable project area coverage defined in the NSCP, which allows up to 50 percent land coverage. However, because Alternative C reduces onsite coverage from existing conditions and does not require a transfer of land coverage to the project area, the proposed 50.3 percent land coverage within the NSCP is allowable.

Alternative C will eliminate 68,317 square feet of existing land coverage within the NSCP area, over five times the reduction goal of 12,000 square feet stated in the NSCP. Alternative C will exceed the NSCP land coverage reduction objective and also reduces land coverage available for use in LCD 1a by relocating banked land coverage from the former Tahoe Mariner site to higher capability LCDs 2 and 4.

The TRPA CEP requires a 5 percent minimum land coverage reduction. TRPA's February 4, 2008 Resolution for the Boulder Bay CEP project required the specification of the percentage of land coverage reduction proposed for the Project. The Resolution states that an increase in density and height should result in an overall reduction in land coverage. Alternative C meets and exceeds the Resolution for additional land coverage reduction to counter expected increases in density and height by proposing a 15.8 percent reduction in total land coverage (sum of onsite project area and offsite NSCP reductions).

Alternative C will relocate existing land coverage from LCD 1a to LCDs 2 and 4. TRPA Code Section 20.5.C includes four findings necessary for relocation of land coverage within a project area. The findings and supporting discussion are provided below.

1. The relocation is to an equal or superior portion of the parcel or project area, as determined by reference to the following factors: (a) Whether the area of relocation already has been disturbed; (b) The slope of and natural vegetation on

the area of relocation; (c) The fragility of the soil on the area of relocation; (d) Whether the area of relocation appropriately fits the scheme of use of the property; (e) The relocation does not further encroach into a stream environment zone, backshore, or the setbacks established in the Code for the protection of stream environment zones or backshore; (f) The project otherwise complies with the land coverage mitigation program set forth in Section 20.5; and

The relocation is to an equal or superior portion of the project area, as the land coverage will be relocated to an area that is currently disturbed (e.g., former Tahoe Mariner site and existing storage areas). The natural vegetation and slopes will be protected as outlined in the project site plan and associated Landscaping (Appendix O) and Overall BMP (Figure 2-7) Plans. Relocation will be to soils of equal or higher land capability and appropriately fits the scheme of use of the project area. The relocation does not encroach into stream environment zone (SEZ), backshore or setbacks and complies with the excess land coverage mitigation program.

2. The area from which the land coverage was removed for relocation is restored in accordance with Subsection 20.4.C

   The area from which the land coverage is removed for relocation will be restored in accordance with Subsection 20.4.C. Restored areas will be landscaped for guest use, planted with native vegetation for open space or used for storm water treatment. A portion of the relocated land coverage is banked on the former Tahoe Mariner site, which has been previously restored pursuant to the existing Settlement Agreement. Use of a portion of the banked land coverage on the former Tahoe Mariner site will require an amendment to the existing Settlement Agreement, described in Chapter 2, and analyzed in Chapter 4.1, Land Use.

3. The relocation is not to Land Capability Districts 1a, 1b, 1c, 2 or 3, from any higher numbered land capability district.

   Banked land coverage in LCD 1a (from the former Tahoe Mariner Sierra Park parcels) will be relocated within the project area. Total banked LCD 1a land coverage from the Sierra Park parcels is 70,229 square feet. Existing LCD 1a land coverage in the Washoe County public ROW is 6,847 square feet for a total of 77,076 square feet of existing and banked LCD 1a land coverage in the project area. The proposed relocation will use 27,116 square feet of the existing and banked LCD 1a land coverage within LCD 1a areas and 26,995 square feet of the banked LCD 1a land coverage in higher capability LCD 2 areas. As a result, the project area will have 22,965 square feet of remaining LCD 1a land coverage banked onsite. LCD 4 land coverage will be reduced by 20,876 square feet under Alternative C for excess land coverage mitigation (permanent retirement) or banking and use on another project. The excess land coverage mitigation requirements by alternative are presented below in Table 4.2-6. Detailed land coverage calculations are provided in Appendix D (Tables D-1A, 1B and 1C). The resultant land coverage for the project area under Alternative C will equal 27,116 square feet on LCD 1a, 26,995 square feet on LCD 2, and 301,932 square feet on LCD 4.

4. If the relocation is from one portion of a stream environment zone to another portion, there is a net environmental benefit to the stream environment zone. Net environmental benefit to a stream environment zone is defined as an improvement in the functioning of the stream environment zone and includes, but

is not limited to: (a) Relocation of coverage from a less disturbed area to a more disturbed area or to an area further away from the stream channel; (b) Retirement of land coverage in the affected stream environment zone in the amount of 1.5:1 of the amount of land coverage being relocated within a stream environment zone; or (c) For projects involving the relocation of more than 1000 square feet of land coverage within a stream environment zone, a finding, based on a report prepared by a qualified professional, that the relocation will improve the functioning of the stream environment zone the quality of existing habitats.

Relocation of project area land coverage does not involve SEZs (LCD 1b).

Alternative C is subject to the excess coverage mitigation program described in Code Section 20.5 to reduce significant land coverage impacts from existing excess land coverage to a level of less than significant. Options to mitigate the excess land coverage are described below in mitigation measure GEO-1: Excess Land Coverage Mitigation Program.

Alternative D. Verified existing land coverage within the project area (including existing Washoe County ROW that will be abandoned) is 325,886 square feet above the TRPA allowable base land coverage. Excess land coverage is a significant impact and must be mitigated in accordance with Code Section 20.5 to reduce the impact to a less than significant level. Under Alternative D, public ROWs will be reconfigured into the project area and an additional 32,575 square feet of land coverage will be removed, as reflected in Table 4.2-6. This land coverage reduction is not directly reflected in the calculation for excess land coverage because TRPA Code of Ordinance section 20.3.B requires that "land coverage associated with existing linear public facilities, highways, streets and roads shall not be considered in the calculation of land coverage". These reductions, however, are taken into consideration through compliance with the excess coverage mitigation program (Code section 20.5), which is discussed below.

