3.7 GEOLOGY, SOILS, LAND CAPABILITY, AND COVERAGE

This section evaluates the potential impacts pertaining to geologic and soil conditions, land capability, and coverage associated with the implementation of the Regional Plan Update alternatives. The analysis includes a description of existing conditions, a discussion of potential changes in coverage associated with each alternative, and potential hazards associated with geologic conditions. Planning guidelines established by TRPA provide the regulatory framework that allow for the assessment of potential environmental effects to these resources. Potential environmental effects related to water quality resulting from soil erosion and other stormwater issues are addressed in Section 3.8, Hydrology and Water Quality.

3.7.1 REGULATORY BACKGROUND

Regulations protecting soil resources in the Tahoe Region are maintained by TRPA, the Lahontan Regional Water Quality Control Board (LRWQCB) (through water quality regulations), the Nevada Division of Environmental Protection (through water quality regulations), five counties (El Dorado, Placer, Washoe, Carson City, and Douglas), and one incorporated city (City of South Lake Tahoe). Other regulations pertain to the establishment of safe structures to ensure minimal, if any, impact resulting from soil- or earth-related hazards. The following discussion provides information regarding applicable requirements in the Tahoe Region.

TAHOE REGIONAL PLANNING AGENCY

Several components of the 1987 Regional Plan include policies and regulations pertaining to geology, soils, land capability, and coverage: Environmental Threshold Carrying Capacities; Goals and Policies; Code of Ordinances; and Water Quality Management Plan.

ENVIRONMENTAL THRESHOLD CARRYING CAPACITIES

Through adoption of Resolution 82-11, TRPA has established threshold standards and indicators for nine resource areas: water quality, air quality, scenic resources, soil conservation, fish habitat, vegetation, wildlife, noise, and recreation. TRPA threshold standards are minimum standards of environmental quality to be achieved in the Tahoe Region. Every 5 years, TRPA evaluates the attainment status of all TRPA threshold standards. The latest TRPA Threshold Evaluation was completed in 2012 and is being released concurrently with this environmental impact statement (EIS) (TRPA 2012a).

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

- Land coverage (impervious cover) Threshold Standard to comply with allowable land coverage limitations established in the *Land-Capability Classification of the Lake Tahoe Basin, California-Nevada: A Guide to Planning* (Bailey 1974) (Bailey System). This threshold indicator reporting category consists of nine separate standards for the nine separate land capability classes.
- Stream environment zone (SEZ) Threshold Standard to restore 25 percent of the SEZ lands that have been identified as disturbed, developed, or subdivided to attain a 5-percent increase in the area of naturally functioning SEZ lands.

Table 3.7-1 shows the current status of the soil conservation threshold standards.

Table 3.7-1. 2011 Status of the Soil Conservation Threshold Standards	
Threshold	**Status**
Land Coverage	
Land Capability District 1a	Considerably Better than Target
Land Capability District 1b	Considerably Worse than Target
Land Capability District 1c	Somewhat Better than Target
Land Capability District 2	Somewhat Better than Target
Land Capability District 3	Considerably Better than Target
Land Capability District 4	Considerably Better than Target
Land Capability District 5	Considerably Better than Target
Land Capability District 6	Considerably Better than Target
Land Capability District 7	Somewhat Better than Target
Stream Environment Zone Restoration	Considerably Worse than Target
Source: TRPA 2012a	

REGIONAL PLAN

Goals and Policies

Goals and policies applicable to geology, soils, land capability, and coverage are included in several elements and subelements of the Goals and Policies document of the Regional Plan. In the Land Use Element, the Natural Hazards Subelement addresses risks from natural hazards (e.g., flood, fire, avalanche, and earthquake). Specifically, Goal 1, Policy 1 restricts construction, reconstruction, or replacement of structures in identified avalanche or mass instability hazard areas unless precautionary measures can be implemented to insure protection of public health and safety. Natural Hazards Subelement Goal 1, Policy 2 prohibits new construction on or disturbance of land within the 100-year floodplain and in the area of wave run-up except as necessary to implement the goals and policies of the plan. It also requires all public utilities, transportation facilities, and other necessary public uses located in the 100-year floodplain and area of wave run-up to be constructed or maintained to prevent damage from flooding and to not cause flooding.

The Water Quality Subelement of the Land Use Element includes goals to reduce loads of sediment and algal nutrients to Lake Tahoe; meet sediment and nutrient objectives for tributary streams, surface runoff, and subsurface runoff; and restore 80 percent of the disturbed lands. It also specifies that the implementation of best management practices shall be required as a condition of approval for all projects.

In the Conservation Element, Goal 1 of the Stream Environment Zone Subelement provides for the long-term preservation and restoration of SEZ and includes policies that limit uses and permanent land disturbance in SEZ, and promote public acquisition and the restoration of 25 percent of disturbed SEZ lands. Additionally, Goal 2 under the Vegetation Subelement provides for the maintenance and restoration of SEZ vegetation.

The Soils Subelement of the Conservation Element addresses soil erosion and loss of soil productivity through policies pertaining to coverage, including allowable coverage for categories of land uses in specific land capability districts. This subelement also addresses special regulations regarding construction and soil-disturbing activities occurring between October 15 and May 1 and promotes the retention of functional SEZ and restoration of disturbed SEZ lands.

Code of Ordinances

Chapter 30 – Land Coverage Standards

Since the late 1970s, TRPA has used the land capability classification system known as the Bailey System (*Land-Capability Classification of the Lake Tahoe Basin, California-Nevada: A Guide to Planning* [Bailey 1974]) to guide land use planning, policy formulation related to the impacts of development on soil erosion, and permitting of development. The Bailey System was developed as a hazard assessment and planning tool to identify and mitigate adverse impacts to water quality and stream systems that occur from surface runoff and erosion related to development. The Bailey System is the basis of the land coverage standards and limitations set forth in Chapter 30 of the TRPA Code of Ordinances (TRPA 2012b).

Coverage is defined by TRPA as a human-built structure or other impervious surface that prevents normal precipitation from directly reaching the surface of the land underlying the structure, therefore precluding or slowing the natural infiltration of water into the soil (Chapter 90 of the Code). TRPA further defines coverage as impervious surface (hard coverage) or compacted soil (soft coverage). Research has established the connection between impervious surfaces and water quality (Schueler 1994). Specifically, coverage may affect water quality as it reduces the amount of soil available to infiltrate water and has the potential to result in surface runoff, erosion, and delivery of pollutants to receiving waters.

To determine the level of coverage that would be appropriate in the Region, TRPA adopted the Bailey Land Classification System (Bailey 1974). The Bailey System assigns land capability districts (LCDs) based primarily on soil characteristics and slope. The LCDs reflect the amount of development the site can support without experiencing soil or water quality degradation. The LCDs range from 1 to 7, with 1 being the most environmentally sensitive and 7 being the most suitable for supporting development (Tables 3.7-2 and 3.7-3). Under this system, TRPA allows landowners to cover 1, 5, 20, 25, or 30 percent of their parcel with impervious surfaces depending on its environmental sensitivity as defined by the Bailey System (Table 3.7-4). New development is allowed in LCDs 4–7 and is largely prohibited in LCDs 1–3 with limited exceptions, particularly in LCD 1b (SEZ). Exceptions for LCDs 1–3 include development related to public outdoor recreation facilities and water quality control facilities. Exceptions are also identified for single-family development under the Individual Parcel Evaluation System (IPES) (described in detail below) and Tyrolian Village in LCDs 1a, 1c, 2, and 3. Stream crossing to access an otherwise-buildable IPES parcel may also be allowed. In most instances, new coverage in LCDs 1-3 must be mitigated at a ratio of 1.5:1 (mitigation to impact).

Table 3.7-2. Land Capability Districts for Lake Tahoe Region Lands

Capability Levels	Tolerance for Use	Slope Percent	Relative Erosion Potential	Runoff Potential	Disturbance Hazards
7	Most	0-5	Slight	Low to moderately low	Low
6		0-16			
5		0-16		Moderately high to high	
4		9-30	Moderate	Low to moderately low	Moderate
3		9-30		Moderately high to high	
2		30-50	High	Low to moderately low	High
1a	Least	30+		Moderately high to high	
1b		Poor natural drainage			
1c		Fragile flora and fauna			

Source: Bailey 1974

Table 3.7-3. Characteristics of Lands by Land Capability District and Suitable Uses Based on Relative Tolerance Levels		
Land Capability District	**General Characteristics**	**Intensity of Uses**
LCDs 5-7 (Low hazard lands)	Areas of gently sloping foothills and plains with deep soils.	Generally suited for various development activities as well as for concentrated public occupancy. Access should be by high-standard roads and trails. May support most kinds of intensive or mass recreational uses. Facilities include campgrounds, recreation residences, hotels, and resorts or other commercial services where it does not destroy other values.
LCDs 3 and 4 (Moderate hazard lands)	Characterized by moderately steep mountain slopes. Often provide visual backdrops for low hazard areas.	Recreation use may be varied and concentrated, including campgrounds, picnic areas, and winter sport sites. Access should be by low-standard roads and trails. Low-density housing may be permitted, as well as limited forestry.
LCD 2 (High hazard lands)	Characterized by steep slopes and a fragile environmental balance with unique plants and animals. Also provide backdrops and foregrounds for surrounding areas.	Suited for limited recreation, restricted grazing, and selective timber harvest due to erosion hazard or very steep slopes. Should remain generally in their natural condition. Access facilities should be restricted to foot and horse trails. Recreation use should be dispersed and limited to hiking, backcountry camping, and fishing. These lands should not be managed for intensive commercial resource use.
LCD 1 (High hazard lands)	Includes mountain tops with little to no soil mantle and very steep slopes with shallow soils. Subclasses (i.e., 1a, 1b, 1c) include marshes, floodplains, meadows, and beaches.	Some of the uses under LCD 2 apply to LCD 1 as well. However, LCD 1 areas are not suitable for development, grazing, or forestry. LCD 1 areas have value for wildlife, recreation, and protection of water supplies.
Source: Data compiled by Ascent from Bailey 1974		

Table 3.7-4. TRPA Base Land Coverage Coefficients	
Land Capability District	**Base Allowable Coverage Percent (%)**
6, 7	30
5	25
4	20
3	5
2	1
1a, 1b, 1c	1
Source: TRPA Code of Ordinances, Chapter 30	

Chapter 33 – Grading and Construction

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

Section 33.3 describes TRPA's requirements for grading and construction schedules for certain projects. Submittal and approval of grading and construction schedules may be required, as a condition of approval, for

projects presenting special problems with regard to project completion, site development, or water quality management (e.g., crossings of SEZs, major earthworks, or major clearing projects).

Section 33.4 of the Code provides for special investigations, reports, and plans as part of an application or as a condition of project approval, as determined to be necessary by TRPA to protect the environment against significant adverse effects from grading projects. The report shall provide information sufficient to determine the effect of grading projects on stability, groundwater, or antiquities.

Section 33.4.1 lists the following locations that may be grounds for requiring subsurface investigations and reports:

- fault zones;
- contact zones between two or more geologic formations;
- zones of trapped water or high water tables;
- areas where bodies of intrusive materials, such as rocks or boulders, are prevalent;
- historic landslide areas or areas where the topography indicates prehistoric landslides;
- adversely sloped bedding planes, short-range folding areas, overturned folds, fractures, and other geologic formations of similar importance;
- proposed or existing fill slopes above a cut slope;
- proposed or existing cuts exceeding 20 feet in height, unless in competent rock;
- proposed or existing fills exceeding 20 feet in height;
- areas where groundwater from either the grading or adjoining parcels is likely to reduce substantially the subsurface stability;
- areas showing characteristics of seeped soils or areas of water influence; or
- areas in the vicinity of historic resources, as identified by the TRPA Historic Resource map, or in other locations where antiquities could be located.

Chapter 53 – Individual Parcel Evaluation System

Chapter 53 of the Code establishes the IPES and related procedures, in accordance with the 1987 Regional Plan Implementation Element (Development and Implementation Priorities, Goal 1, Policy 1). In accordance with Chapter 53, vacant residential parcels within the Region are evaluated, assigned a numerical IPES score, and ranked within each local jurisdiction from most suitable to least suitable for development.