Land coverage proposed under Alternative D is 377,875 square feet, a reduction of 22,009 square feet (5.5 percent) of verified existing land coverage within the project area. Alternative D will not result in legally conforming project area coverage within the NSCP, which allows up to 50% maximum land coverage, because land coverage for the project area will be 53.3%. However, because Alternative D reduces onsite coverage from existing conditions and does not require a transfer of land coverage to the project area, the proposed 53.3 percent land coverage within the NSCP is allowable. Alternative D will eliminate 41,974 square feet of existing land coverage within the NSCP area, which is almost three times the reduction goal of 12,000 square feet stated in the NSCP. Alternative D will exceed the NSCP land coverage reduction objective and also reduces land coverage in LCD 1a by relocating land coverage to higher capability LCDs 2 and 4.

The TRPA CEP requires a 5 percent minimum land coverage reduction. TRPA's February 4, 2008 Resolution for the Boulder Bay CEP project required the specification of the percentage of land coverage reduction proposed for the Project. The Resolution states that an increase in density and height should result in an overall reduction in land coverage. Alternative D meets and exceeds the Resolution for additional land coverage reduction to counter expected increases in density and height by proposing a 9.7 percent reduction in total land coverage (sum of onsite project area and offsite NSCP reductions).

Alternative D will relocate existing land coverage from LCD 1a to LCDs 2 and 4. TRPA Code Section 20.5.C includes four findings necessary for relocation of land coverage (listed above for Alternative C) within a project area. The supporting discussion for these findings is provided below.

1. *The relocation is to an equal or superior portion of the project area, as the land coverage will be relocated to an area that is already disturbed (e.g., former Tahoe Mariner site and existing storage areas). The natural vegetation and slopes will be protected as outlined in the site plan and associated Landscaping (Appendix O) and Overall BMP (Figure 2-7) Plans. Relocation will be to soils of equal or higher land capability and appropriately fits the scheme of use of the project area. The relocation does not encroach in to stream environment zone (SEZ), backshore or setbacks and complies with the excess land coverage mitigation program.*

2. *The area from which the land coverage is removed for relocation will be restored in accordance with Subsection 20.4.C. Restored areas will be landscaped for guest use, planted with native vegetation as open space or used for storm water treatment. A portion of the relocated land coverage is banked on the former Tahoe Mariner site, which has been previously restored pursuant to the existing Settlement Agreement. Use of a portion of the banked land coverage on the former Tahoe Mariner site will require an amendment to the existing Settlement Agreement, described in Chapter 2, and analyzed in Chapter 4.1, Land Use.*

3. *Banked land coverage in LCD 1a (from the former Tahoe Mariner Sierra Park parcels) will be relocated within the project area. Total banked LCD 1a land coverage from the Sierra Park parcels is 70,229 square feet. Existing LCD 1a land coverage in the Washoe County public ROW is 6,847 square feet, for a total of 77,076 square feet of existing and banked LCD 1a land coverage in the project area. The proposed relocation will use 32,276 square feet of the existing and banked LCD 1a land coverage within LCD 1a areas and 27,270 square feet of the banked LCD 1a land coverage in higher capability LCD 2 areas. As a result, the project area will have 17,530 square feet of remaining LCD 1a land coverage banked onsite. LCD 4 land coverage will be reduced by 4,479 square feet under Alternative C for excess land coverage mitigation (permanent retirement) or banking and use on another project. The excess land coverage mitigation requirements by alternative are presented below in Table 4.2-6. Detailed land coverage calculations are provided in Appendix D (Tables D-1A, 1B and 1C). The resultant land coverage for the project area under Alternative C will equal 32,276 square feet on LCD 1a, 27,720 square feet on LCD 2, and 318,329 square feet on LCD 4.*

4. *Relocation of project area land coverage does not involve SEZs (LCD 1b).*

Alternative D is subject to the excess coverage mitigation program described in Code Section 20.5 to reduce significant land coverage impacts from existing excess land coverage to a level of less than significant. Options to mitigate the excess land coverage are described below in mitigation measure GEO-1: Excess Land Coverage Mitigation Program.

Alternative E. Land coverage proposed under Alternative E is 399,884 square feet, 100 percent of the verified existing land coverage in the project area. The verified existing land coverage in the project area exceeds the TRPA allowable base land coverage by 325,886 square feet. Under Alternative E, land coverage within the NSCP will not be reduced and land coverage will be relocated from within LCD 1a, LCD 2, and LCD 4 lands to accommodate redevelopment of the project area.

Alternative E is subject to the excess coverage mitigation program described in Code Section 20.5 to reduce significant land coverage impacts from existing excess land

coverage to a level of less than significant. Options to mitigate the excess land coverage are described below in mitigation measure GEO-1: Excess Land Coverage Mitigation Program.

Mitigation: **GEO-1: Excess Land Coverage Mitigation Program**

Alternatives C, D and E are subject to the excess coverage mitigation program described in Code Section 20.5. The excess land coverage within the project area can be reduced to a level of less than significant through: 1) reduction of coverage onsite; 2) reduction of coverage offsite; 3) payment of excess coverage mitigation fee; 4) parcel consolidation or parcel line adjustment; 5) findings for NSCP excess land coverage; or 6) combination of these options.

Table 4.2.6 presents the excess coverage mitigation fee and reductions in land coverage options for each of the alternatives, which are the mitigation options most applicable to the project area. Land coverage must be permanently retired to supplement the mitigation fee.

The impact from excess land coverage under Alternatives C, D and E can be reduced to a less than significant level through completion of the excess land coverage mitigation program as outlined in TRPA Code section 20.5. The mitigation options are listed below according to alternative.

Alternative C:

1) Payment of Excess Coverage Mitigation Fee = $1,290,705;

2) Permanent Retirement of 68,317 square feet of land coverage (offset of 18$/square foot assumed) and payment of adjusted Excess Coverage Mitigation Fee = $60,999; or

3) Permanent Retirement of 68,317 square feet of land coverage (offset of 18$/square foot assumed) and the permanent retirement of an additional 3,389 square feet (offset of 18$/square foot assumed) of land coverage identified on or offsite.

According to TRPA Code Section 20.5.A, the payment of the Excess Coverage Mitigation Fee legally mitigates excess land coverage for the project area. However, permanently retiring 68,317 square feet of land coverage under Alternative C is considered a more beneficial option for reducing impacts from excess land coverage than only the payment of the mitigation fee. Permanent retirement of land coverage directly reduces impacts in the East Stateline watershed through the permanent removal of impervious surfaces and restoration of land capability. Identification and permanent retirement of additional onsite or offsite land coverage (total of 71,706 square feet) in lieu of payment of the remaining Excess Coverage Mitigation Fee ($60,999) is considered the most beneficial option (Option number 3 above) for reducing impacts from excess land coverage.

Table 4.2-6

Excess Land Coverage Mitigation Comparison by Alternative

	Alt. C	Alt. D	Alt. E
Verified Existing Land Coverage (sf)	399,884	399,884	399,884
TRPA Allowable Land Coverage (sf)[1]	73,998	73,998	73,998
Proposed Land Coverage (sf)	356,043	377,875	336,365
Adjustment for Reconfiguration of Washoe County Road ROWs (sf)	(-32,575) 323,468	(-32,575) 345,300	(+63,519) 399,884
Excess Land Coverage (sf)[2]	249,470	271,302	325,886
Onsite Land Coverage Available to be Permanently Retired	43,841	22,009	0
Offsite Land Coverage Available to be Permanently Retired	24,476	19,965	0
Total Verified Coverage Available to be Permanently Retired (sf)	68,317	41,974	0
Additional Land Coverage (Onsite or Offsite) Required for Permanent Retirement to Negate Total Mitigation Fee (sf) - Optional	3,389	38,314	40,747
Excess Land Coverage Mitigation Fee[3]	$1,290,705	$1,445,186	$733,447
Permanently Retired Land Coverage Credit [4]	$1,229,706	$755,532	0

Source: Boulder Bay Coverage Summary 2009; TRPA Code of Ordinances Chapter 20 Table; Hauge Brueck Assoc. 2009

Notes:

1 ROW base land coverage is not included in the allowable base land coverage calculated for the Excess Coverage Mitigation Fee

2 Excess land coverage is equal to the Existing Land Coverage – Allowable Bass Coverage

3 Coverage Reduction (sf) = ((Fee Percentage of 5%) x (CM Construction Cost) / Mitigation Factor of 8);
Mitigation Fee ($) = (Coverage Reduction (sf) X Mitigation fee square feet Coverage Cost Factor (Boulder Bay is located in Area 9 for Agate Bay = 18$)); and Construction costs are approximately: Alt C = $11,472,930; Alt D = $12,846,094; and Alt E = $6,519,525.

4 Assuming the application of Agate Bay Cost Factor of $18/square foot

Notable benefits of Alternative C that are above and beyond standard TRPA mitigation requirements include: land coverage reductions in excess of the CEP goals and the NSCP reduction targets (which is 5 percent or 12,000 square feet) and the relocation of banked land coverage from LCD 1a lands to higher capability LCD 2 and 4 lands within the NCSP. Additionally, proposed land coverage will be effectively reduced through application of low impact design measures such as green roofs and pervious pavement. Effective land coverage is defined as a subset of total impervious area that is hydrologically-connected via sheet flow or discrete conveyance to a drainage system of receiving body of water (Washington State University 2005). Alternative C will utilize pervious pavers and pervious pavement on approximately 55,000 square feet of the project area and will install storm water catchment systems (61,300 square feet) on the

rooftops of Buildings B, C, D and E. Green roofs (50,700 square feet) that reduce heat island effects will be installed on retail Buildings G and H, covered walkways and the interior roof of Building A. These LID measures are not considered in the TRPA calculations for land coverage reductions but will provide added benefits to the Project through reductions in runoff from impervious surfaces (See impact HYDRO-1 in Chapter 4.3 for additional discussions of benefits).

Alternative D:

1) Payment of Excess Coverage Mitigation Fee = $1,445,186;

2) Permanent Retirement of 41,974 square feet of land coverage (offset of 18$/square foot assumed) and payment of adjusted Excess Coverage Mitigation Fee = $689,654; or

3) Permanent Retirement of 41,974 square feet of land coverage (offset of 18$/square foot assumed) and the permanent retirement of an additional 38,314 square feet (offset of 18$/square foot assumed) of land coverage identified on or offsite.

According to TRPA Code Section 20.5.A, the payment of the Excess Coverage Mitigation Fee legally mitigates excess land coverage for the project area. However, permanently retiring 41,974 square feet of land coverage under Alternative D is considered a more beneficial option for reducing impacts from excess land coverage that only the payment of the mitigation fee. Permanent retirement of land coverage directly reduces impacts in the East Stateline watershed through the permanent removal of impervious surfaces and restoration of land capability. Identification and permanent retirement of additional onsite or offsite land coverage (total of 80,288 square feet) in lieu of payment of the remaining Excess Coverage Mitigation Fee ($689,654) is considered the most beneficial option (Option number 3 above) for reducing impacts from excess land coverage.

Notable benefits of Alternative D that are above and beyond standard TRPA mitigation requirements include: land coverage reductions in excess of the CEP goals and the NSCP reduction targets (which is 5 percent or 12,000 square feet) and the relocation of land coverage from LCD 1a lands to higher capability LCD 2 and 4 lands within the NCSP. Additionally, proposed land coverage will be effectively reduced through application of low impact design measures such as green roofs and pervious pavement that are described above for Alternative C. These LID measures are not considered in the TRPA calculations for land coverage reductions but will provide added benefits to the Project through reductions in runoff from impervious surfaces (See impact HYDRO-1 in Chapter 4.3 for additional discussions of benefits).

Alternative E:

1) Payment of Excess Coverage Mitigation Fee = $733,447;

2) Permanent retirement of 40,747 square feet of offsite land coverage (offset of 18$/square foot assumed); or

3) Combination of permanent retirement of offsite land coverage (offset of 18$/square foot assumed) and payment of Excess Coverage Mitigation Fee that is appropriate for the amount of excess land coverage that remains (assuming an offset of $18/square foot).