IPES was developed and implemented to respond to the inability to construct new single-family dwellings on sensitive lands (LCDs 1–3). IPES was created through a consensus process and applies to all new single-family residential development from May 27, 1987, onward. The ability to develop on what would be the equivalent of LCDs 1–3, or sensitive lands, is based on the determination that the local jurisdiction has met numerous other environmental criteria (e.g., the retirement of a specified percentage of sensitive parcels, installation of water quality improvements) that collectively provide enough environmental improvements to offset any impacts. IPES further differs from the Bailey System in that it examines a host of site-specific soil and parcel development criteria and can result in allowable coverage ranging from 1 to 30 percent. Although, at the individual parcel level, allowable coverage under IPES may differ from the Bailey System, the two systems are intended to be equivalent when considered in the aggregate and therefore to meet coverage threshold standard criteria.

TRPA Code Section 30.4.2(A)(1) specifies the maximum amount of coverage (base plus transferred) allowed on residential parcels up to four units. Under this provision, additional coverage may be allowed on the IPES parcel that would be the equivalent of LCDs 1–3.

Chapter 60 – Best Management Practice Requirements

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

WATER QUALITY MANAGEMENT PLAN

The Water Quality Management Plan for the Lake Tahoe Region (208 Plan) was prepared by TRPA in compliance with Section 208 of the federal Clean Water Act (CWA). The 208 Plan contains overlapping elements with the TRPA Regional Plan, including the Handbook of Best Management Practices, the Stream Environment Zone Protection and Restoration Program, and the Capital Improvements Program for Erosion and Runoff Control. The 208 Plan identifies pollution sources, control needs, and management practices to improve water quality. The 208 Plan is scheduled to be updated concurrent with the Regional Plan Update to ensure that overlapping elements of the 208 Plan are consistent with the Regional Plan.

The 208 Plan management programs pertain to urban runoff and erosion, airborne nutrients, waste management, natural area management, and water quality issues in Lake Tahoe and the Shorezone. Programs are implemented through designated management agencies, including TRPA, the U.S. Forest Service Lake Tahoe Basin Management Unit (LTBMU), the Nevada Division of Environmental Protection, the LRWQCB, and local governments. To determine if water quality goals are attained and maintained, water quality programs require continuous scientific monitoring of environmental conditions related to the threshold standards for pelagic Lake Tahoe, littoral Lake Tahoe, tributary streams, surface runoff, groundwater, land coverage, and SEZs. TRPA publishes annual or semi-annual reports on monitoring program implementation and must evaluate the results at least every 5 years (LRWQCB 2011). For further information on the Water Quality Management Plan for the Lake Tahoe Region, water quality threshold standards, and the potential water quality impacts related to the Regional Plan Update, see Section 3.8, Hydrology and Water Quality.

FEDERAL

NATIONAL EARTHQUAKE HAZARDS REDUCTION PROGRAM

The National Earthquake Hazards Reduction Act was passed to reduce the risks to life and property resulting from earthquakes. To accomplish this, the act established the National Earthquake Hazards Reduction Program (NEHRP). The mission of NEHRP includes improved understanding, characterization, and prediction of hazards and vulnerabilities; improved building codes and land use practices; risk reduction through post-earthquake investigations and education; development and improvement of design and construction techniques; improved mitigation capacity; and accelerated application of research results. The NEHRP designates the Federal Emergency Management Agency (FEMA) as the lead agency of the program and assigns several planning, coordinating, and reporting responsibilities. Other agencies involved in the NEHRP are the National Institute of Standards and Technology, the National Science Foundation, and the U.S. Geological Survey (USGS).

BUILDING STANDARDS CODE

The International Code Council (ICC) is responsible for developing building codes that must be complied with when constructing residential or commercial buildings throughout the United States. Building codes developed by the ICC include the International Building Code (IBC), the Uniform Building Code (UBC), and the International Residential Code (IRC), among others.

STATE

CALIFORNIA

California Tahoe Conservancy

The mission of the California Tahoe Conservancy (CTC) is to preserve, protect, restore, enhance, and sustain the unique and significant natural resources and recreational opportunities of the Lake Tahoe Region (California Government Code, Title 7.42 Sections 66905 to 66908.3). CTC's jurisdiction extends throughout the California side of the Lake Tahoe Region, as defined in California Government Code Section 66905.5. In 1987, CTC authorized staff to develop and implement a Land Coverage (Land Bank) Program. Through this program, CTC acquires properties eligible for purchase through willing sellers. The development potential on these properties is retired. All rights and credits acquired by CTC are stored in a Land Bank. Through a Memorandum of Understanding (MOU) with TRPA, CTC is authorized to receive disbursements of TRPA excess coverage mitigation fees to perform coverage reduction through its Land Bank (TRPA and CTC 1988). The MOU also authorizes CTC to sell coverage rights on the open market and conduct SEZ restoration or mitigation for private or public service projects through the Land Bank (CTC 2012a).

The benefits of CTC's Land Coverage Program include acquisition and restoration of developed areas that have become degraded and that are contributing to, or have the potential to contribute to, water quality problems; protecting land before development activities can generate the need for mitigation; performing ongoing management to ensure that resource benefits are sustained; assisting property owners in complying with regional land coverage policies so that they can construct or rehabilitate homes and businesses; and simplifying and expediting public and private projects (CTC 2012a).

Alquist-Priolo Earthquake Fault Zoning Act

The Alquist-Priolo Act (Public Resources Code Sections 2621–2630) was passed in 1972 to mitigate the hazard of surface faulting to structures designed for human occupancy. The main purpose of the law is to prevent the construction of buildings used for human occupancy on the surface trace (the intersection of a fault with the ground surface) of active faults. The law addresses only the hazard of surface fault rupture and is not directed toward other earthquake hazards. The Alquist-Priolo Act requires the State Geologist to establish regulatory zones known as "Earthquake Fault Zones" around the surface traces of active faults and to issue appropriate maps. The maps are distributed to all affected cities, counties, and state agencies for their use in planning efforts. Before a project can be permitted in a designated Alquist-Priolo Earthquake Fault Zone, cities and counties must require a geologic investigation to demonstrate that proposed buildings would not be constructed across active faults.

Seismic Hazards Mapping Act

The Seismic Hazards Mapping Act of 1990 (Public Resources Code Sections 2690–2699.6) addresses earthquake hazards from nonsurface fault rupture, including liquefaction and seismically induced landslides. The act established a mapping program for areas that have the potential for liquefaction, landslide, strong ground shaking, or other earthquake and geologic hazards. The act also specifies that the lead agency for a project may withhold development permits until geologic or soils investigations are conducted for specific sites and mitigation measures are incorporated into plans to reduce hazards associated with seismicity and unstable soils.