Because Alternative E will retain all existing onsite land coverage, the option for permanent retirement of onsite land coverage will not apply for Alternative E. However, according to TRPA Code Section 20.5.A, the payment of the Excess Coverage Mitigation Fee legally mitigates excess land coverage for the project area. Identification and permanent retirement of offsite land coverage (40,747 square feet) in lieu of payment of

the remaining Excess Coverage Mitigation Fee ($733,447) is considered the most beneficial option for reducing impacts from excess land coverage in the East Stateline watershed. A combination of the two mitigation options, described above under option three, is considered more beneficial than the payment of the excess coverage mitigation fee only.

Alternative E will not meet the land coverage reduction goals and targets of the CEP or NSCP and will not relocate land coverage from LCD 1a lands to LCD 2 and 4 lands. LID measures will not be implemented under Alternative E to effectively reduce land coverage.

After Mitigation: *Less than Significant Impact; Alternatives C, D and E*

Impacts of excess land coverage associated with Alternatives C, D and E will be reduced to a less than significant level through completion of mitigation options outlined above in mitigation measure GEO-1.

IMPACT: GEO-2: Will the Project facilities be subject to ground rupture due to location near a surface trace of an active fault or expose people or property to geologic hazards such as earthquakes, landslides, avalanches, mudslides, ground failure, or similar hazards?

Analysis: *Significant Impact; Alternative A*

Alternative A will maintain existing structural configurations, which are located on a site that was leveled during the original construction in the 1940's. Although landslides, mudslides, avalanches, and other geologic hazards can be triggered by seismic activity, it is not necessarily a prerequisite. There are no known landslides, mudslides, avalanches, or sinkholes that have occurred within the project area since development.

The project area is outside the impact area of the Crystal Bay avalanche path and is determined to be in a low hazard area (Penniman, 1993). Likelihood of avalanche activity damaging structures on the site is considered to be very low because the Crystal Bay Avalanche Path is 0.75 miles from the project area.

The project area is mapped within IBC Seismic Hazard Zone 3, indicating probable damage in the event of an earthquake having intensities of V or more (Lumos and Associates 2008). Under Alternative A, the existing facilities will be retained. The existing facilities, because of age, have the inherent risk of facility failure due to cracks and damage caused by a combination of age and geologic settling. Existing facilities are not designed and constructed, consequently, to the appropriate level of engineering contained in the IBC for Seismic Hazard Zone 3 areas (Washoe County adopted IBC design requirements in 2006).

The project area is not located along an active fault as illustrated on Figure 4.2-1, and the potential for surface rupture at or near the North Tahoe Fault (located 2000 feet to the east) is inferred to be low (Lumos and Associates 2008). The North Tahoe area is considered to have a low to moderate potential for shaking from seismic-related activity according to the Earthquake Shaking Potential Map for Portions of Eastern California and Western Nevada (California Geological Society 2005). However, a large, active fault, the Genoa Fault with its surface trace, is located approximately 22 miles southeast of the project area. The Genoa Fault System is reported to have had activity within the past 500

years and to be capable of producing earthquakes with a maximum moment magnitude of 6.9 (California Department of Conservation 1996). A large earthquake could cause low to moderate ground shaking in the project area. Anticipated PGA at the project area is 0.39g, great enough to cause structural damage to existing features.

Alternative A potentially expose people or property to structural failures from earthquake induced ground shaking. Therefore, this is a significant impact, as determined by noncompliance with current requirements of Washoe County Building Codes. Additionally, in the event of facility failure from a catastrophic event, personnel and visitors will need to be evacuated from the project area and possibly the Lake Tahoe Basin.

Mitigation: No mitigation is available.

After Mitigation: *Significant Impact; Alternative A*

Alternative A does not require a discretionary action from TRPA or other regulatory agency. As a result, mitigation measures to reduce risks associated with potential damage to existing facilities will not be implemented. Therefore, this impact is considered to be significant and unavoidable.

Analysis: *Significant Impact; Alternative B*

Alternative B will incorporate the geotechnical recommendations outlined in the Geotechnical Investigation Report (Lumos and Associates 2008) for site grading, foundation design criteria (spread footings, footing settlements, lateral loading and dynamic factors), concrete slab design, retaining walls, and pavement design for new single-family structures. These standard engineering practices are incorporated into and committed to as part of the Project and are not considered recommended mitigation measures because they are required for project permitting.

The project area is mapped within IBC Seismic Hazard Zone 3, indicating probable damage in the event of an earthquake having intensities of V or more (Lumos and Associates 2008). Under Alternative B, the existing Tahoe Biltmore Casino and Hotel building will be retained and remodeled under the rules governing the NTRPA. NTRPA may require seismic retrofit of existing structures as part of a remodel. The existing facility, because of age, has the inherent risk of facility failure due to cracks and damage caused by a combination of age and geologic settling. Existing facilities are not designed and constructed, consequently, to the appropriate level of engineering contained in the IBC for Seismic Hazard Zone 3 areas (Washoe County adopted IBC design requirements in 2006).

Alternative B will potentially expose people or property to structural failures from earthquake induced ground shaking. Therefore, this is a significant impact, as determined by noncompliance with current requirements of Washoe County Building Codes. Additionally, in the event of facility failure from a catastrophic event, personnel and visitors will need to be evacuated from the project area and possibly the Lake Tahoe Basin.

Mitigation: **GEO-2A: Retrofits for Compliance with International Building Codes as Amended for Washoe County**

Structural reinforcement of existing buildings that will be retained shall be necessary to reduce the potential impact from geologic hazards to a less than significant level. The seismic design and retrofit of structures within Washoe County shall be based on the

response parameters and equations of Chapter 16, Section 1613 of the IBC. See ASCE 7-05 as referenced in the IBC. Due to the proximity of the project area to the seismic zone IV boundary, located a few miles to the east, IBC Zone IV design criteria shall be considered as an option to further reduce the potential for damage from earthquakes (Lumos and Associates, Inc. 2008). Ground shaking intensities shall be estimated based on activity of the Genoa Fault using a maximum credible earthquake with a moment magnitude of 6.9 (Clark et al. 1984). A PGA of 0.39g shall be used for the project design (see Appendix N), and the site-specific design criteria identified by Lumos and Associates (2008) shall be applied when appropriate.

GEO-2B: Emergency Response Plan

Boulder Bay shall create and maintain an Emergency Response Plan because Washoe County Building Codes are the minimum requirements intended to maintain public safety during strong ground shaking, but do not insure functionality of the structure during and/or after a large seismic event. The plan shall outline procedures for personnel response and personnel and visitor evacuation in the event of facility failure from a catastrophic event.

After Mitigation: *Less than Significant Impact; Alternative B*

With the retrofit of existing facilities to the appropriate levels of engineering set forth in the Washoe County Building Codes (Mitigation Measure GEO-2A) in combination with the implementation of an Emergency Response Plan (GEO-2B), the potential effects from facility failure during a seismic event will be minimized through reduction of risk of facility failure and through expedited and organized evacuation of personnel and visitors from the project area. The impact is reduced to a level of less than significant through mitigation.

Analysis: *Significant Impact; Alternatives C and D*

Landslides, mudslides, avalanches, and other geologic hazards can be triggered by seismic activity, although it is not necessarily a prerequisite. There are no known landslides, mudslides, avalanches, or sinkholes that have occurred within the project area since development.

The project area is outside the impact area of the Crystal Bay avalanche path and is determined to be in a low hazard area (Penniman, 1993). Likelihood of avalanche activity damaging structures on the site is very low because the Crystal Bay Avalanche Path is 0.75 miles from the project area.

The project area is located in IBC Seismic Hazard Zone 3. An appropriate level of engineering mandated by Washoe County Building Codes for Zone 3 areas governs project design and construction for Alternatives C and D. Adherence to the IBC design requirements adopted and amended locally for Washoe County will minimize the potential effects of seismic hazards. As recommended in the Geotechnical Investigation Report for Boulder Bay (Lumos and Associates, Inc. 2008), due to the project area's proximity to the Seismic Hazard Zone 4 boundary, IBC Zone 4 design criteria should be considered as an option to further reduce the potential for damage from earthquakes. Seismic Considerations are outlined on pages 5, 6 and 7 of this report, which is attached in Appendix N, and a PGA of 0.39g is recommended for the design of the Project.

The Project as implemented under Alternatives C and D will incorporate the geotechnical recommendations outlined in the Geotechnical Investigation Report (Lumos and

Associates 2008) for site grading, foundation design criteria (spread footings, footing settlements, lateral loading and dynamic factors), concrete slab design, retaining walls, and pavement design. These standard engineering practices (SP-1 in Chapter 6) are incorporated into and committed to as part of the Project.

The existing facilities were constructed in the 1940's, and the replacement of facilities with new structures designed to meet the requirements for public safety during strong ground shaking, will reduce the risk of facility failure due to cracks, leaks and damage caused by a large seismic event. Under Alternatives C and D, the Project will reduce, but cannot completely eliminate, the adverse effects that could result from a significant seismic event. Even with facility upgrades, Boulder Bay cannot guarantee that there will be no future structural failures. In the event of facility failure personnel and visitors will need to be evacuated from the project area and possibly the Lake Tahoe Basin. Mitigation in the form of an emergency response plan is recommended to reduce the impact to a level of less than significant.

Mitigation: **GEO-2B: Emergency Response Plan**

Implement mitigation measure GEO-2B described above under Alternative B.

After Mitigation: *Less than Significant Impact; Alternatives C and D*

Through the implementation of an Emergency Response Plan, the potential effects of facility failure during and after a seismic event will be minimized through expedited and organized evacuation of personnel and visitors from the project area. The impact is reduced to a level of less than significant through mitigation.

Analysis: *Potentially Significant Impact; Alternative E*

Alternative E will incorporate the geotechnical recommendations outlined in the Geotechnical Investigation Report (Lumos and Associates 2008) for site grading, foundation design criteria (spread footings, footing settlements, lateral loading and dynamic factors), concrete slab design, retaining walls, and pavement design for new structures. These standard engineering practices (SP-1 in Chapter 6) are incorporated into and committed to as part of the Project and are not considered recommended mitigation measures because they are required for project permitting.

The project area is mapped within IBC Seismic Hazard Zone 3, indicating probable damage in the event of an earthquake having intensities of V or more (Lumos and Associates 2008). Under Alternative E, the existing Tahoe Biltmore Casino and Hotel building will be retained. The existing facility, because of age, has the inherent risk of facility failure due to cracks and damage caused by a combination of age and geologic settling. Consequently, existing facilities are not designed and constructed to the appropriate level of engineering contained in the IBC for Seismic Hazard Zone 3 areas (Washoe County adopted IBC design requirements in 2006).

Because Alternative E will potentially expose people or property to structural failures from earthquake induced ground shaking, this is a significant impact, as determined by noncompliance with current requirements of Washoe County Building Codes. Additionally, in the event of facility failure from a catastrophic event, personnel and visitors will need to be evacuated from the project area and possibly the Lake Tahoe Basin.

Mitigation: **GEO-2A: Retrofits for Compliance with International Building Codes as Amended for Washoe County**

Implement mitigation measure GEO-2A described above under Alternative B.

GEO-2B: Emergency Response Plan

Implement mitigation measure GEO-2B described above under Alternative B.

After Mitigation: *Less than Significant Impact; Alternative E*

With the retrofit of the existing Tahoe Biltmore facility to the appropriate levels of engineering set forth in the Washoe County Building Codes (Mitigation Measure GEO-2A) in combination with the implementation of an Emergency Response Plan (GEO-2B), the potential effects from facility failure during a seismic event will be minimized through reduction of risk of facility failure and through expedited and organized evacuation of personnel and visitors from the project area. The impact is reduced to a level of less than significant through mitigation.

IMPACT: GEO-3: Will construction or operation of the Project cause erosion, loss of topsoil, changes in topography, undisturbed soil or native geologic substructures, or unstable soil conditions from excavation, grading or filling?