Water Quality Control Plan for the Lahontan Region

Water quality standards and control measures for surface water and groundwaters of the Lahontan Region are contained in the *Water Quality Control Plan for the Lahontan Region* (Basin Plan). The Basin Plan designates beneficial uses for water bodies. It also establishes water quality objectives, waste discharge prohibitions, and other implementation measures to protect those beneficial uses.

Chapter 5 of the Basin Plan, Water Quality Standards and Control Measures for the Lake Tahoe Basin, summarizes a variety of control measures for the protection and enhancement of Lake Tahoe. Implementation of the Basin Plan is a bi-state, interagency effort. Many of the control measures can best be implemented by local governments or TRPA, but LRWQCB and the State Water Resources Control Board are ultimately responsible for implementation. To the extent that other agencies do not make and fulfill implementation commitments, LRWQCB will carry out these control measures. Similar control measures are implemented by TRPA and the Nevada Division of Environmental Protection for the Nevada portion of the Tahoe Region.

Elements of the Basin Plan relevant to geology, soils, land capability, and coverage within the California portion of the Region are as follows.

- **Best Management Practices:** Use of BMPs is mandatory for all new development, must be retrofitted for existing development, and is required for resource management uses (e.g., timber harvest, livestock grazing).
- **Land Coverage Restrictions:** The Bailey System limits the amount of allowable impervious surface coverage, especially on lands with high erosion hazard and in SEZs. This element contains limited exceptions for public projects, coverage transfer, and coverage relocation.
- **Roads and Rights-of-Way:** Permits granted by LRWQCB implement controls for issues related to erosion from new and existing roads, road maintenance activities, and snow and ice control.

California Building Standards Code

The state of California provides minimum standards for building design through the California Building Standards Code (California Code of Regulations, Title 24). Where no other building codes apply, Chapter 29 regulates excavation, foundations, and retaining walls. The California Building Standards Code (CBC) applies to building design and construction in the state and is based on the federal Uniform Building Code (UBC), used widely throughout the country (generally adopted on a state-by-state or district-by-district basis). The CBC has been modified for California conditions with more detailed and/or more stringent regulations.

The state earthquake protection law (California Health and Safety Code Section 19100 *et seq.*) requires that structures be designed to resist stresses produced by lateral forces caused by wind and earthquakes. Specific minimum seismic safety and structural design requirements are set forth in Chapter 16 of the CBC. The CBC identifies seismic factors that must be considered in structural design.

Chapter 18 of the CBC regulates the excavation of foundations and retaining walls, and Appendix Chapter A33 regulates grading activities, including drainage, erosion control, and construction on unstable soils (e.g., expansive soils and areas subject to liquefaction).

NEVADA

Nevada Division of State Lands

The Nevada Division of State Lands (NDSL) leads the state's programs to protect Lake Tahoe. NDSL administers the excess coverage mitigation program for the Nevada portion of the Lake Tahoe Region, which is funded by excess coverage mitigation fees disbursed from TRPA. The objective of this program is to improve the water quality of Lake Tahoe through the retirement of land coverage and restoration of disturbed lands. This program acquires land and land coverage. Acquired lands are protected and are not available for development or disposal. Management goals include clean water, healthy forests, the reduction of excess fire fuels and hazardous forest conditions, good wildlife habitat, and reasonable public access.

3.7.2 AFFECTED ENVIRONMENT

LAND COVERAGE

Permanent land disturbance in the Tahoe Region is measured in terms of land coverage, including impervious surfaces and significantly degraded soil conditions that do not readily self-mitigate after the disturbance has ceased. The TRPA Code (Chapter 90) defines land disturbance as the "alteration of soil, vegetation, surface hydrology, or subsurface hydrology on a temporary or permanent basis, through action including, but not limited to, grading." Significant soil disturbance is defined as:

> damage to soil structure, chemistry and biota through compaction, burning, removal or topsoil, soil contamination or other activities, to the degree that there may be reduced vegetation growth, increased surface runoff or erosion. Soil compaction and other disturbance potential can vary depending upon soil type, rooting depth, soil moisture content, surface litter thickness and compaction forces.

HARD LAND COVERAGE

Hard land coverage (impervious cover), as defined by Chapter 90 of the TRPA Code, is any human-made structure, improvement, or covering that prevents normal precipitation from directly reaching the surface of the land underlying the structure, improvement, or covering. These typically include, but are not limited to, roofs, decks, asphalt, concrete, tennis courts, and patios. A structure, improvement, or covering is not considered land coverage by TRPA if it allows at least 75 percent of normal precipitation to reach the ground directly and permits growth of vegetation on the approved species list. Impervious cover can result in water quality degradation, flooding, and soil erosion. It affects natural hydrology and water quality by preventing rainfall and snowmelt from infiltrating into the soil (to subsurface flows) and causing it to become surface runoff.

SOFT LAND COVERAGE

Soft land coverage (soil compaction), as defined by Chapter 90 of the TRPA Code, includes artificially compacted areas without human-made structures, where the soil has become sufficiently altered and/or compacted so as to prevent substantial infiltration. Causes may include, but are not limited to, the parking of cars and heavy and repeated pedestrian traffic. Soil compaction inhibits natural water and soil-air storage by reducing pore space in the soil. Reduced soil water-storage capacity affects plant growth and increases runoff and sediment export.

STREAM ENVIRONMENT ZONES

"Stream Environment Zone" or SEZ is a term used by TRPA to describe perennial, intermittent, and ephemeral streams and drainages, wet meadows, marshes, and other wetlands; riparian areas; and other areas expressing the presence of surface water or near-surface groundwater. SEZ areas generally possess the following characteristics: riparian or hydric (wet site) vegetation; alluvial, hydric soils; and the presence of surface water or near-surface groundwater at least part of the year. While SEZs may only make up 5 percent of the land area in the Region, they provide key habitat for 84 percent of the 250 wildlife species in the Region and can help to reduce sediment and nutrient runoff concentrations by 70-90 percent. SEZs can also provide dispersed recreation opportunities, scenic open space, flood flow capacity, and buffers within urban areas (CTC 2012b). Protecting and restoring SEZs is essential for improving and maintaining the environmental amenities of the Lake Tahoe Region and for achieving environmental threshold standards for water quality, vegetation preservation, and soil conservation.