Analysis: *Less than Significant Impact; Alternatives A, B, C, D and E*

The project area in its entirety has been previously disturbed because of site grading for structures, parking lots and utilities. Alternatives A and B will retain the existing structures and will not alter project area topography or geology substructures. Alternatives C, D and E will require grading and excavation (as detailed in Table 4.2-7 below), but structures will generally follow the existing contours of the project area and will not change topographic features such that the edges of the project area will be inconsistent with the existing natural surrounding conditions.

Alternatives A and B will not require the extent of soil disturbance as Alternatives C, D and E because the existing facilities will be retained. However, future operation of the existing facilities could contribute to erosion, loss of topsoil and unstable soil conditions in the project area if BMPs are not installed, monitored and maintained.

Alternatives C, D and E will involve excavation, grading, and filling activities that could cause temporary erosion and alter geologic substructures. Construction activities, such as trenching, soil removal, vegetation removal, and other activities associated with construction, could result in the erosion of soils in areas within the Cagwin and Cassenai soil groups. Excavations will be in excess of 5 feet in numerous areas to accommodate appropriate depths for building footings. Excess excavated materials that are not needed for fill will be exported off-site to a TRPA approved fill location.

The estimated excavation, grading and fill volumes presented by alternative are outlined in Table 4.2-7. The Geotechnical Investigation (Lumos and Associates 2008) and Soils/Hydrologic Reports (Lumos and Associates 2008) found no severe soil constraints that preclude grading and construction activities, and no ground water was found in test pits to maximum depths of 55.5 feet below ground surface (bgs). Although excavations will be in excess of 5 feet, project activities meet the necessary conditions to receive an approved exemption to allow excavation beyond 5 feet bgs from TRPA. The findings for excavation depths for the Project were approved by TRPA in February 2009 (see Appendix I).

Table 4.2-7

Estimated Excavation, Grading and Fill Volumes By Alternative

	Alternative				
	A	**B**	**C**	**D**	**E**
Excavation Volume (yd^3)	0	0	127,000	190,000	54,000
Fill Volume (yd^3)	0	0	6,000	6,000	4,000
Grading Volume (yd^3) [1]	0	0	133,000	196,000	58,000

Source: Boulder Bay Project Cut Sheets and Design Plans 2009

1. Grading volume is the sum of the cut and fill volumes for the total amount of soil altered.

Disturbed and denuded soils in the Lake Tahoe Basin are a significant erosion hazard. Soils without vegetative cover are highly susceptible to particle detachment and transportation due to raindrop impact and overland flow (Brady 1990). Soil loss can be reduced through erosion control practices to provide soil coverage, revegetation and slope stabilization.

Boulder Bay will be required to apply for and obtain a special use/construction permit from the TRPA to conduct excavation, trenching, stockpiling and other earth movement activities associated with project construction as outlined in Chapter 64 of the Code of Ordinances. The permit requires construction activities, equipment, materials and runoff be contained within the project area. The TRPA permit also requires the implementation of soil protective measures and consistency with the NSCP (PAS 032) and PAS 034 guidelines.

Chapter 2 references the standard erosion control practices (e.g., BMP Plan, Landscaping Plan and Fertilizer Management Plan) that will be used to control erosion and to reduce potential impacts to earth and water resources. These standard practices and plans are considered part of the project description because they are required by law or for project-level permitting, and are included in the detailed Mitigation and Monitoring Program, Chapter 6.

Construction activities (e.g., ground disturbance) associated with all action alternatives will require site-specific temporary BMPs, maintenance and monitoring to ensure that disturbed soils are protected during precipitation events and for over wintering. Boulder Bay will prepare a site-specific Erosion Control Plan (SP-2) to define and map temporary BMPs for the control of erosion from ground disturbing activities. BMPs will be installed in accordance with Chapter 25 of the TRPA Code of Ordinances and are incorporated as part of the Project. The Boulder Bay Erosion Control Plan will be complimentary to the SWPPP that is required by NDEP for NDPES permitting and will include, but not be limited to, the following list of management practices:

Construction Activities. The following measures and actions will be complied with during construction activities:

- Limit grading activities to between 1 May and 15 October.
- Standard workdays will be Monday through Friday. Noise generating activities will be limited to the hours of 8:00 AM to 6:30 PM.

- Noise will be reduced by the mandatory use of mufflers on all construction vehicles and equipment. Where feasible, solenoid pavement breakers will be used in lieu of air powered jackhammers.

- Contractor will be responsible for air quality and dust control throughout the construction period in accordance with all local, State, and federal regulations. Contractor will be responsible for obtaining any necessary air quality permits needed to carry out construction activities.

- Soil and construction material will not be tracked off the construction site. Grading operations will cease in the event that a danger of violating this condition exists.

- During the construction period, environmental protection devices, such as erosion control, dust control and vegetation protection devices will be maintained at all times.

- Contractor will provide crushed rock in areas of temporary construction access to minimize migration of sediment.

- Spoil stockpiles or uncompacted soil material will be surrounded with filter fencing and covered with plastic sheeting prior to storm events. Wherever possible, spoils will be temporarily located uphill from open trenches to protect down slope drainages from sedimentation.

- Filter fabric fences will be anchored with staked coir logs (or similar approved by TRPA) and utilization of crescent shape cross checks to contain sediment where the construction corridor is located on steep hillsides.

- Topsoil to be reused following excavation will be conserved throughout the project area by stockpiling it separately from other excavated soils. A double or triple lift excavation process will ensure topsoil that is to be reused is kept separate from deeper soil materials. Excavated material that will not be reused will be loaded directly into hauling trucks and removed from the construction area. Stockpiled soil will be placed within the construction site and be covered with tarps to protect the soil from wind and rain. Straw bale sediment barriers or filter fences will be placed around the down slope side of the stockpiled soil. After the excavations and trenches are backfilled, the stockpiled soil will be replaced around the corridor. After final grade is achieved, topsoil will be spread evenly over the final grade. Stockpiled soil along trenches will be placed on the uphill side of trenches.

- Excavated material will be stored upgrade from the excavated area whenever possible. No material will be stored in a wet area. Excavated materials will be located onsite on paved surfaces, previously disturbed areas, or locations where existing buildings have been removed. Storage areas will be positioned where they will have the least amount of impact on the soils. Any material not stored onsite will be hauled out of the Basin to a TRPA approved disposal site.