EXISTING COVERAGE

Existing Coverage Based on Bailey Land Capability Map

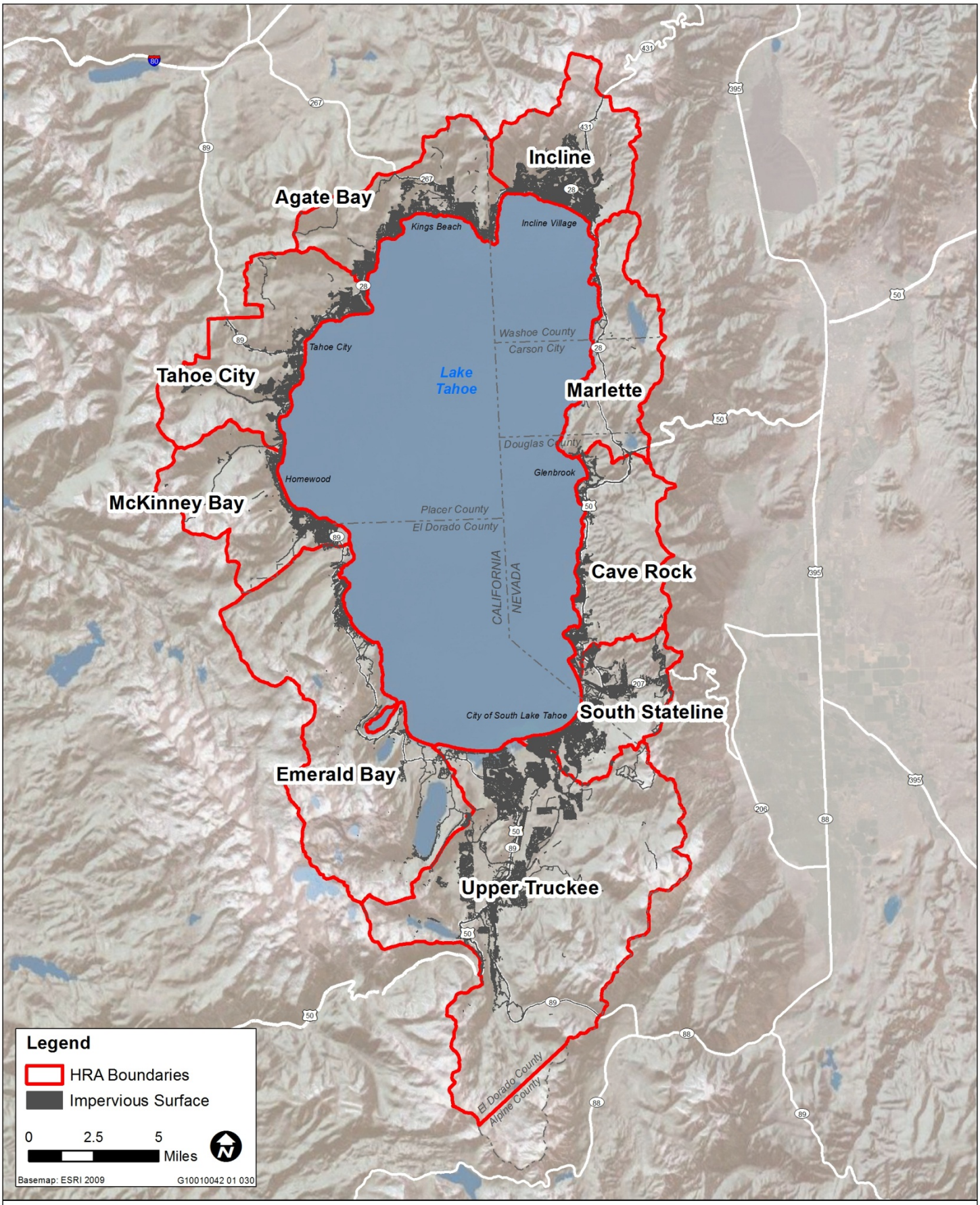
To assist in application of the Bailey Land Classification System, TRPA uses a Land Capability Overlay Map (Bailey map). The Bailey map was based, primarily, on the best available soil, slope, and geomorphic hazard information available in 1974, when the classification system was created. TRPA uses the Bailey map as the starting point to determine the land capability and allowable coverage for a site on which a project is proposed. The actual land capability is determined through a land capability verification or challenge process, which uses an on-the-ground assessment and other available information to adjust the land capability districts as shown in the Bailey map. A land capability verification confirms and/or adjusts the soil type and LCD presented in the Bailey map, whereas a land capability challenge may allow for the identification of an entirely different soil type and LCD than presented in the Bailey map.

As applied to the entire Region, the Bailey map results in a maximum allowable coverage of 10,941 acres, or approximately 5.4 percent of the Region's land area (Table 3.7-5). Based on a preliminary assessment of remote sensing data collected in 2010, approximately 7,254 acres of hard coverage (approximately 3.6 percent of the land area) currently exist in the Region, as illustrated in Exhibit 3.7-1. Based on the Bailey map, the Region as a whole has less than the allowable amount of coverage; however, several land capability classes, including some of the most sensitive lands, currently have more coverage than would otherwise be allowed. As shown in Table 3.7-5, LCD 1a is over covered by 102 acres; LCD 1b (SEZ) is over covered by 1,225 acres; LCD 2 is over covered by 159 acres; and LCD 7 is over covered by 17 acres. Table 3.7-5 identifies the relative amounts of existing coverage per LCD, but likely underestimates the total amount of existing coverage because the remote-sensing data does not include all soft coverage.

Table 3.7-5. Region-wide Existing and Allowable Coverage by Land Capability District Based on Bailey Land Capability Map

Land Capability District	Total Area Within Class (acres)	Allowable Impervious Cover (%)	Impervious Surface Allowed Within Class (acres)	Estimated Area of Impervious Cover (acres)[1]	Existing Impervious Surface Within Class (%)	Difference from Allowable (%)	Area Over or Under Covered (acres)
1a	72,440	1	724	827	1.1	0.1	102
1b (SEZ)	17,485	1	175	1,400	8.0	7.0	1,225
1c	54,807	1	548	286	0.5	(0.5)	(262)
2	10,134	1	101	261	2.6	1.6	159
3	12,775	5	639	495	3.9	(1.1)	(143)
4	7,142	20	1,428	639	8.9	(11.1)	(789)
5	15,361	25	3,840	1,447	9.4	(15.6)	(2,393)
6	8,583	30	2,575	972	11.3	(18.7)	(1,603)
7	3,032	30	910	927	30.6	0.6	17
Total	**201,760**	**5.4**	**10,941**	**7,254**	**3.6**	**(1.8)**	**(3,687)**

Source: TRPA; Aerial LIDAR data collected in summer 2010.



Source: TRPA 2011

Exhibit 3.7-1. Existing Impervious Surfaces within Hydrologically Related Areas

Existing Coverage Based on 2007 NRCS Soil Survey

In 2007, the USDA Natural Resource Conservation Service (NRCS) completed a new soil survey of the Tahoe Region and translated the soil survey into LCDs using the Bailey Land Capability System. While the Bailey map is currently used by TRPA as the starting point for the land capability verification and challenge processes, the 2007 soil survey offers much higher resolution. Therefore, the 2007 soil survey is used in addition to the Bailey map in this EIS analysis to provide an additional estimate of the potential coverage impacts of the various Regional Plan Update alternatives.

It is important to note that land capability based on the 2007 soil survey, and therefore allowable coverage, differs from the 1974 Bailey map in several ways. The Bailey map and 2007 soil survey used slightly different map boundaries, resulting in approximately a 200-acre difference in the extent of each map. The land capability map developed by Bailey (1974) was conducted at a large scale and focused on areas where development was likely, rather than on remote public lands. In many cases, areas of high capability lands (as determined by soil type) were fully surrounded by low capability lands. The Bailey map reclassified these areas of high capability soils into the lower capability 1a land capability class (i.e., only 1 percent allowable coverage). The 2007 soil survey does not reclassify land capability classes in this way; it retains the land capability classification as determined by soil type, erodability, and slope. This accounts for some of the differences in total area of each land capability class between the Bailey map and the 2007 soil survey.

As applied to the entire Region, the 2007 soil survey results in a maximum allowable coverage of 19,984 acres, or approximately 10 percent of the Region's land area (Table 3.7-6). Based on a preliminary assessment of remote sensing data collected in 2010, approximately 7,263 acres of coverage (approximately 3.6 percent of the land area) currently exist in the Region. Like the Bailey map, the 2007 soil survey shows that the Region as a whole has less than the allowable amount of coverage; however, LCD 1b (SEZ) lands are shown to be over covered by 657 acres (Table 3.7-6).

Table 3.7-6. Region-wide Existing and Allowable Coverage by Land Capability District based on NRCS 2007 Soils Survey

Land Capability District	Total Area Within Class (acres)	Allowable Impervious Cover (%)	Impervious Surface Allowed Within Class (acres)	Estimated Area of Impervious Cover (acres)	Existing Impervious Surface Within Class (%)	Difference from Allowable (%)	Area Over or Under Covered (acres)
1a	23,558	1	236	119	0.5	(0.5)	(116)
1b (SEZ)	11,304	1	113	770	6.8	5.8	657
1c	53,957	1	540	435	0.8	(0.2)	(104)
2	23,648	1	236	213	0.9	(0.1)	(24)
3	16,920	5	846	257	1.5	(3.5)	(589)
4	32,386	20	6,477	1,097	3.4	(16.6)	(5,380)
5	10,347	25	2,587	1,036	10	(15.0)	(1,551)
6	24,308	30	7,292	2,062	8.5	(21.5)	(5,230)
7	5,525	30	1,658	1,274	23.1	(6.9)	(383)
Total	**201,953**	**9.9**	**19,984**	**7,263**	**3.6**	**(6.3)**	**(12,721)**

Source: NRCS; TRPA; Aerial LIDAR data collected in summer 2010

COVERAGE AS A TRANSFERABLE RIGHT

The Implementation Element of the 1987 Regional Plan created several classes of transferable rights and entitlements related to existing and new development: coverage (impervious surface), residential development rights, residential allocations, and CFA and TAUs (as discussed in Section 3.2, Land Use). Coverage is the most

frequently traded commodity in the Tahoe Region (Solimar Research Group 2003). The Region-wide limits on allowable coverage by LCD (Table 3.7-5) form the basis of the transferable rights for coverage. Landowners are permitted to cover between 1 and 30 percent of their property with impervious surface, depending on its environmental sensitivity. Property owners who have created less than their allotted amount of coverage (or none at all) may sell that "potential" coverage to other property owners. In some instances, coverage in excess of the allowable coverage amount can be verified as legally existing, thereby becoming a marketable right. In other words, such coverage is "grandfathered in" because it was established prior to the existence of TRPA. Property owners who have already exceeded their allocated amount (i.e., base allowable coverage) and seek new permits from the TRPA are said to have "excess coverage" and are required to remove a portion of the excess coverage, retire coverage off-site, or pay an excess coverage mitigation fee.

HYDROLOGICALLY RELATED AREAS

The existing Regional Plan partitions the Tahoe Region into a series of nine hydrologically related areas (HRAs) based on the boundaries of adjacent watersheds (Exhibit 3.7-1). The intent of the HRA concept is described in the EIS for the existing Regional Plan (Goals and Policies, p. II-17), which states: "(TRPA) will limit transfers of coverage to a reasonable distance from the receiving site, so that the effect on water quality of coverage within the area is no worse than if the development were confined to the respective parcels."

The existing 1987 Regional Plan applies the HRA concept in the following ways:

- Transfers of coverage may occur only from within the same HRA.
- Excess coverage mitigation fees generated from projects that maintain legally existing but non-conforming coverage (i.e., "grandfathered" coverage in excess of the base allowable) can only be used to remove or retire coverage within the same HRA.
- Project proponents who choose to mitigate their excess coverage by removing coverage off-site must remove that off-site coverage within the same HRA as their project.

GEOLOGY AND SOILS

GEOLOGIC CONDITIONS

The Lake Tahoe Basin is located in the Sierra Nevada Range geomorphic province. The Sierra Nevada is a tilted fault block with a gentle western slope and a steep, rugged eastern escarpment. It runs through eastern California, from the Mojave Desert in the south to the Cascade Range and Modoc Plateau on the north, for more than 400 miles and averages 50–80 miles wide. The Sierra Nevada Range geomorphic province is primarily composed of cretaceous granitic plutons, remnants of Paleozoic and Mesozoic metavolcanic and metasedimentary rocks, and Cenozoic volcanic and sedimentary rocks. It is bounded on the west by sedimentary rocks of the Great Valley geomorphic province and on the north by volcanic sheets extending south from the Cascade Range (California Geological Survey [CGS] 2002: p. 2).