- Trenches that are located outside of existing roadways will be compacted to original grade and revegetated using native plant materials.

- During pipe or material placement, pipelines or construction materials will not be dragged over previously undisturbed soils.

- Immediately following topsoil replacement, disturbed sites will be revegetated in accordance with the approved Landscaping Plans. Seed mixes or plant species will be determined and prescribed by the Landscaping Plans.

- Jute netting or erosion control blankets may used on steep slopes to help establish the revegetation. Sediment barriers will be maintained until the vegetation is established.

- Where the construction site is located on a slope of at least 0.5 percent (0.5%), sediment barriers or filter fences will be placed around the down slope side of all construction sites (including building foundations, trenches, soil stockpiles and roadways).

- All trees and natural vegetation to remain on the construction site will be protected per TRPA BMP-8.

- Only equipment of a size and type that will do the least amount of damage, under prevailing site conditions and considering the nature of the work to be performed, will be used.

- No washing of vehicles or heavy equipment will be permitted anywhere on the subject property unless authorized by TRPA in writing.

- No vehicle or heavy equipment will be allowed in wet areas except as authorized by TRPA.

- Construction will be limited in non-paved areas during inclement weather. Equipment movement will cease when ruts begin to form in the soil due to wet conditions. Equipment movement will resume once the soils have dried to a degree that prevents rut formation.

- Earthen berms, water bars, armored conveyance ditches, settling basins, and infiltration trenches will be installed to intercept, contain and infiltrate runoff from the construction site.

- Contractor will be responsible for pre-grading meeting and notify IVGID of date and time.

Winterization. All construction sites must meet the following winterization requirements:

- Unless exempted under a grading extension issued by TRPA, grading is PROHIBITED on all construction sites between October 15th and May 1st.
- Install and maintain temporary sediment control devices (fiber rolls, silt fence). Apply additional temporary sediment control devices where water may concentrate or pond.

- Install and maintain effective temporary fencing for the protection of vegetation.
- Stabilize disturbed and bare soil areas with erosion control blankets or by applying a thin layer (no greater than 1 inch thick) of organic mulch (wood chips, pine needles) with the following guidance:
- Organic mulch cannot be applied within 5 feet of any structure. However, inorganic mulch (gravel) may be applied in this area.
- Apply organic mulch sparingly on no more than 50% of bare soil area (not 50% of the total project area). Patches of organic mulch should be applied to those areas where there is a higher risk of erosion. Create a fragmented mosaic of mulched patches.
- If the existing vegetation surrounding the construction site provides a uniform blanket of needle cast or leaf litter, then rake organic litter from within 5 feet of all structures. For all other portions of the project area within the limits of the construction fencing, rake organic mulch into thin discontinuous patches of mulch (creating a fragmented mosaic of mulched patches).
- Before commencement of the grading season (May 1st), all organic mulch needs to be removed from within 30 feet of all structures. Needles and leaves that fall after the spring removal period can accumulate on the ground as long as they do not create a fire hazard.
- For all bare cut and fill slopes, install permanent (rock riprap, retaining walls) or temporary (erosion control blankets, hydro mulch with tackifiers) stabilization measures.
- Cleanup and remove all on-site construction slash, debris and spoil piles.
- Cover stockpiles that will remain over winter with a durable material or plastic sheeting. Install full perimeter sediment control containment by using either a filter fabric fence or fiber rolls. When feasible, position stockpiles away from sensitive or erosion-prone areas.
- For active construction sites where work will continue between October 15 and May 1, the following requirements are also mandatory:
- Pave all driveways, parking areas and material storage areas.
- Parking of vehicles and storage of building materials will be restricted to paved areas.
- Sweep daily to recover sediment that has been tracked off the construction site.

Construction Monitoring. The following is posted at http://www.trpa.org. Construction monitoring is done to ensure compliance with all aspects of the permit for a particular project. There are three main phases: pre-grade, intermediate and final and/or complaint follow-up monitoring.

First, the pre-grade inspection is performed before the project starts to verify the temporary erosion controls measures and vegetation protection are properly installed, the permit and permit conditions are understood, and any questions the contractors may have are answered. To obtain a pre-grade inspection you must have:

- The temporary BMPs and vegetation protection, as listed on the plans, are in place;

- Site address posted (the house number on the house counts);
- If needed, the foundation footprint staked;
- The original stamped plans (not copies) and all the permits on site; and
- An appointment for the inspection scheduled at least 48 hours in advance - call (775) 588-4547.

Intermediate inspections are performed during the construction process. They ensure the permit conditions are being followed, that the temporary BMPs are in place and functional, sites are properly winterized (between October 15 and May 1), and that the project is progressing as approved.

A final inspection is made towards the completion of the project to make sure all work was completed properly and to return any security deposit.

Finally, if a complaint is made, one of TRPA's inspectors will follow up on the complaint and verify whether or not any unauthorized activity is occurring.

Additionally, TRPA has adopted many Memoranda of Understanding (MOUs) with other agencies such as public utility districts and county road departments, which allow them to do many types of projects without TRPA review. An example of this type of MOU is the Tahoe City Public Utility District installing a water line. There may be cases where another agency conducts construction inspections.

Post-Project BMP Effectiveness Monitoring. Revegetation/Landscaping, permanent BMPs and slope stabilizing measures will be visually monitored annually for the first five years following construction to assess adequacy and effectiveness of BMPS, and additional BMPs will be prescribed by the TRPA if existing treatments fail to protect the site from accelerated erosion. A qualified consultant or trained Boulder Bay staff (Note: completion of the TRPA contractor BMP certification training is recommended) will monitor restoration progress.

Visual monitoring of the condition and effectiveness of the BMPs will occur before and after storm events, and if necessary, corrective actions will be taken. The contractor will be required to maintain the effectiveness of the BMPs until the disturbed areas are stabilized and erosion is no longer a threat, restoring disturbed area in accordance with the Landscaping Plan.