The Lake Tahoe Basin is located in the northern Sierra Nevada, between the Sierra crest to the west and the Carson Range to the east, and is one of the most prominent mountain ranges in California (Saucedo 2005: p. 1). The southern part of the Basin is a flat plain of lakebed deposits, glacial outwash, and glacial moraines bounded by high peaks of granite and metamorphic rock. The northern part is extensive volcanic rocks. Faulting and volcanism created the Lake Tahoe Basin more than 2 million years ago and, as a result, the Basin contains granitic, metamorphic, and volcanic rock (TRPA and USFS 1971: pp. 7-8).

Granitic rocks underlie the entire Basin; however, in the northern and northwestern parts, basement rocks are covered by younger Tertiary and Quaternary volcanic rocks derived through erosion of the volcanic and granitic rocks. Younger glacial moraines, tills, glacial outwash, and lakebed sediments form extensive deposits in the

southern part of the Basin; similar but less extensive deposits lie to the northwest but are much less common in the eastern part of the Basin in Nevada (TRPA and USFS 1971: pg. 8).

TOPOGRAPHY

Elevations of the peaks in the Tahoe Basin range from approximately 8,000 to almost 11,000 feet above sea level. The Region consists mostly of steeply sloping mountains with a few flat or moderately sloping areas where most of the development has occurred.

SEISMIC SETTING

The potential for seismic activity is related to the proximity of faults, which are fractures or zones of closely associated fractures along which rocks on one side have been displaced with respect to those on the other side. Most faults are the result of repeated displacement that may have taken place suddenly and/or by slow creep (Bryant and Hart 2007: p. 3).

The Lake Tahoe Basin is located in a seismically active area of the United States. The Basin lies within a tectonically active, asymmetric half-graben, a depressed block of land bordered by a major fault. Evidence shows that Tahoe Basin faults have had pre-historic earthquakes of a magnitude of 7.0 within the past 10,000 years. However, scientists believe that large earthquakes are “rare events” in the Basin, meaning quakes of magnitude 6.5 or greater occur on individual faults about every 3,000 to 4,000 years (Segale and Cobourn 2005: p. 1). None of the Tahoe Region counties include Earthquake Fault Zones under the Alquist-Priolo Earthquake Fault Zoning Act of California; the closest mapped fault zone (within two miles of the Region) occurs in Alpine County to the south (CGS 2010).

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

According to the Earthquake Potential Map for Portions of Eastern California and Western Nevada (CGS 2005), the Lake Tahoe Basin is considered to have relatively low to moderate potential for shaking caused by seismic-related activity. However, earthquakes occurring nearby, such as the Reno-Carson urban corridor, have the potential to trigger secondary hazards in the Basin.

FAULTS AND FAULT RUPTURE

Earthquake Fault Zones are delineated around active faults and are used for planning and construction purposes. Under the Alquist-Priolo Act, an active fault is one that has ruptured in the last 11,000 years (within Holocene time). An early Quaternary fault has had surface displacement during the last 1.6 million years (Quaternary time) and a pre-Quaternary fault has had surface displacement before the Quaternary period. An Alquist-Priolo Earthquake Fault Zone is located within two miles of the Lake Tahoe Basin in Alpine County (Bryant and Hart 2007: p. 19).

Table 3.7-7 lists faults that are found within the Lake Tahoe Region that have been sources of magnitude > 6 earthquakes during the Quaternary period (past 1.6 million years) (USGS and CGS 2006). None of these faults or fault zones is located in an Alquist-Priolo Earthquake Fault Zone (Bryant and Hart 2007, p. 3).

Table 3.7-7. Lake Tahoe Basin Faults	
Name	Age (years)
Agate Bay Fault	< 1,600,000
East Tahoe Fault	< 1,600,000
Incline Village Fault	< 15,000
Little Valley Fault	< 1,600,000
North Tahoe Fault	< 15,000
Tahoe-Sierra Frontal Fault Zone	< 1,600,000
Tahoe Valley Fault Zone	< 1,600,000
Unnamed	< 1,600,000
West Tahoe-Dollar Point Fault Zone	< 15,000 < 130,000 < 1,600,000
Source: USGS and CGS 2006	

GROUND FAILURE/LIQUEFACTION

Soil liquefaction occurs when ground shaking from an earthquake causes a sediment layer saturated with groundwater to lose strength and take on the characteristics of a fluid. Factors determining the liquefaction potential are soil type, the level and duration of seismic ground motions, the type and consistency of soils, and the depth to groundwater. Loose sands and peat deposits are susceptible to liquefaction, while clayey silts, silty clays, and clays deposited in freshwater environments are generally stable under the influence of seismic ground shaking (CGS 2008: pp. 35-37). Liquefaction poses a hazard to engineered structures. The loss of soil strength can result in bearing capacity insufficient to support foundation loads, increased lateral pressure on retaining or basement walls, and slope instability. Sites underlain by relatively loose sandy soils and saturated deposits of fill combined with a shallow groundwater table, which typically are located in alluvial river valleys/basins and floodplains, are susceptible to liquefaction. Liquefaction potential within the Lake Tahoe Basin exists in low-lying areas composed of loose, unconsolidated, saturated, clay-free glacial material and certain areas with a high water table.

SUBSIDENCE

Land surface subsidence can be induced by both natural and human phenomena. Natural phenomena include: subsidence resulting from tectonic deformations and seismically induced settlements; soil subsidence from consolidation, hydrocompaction, or rapid sedimentation; subsidence from oxidation or dewatering of organic rich soils; and subsidence related to subsurface cavities. Subsidence related to human activity includes subsurface fluid or sediment withdrawal. Pumping of water for residential, commercial, and agricultural uses from subsurface water tables causes more than 80 percent of the identified subsidence in the United States (Galloway et al. 1999: p. 1). Lateral spreading is the horizontal movement or spreading of soil toward an open face, such as a streambank, the open side of fill embankments, or the sides of levees. The potential for failure from subsidence and lateral spreading is highest in areas where there is a high groundwater table, where there are relatively soft and recent alluvial deposits, and where creek banks are relatively high.