The Erosion Control Plan will include temporary BMPs to control and contain erosion onsite during construction. The Erosion Control Plan and SWPPP in combination with the proposed Overall BMP Plan for the project area, which is illustrated in Figure 2-7, will implement temporary and permanent BMPs to minimize loss of top soil and stabilize slopes during project construction and throughout project operations; thus reducing the potential impact from excavation, grading and fill to a less than significant level. Both plans will be modified during TRPA project permitting to reflect the needs of the final project design.

Mitigation: No mitigation is required.

CUMULATIVE IMPACTS AND MITIGATION MEASURES

IMPACT: GEO-C1: Will the Project have significant cumulative impacts to geology and earth resources?

Analysis: *Less than Significant Impact; Alternatives A, B, C, D and E*

Geologic impacts related to the Project and future projects in the region will involve hazards related to soils conditions, erosion and seismic activity. The entire region along the California-Nevada State boundary is susceptible to impacts from seismic activity. Soils and geologic influences are typically site-specific and confined to discrete spatial locations, however, and operation of the Project will not alter the potential for seismic activity or affect the level of intensity at which a seismic event on a nearby project site is experienced.

Geologic impacts require project-level planning and design to avoid and reduce potential hazards so they do not combine to create cumulative impact conditions beyond project area boundaries. The exception to this general condition would occur in areas where a large geologic feature such as a fault zone or active landslide area might affect the geology of an off-site location up or down gradient from the project area. These circumstances are not present within the project area.

Project-specific geotechnical investigations are part of the design and permitting process. As such, all project facilities in the Lake Tahoe Basin and throughout the region are required to utilize standard engineering practices and to comply with design standards and building codes to reduce the potential for cumulative geologic impacts during construction and operations to a less than significant level.

Considerable cumulative impacts could result from erosion and unstable slopes if multiple projects are constructed concurrently. The contribution of the Project to cumulative effects from erosion and unstable slopes is reduced to a level of less than significant through implementation of standard practices for erosion control during construction activities (i.e. the required TRPA Erosion Control Plan and the SWPPP for NDEP) and during operations (i.e. Permanent BMP Plan).

Potential geologic hazards specific to the Project are minimized through implementation of mitigation measures GEO-1, GEO-2A and GEO-2B. As a result, cumulative incremental contributions to regional geologic impacts that could occur from construction and operation of the Project are minimized.

Mitigation: No additional mitigation is required.

REFERENCES

Bailey, R.G. 1974. Land Capability Classification of the Lake Tahoe Basin, California - Nevada. U.S. Forest Service, Department of Agriculture in cooperation with the Tahoe Regional Planning Agency, 32 pages.

Birkeland, P.W. 1963. Pleistocene Volcanism and Deformation of the Truckee Area, North of Lake Tahoe. California Geological Society of America Bulletin, vol. 74. pp 1452-1464.

Brady, N.C. 1990. The Nature and Properties of Soils. Macmillan Publishing Company, New York, 621 pages.

Buol, S.W., F.D. Hole and R.J. McCracken. 1980. Soil Genesis and Classification. The Iowa State University Press, 402 pages.

Burnett, J.L. 1973. Earthquake History of the United States. U.S Department of Commerce.

California Department of Conservation, Division of Mines and Geology. 1998. Maps of Known Active Fault Near-Source Zones in California and Adjacent Portions of Nevada: to be used with the 1997 Uniform Building Code. California Department of Conservation, Division of Mines and Geology. In Cooperation with Structural Engineers Association of California, Seismology Committee, International Building Officials, Whittier, California.

California Geology Survey. 2005. Earthquake Shaking Potential Map for Portions of Eastern California and Western Nevada. Sheet 56.

Clark M. M. et al. 1984. Preliminary Sliprate Table and Map of Lake Quaternary Faults of California: U.S. Geological Survey Open-File Report 84-106, 12 p. 5 plates, map scale 1:1,000,000.

Cooper, Clark and Associates. 1974. Natural Hazards of the Lake Tahoe Basin. Prepared for Tahoe Regional Planning Agency

DePolo D. M. and C. M. DePolo. 1999. Earthquakes in Nevada 1852-1998: Nevada Bureau of Mines and Geology, Map 119, 1:1000000 scale.

Gasch and Associates. 2008. Surface Refraction Microtremor Seismic Shear-wave Investigation Report for Boulder Bay. Crystal Bay, Nevada. June.

International Code Council. Inc. (ICC). 2006. 2006 International Building Code (IBC) Country Club Hills, Illinois.

Jennings, C.W. 1994. Fault Activity Map of California. California Department of Conservation, Division of Mines and Geology.

Lawson, A.C. 1912. The Recent Fault Scarps at Genoa, Nevada. Bulletin of the Seismological Society of America, vol. 2, pp 193-200.

Lindgren, W. 1897. Geological Atlas of the United States, Truckee Folio. U.S. Geological Survey Folio No. 39.

Lumos and Associates, 2009. Revised Soils/Hydrologic Report for Boulder Bay. Crystal Bay, Nevada. August.

Lumos and Associates. 2008. Geotechnical Investigation Report for Boulder Bay. Crystal Bay, Nevada. September.

Penniman, Dick. 1993. Avalanche Hazard Study, Washoe County. Snowbridge Associates.

Saucedo, George J. 2005. Geologic Map of the Lake Tahoe Basin, California and Nevada. Nevada Bureau of Mines and Geology, Reno, Nevada.

Tahoe Regional Planning Agency. 2000. Tahoe Keys Marina Master Plan EIS/EIR. January.

Tahoe Regional Planning Agency. 1986. Regional Plan for the Lake Tahoe Basin, Goals and Policies.

United States Department of Agriculture, Natural Resources Conservation Service. 2007. Soil survey of the Tahoe Basin Area, California and Nevada. Accessible online at: http://soils.usda.gov/survey/printed_surveys/.

United States Geological Society. 2008. USGS National Earthquake Information Center. http://neic.usgs.gov. Accessed on 10/21/2008.

Washoe County. 2007. Standard Specifications for Public Works Construction. Washoe County, Nevada.

Washoe County. 2006. Washoe County Comprehensive Plan.

Washoe County. 1994. Washoe County Comprehensive Plan – Tahoe Area Plan