SLOPE STABILITY

A landslide is the downhill movement of masses of earth material under the force of gravity. The factors contributing to landslide potential are steep slopes, unstable terrain, and proximity to earthquake faults. This process typically involves the surface soil and an upper portion of the underlying bedrock. Expansive soil on slopes tends to shrink and swell in response to moisture content changes. During this shrinking and swelling process, gravity tends to work the soil downslope. Movement may be very rapid, or so slow that a change of

position can be noted only over a period of weeks or years (creep). The size of a landslide can range from several square feet to several square miles. The varied topography within the Lake Tahoe Basin makes many areas susceptible to landslide hazards. The main hazards associated with alpine granitic terrains in the Basin are rock falls on steep slopes of massive granite and erosion of decomposed granite on both gentle and steep slopes. However, as described above, the Land Use Element, Natural Hazards Subelement, Goal 1, Policy 1 restricts construction, reconstruction, or replacement of structures in identified avalanche or mass instability hazard areas unless precautionary measures can be implemented to insure protection of public health and safety.

EROSION AND LOSS OF TOPSOIL

Erosion is the process in which materials of the earth's surface (sediment, soil, rock, and other particles) are loosened, dissolved, or worn away, and transported from one place to another by natural agents. Soil erosion includes wind erosion and water erosion. Erosion potential is characterized by steep slopes and loose texture that can be eroded by water or wind forces. Human activity tends to increase erosion potential, primarily through the development of structures and impervious surfaces and the removal of vegetative cover.

EXPANSIVE SOILS

Expansive soils contain shrink-swell clays that are capable of absorbing water. As water is absorbed the clays increase in volume. This change in volume is capable of exerting enough force on buildings and other structures to damage foundations and walls. Damage can also occur as these soils dry out and contract.

According to the Swelling Clays Map of the Coterminous United States, the Tahoe Basin falls within an area that is underlain with little to no clays with swelling potential (USGS 1989). However, soil units mapped within the Basin contain soils with low to high shrink/swell potential (NRCS 2007).

TSUNAMI/SEICHE

A tsunami is a wave or series of waves that may result from a major seismic event that involves the displacement of a large volume of water and can occur in any large body of water. A seiche is a periodic oscillation of an enclosed or restricted water body, typically a lake or reservoir, produced by seismic shaking. A sieche results in a potentially damaging wave, similar to a tsunami, which may result from seismic activity near a large lake. A seiche (wave) may occur in periods that differ from a tsunami; however, should the period of wave propagation occur simultaneously with a tsunami, it could result in cumulative seismic-related wave effects.

3.7.3 ENVIRONMENTAL CONSEQUENCES AND RECOMMENDED MITIGATION MEASURES

METHODS AND ASSUMPTIONS

Evaluation of coverage changes and geologic hazards that could result from each alternative was based on a review of documents pertaining to the Region, including the Bailey Land Capability map, the NRCS 2007 soil survey, TRPA regulations and planning documents, and published and unpublished geologic literature. In determining the level of significance of geologic hazard impacts, the analysis assumes that the Regional Plan Update would comply with relevant federal, state, and local ordinances and regulations. Additionally, soils and coverage impacts are closely related to hydrologic conditions and water quality, which are addressed in Section 3.8 of this EIS.

For Impact 3.7-1, it would be too speculative to predict the exact amount and location of land coverage that would result from each of the alternatives. Under each Regional Plan Update alternative, the amount of new coverage would depend on the design and location of individual projects, which would be subject to existing and proposed

regulations that ensure the maximum allowable coverage is not exceeded at the project scale. Each alternative would also include the removal of existing coverage as a result of the continuation or modification of certain programs and provisions, such as coverage transfer requirements, the excess coverage mitigation program, and the Environmental Improvement Program. A good-faith effort was made to disclose the potential amount and distribution of coverage that could result from new development, changes to coverage transfer ratios, and the maximum allowable coverage in community centers in each Regional Plan Update alternative.

The location and extent of existing coverage (Tables 3.7-5 and 3.7-6) was based on impervious surfaces derived from aerial LIDAR data and multi-spectral satellite images collected in August 2010. The amount of new coverage associated with each unit of development—tourist accommodation unit (TAU), commercial floor area (CFA), residential allocation, and residential bonus unit—was based on an average coverage per unit derived from a sample of existing developed units. New coverage scenarios were applied to both the Bailey Land Capability map (Table 3.7-8) and the 2007 NRCS soil survey (Table 3.7-9). The 1974 Bailey map is used to establish the level of significance of changes in coverage because it is both the map used initially by TRPA in land capability verifications and is the most conservative approach (i.e., the land district boundaries in the Bailey map provide for less coverage, when aggregated across the entire Region, than the 2007 soil survey). The 2007 soil survey is also used, even though it is not an adopted map, because it provides higher resolution soils information based on extensive field verifications, which is considered to be the best available information to estimate the location and extent of many LCDs. Coverage scenarios were estimated separately based on each map; this provides a range of coverage impacts and addresses some of the variability that could result from future site-specific land capability verifications. The methodology utilizes five separate components: (1) estimate coverage resulting from each type of authorized allocation; (2) estimate the total amount of coverage within and outside community centers; (3) distribute new coverage to individual land capability districts (LCDs); (4) estimate the coverage transfer requirement; and (5) distribute the coverage reductions to individual LCDs. The coverage estimates (Tables 3.7-8 and 3.7-9) assume that all authorized development would be built for each alternative, and that the distribution of that development would reflect distribution assumptions used in the TRPA transportation demand model. Coverage reductions from transfers reflect the transfer ratios proposed in each alternative and the amount of coverage that would need to be transferred to allow for the amount and distribution of development authorized under each alternative. Estimates of new coverage were assigned to individual land capability districts based on the proportion of each district in the areas where the development could occur. Coverage reductions from transfers were assumed to come from individual land capability districts based on the proportion of existing coverage within each district. Though based on reasonable assumptions and the best available data, these estimates represent one of many possible scenarios that could result from implementation of each of the alternatives. More details on coverage estimate methods and assumptions are available in Appendix H.

To assist in evaluating potential changes in the distribution of coverage resulting from the proposed transfer provisions, TRPA evaluated data that provides an indication of the degree to which HRAs would send or receive greater amounts of coverage Region-wide: (1) land values, (2) existing market price of coverage, and (3) inventory of coverage available for sale in each HRA. These factors were considered in aggregate to estimate the likelihood that each HRA would be a net sender or receiver of coverage transfers without HRA transfer restrictions in Alternative 3. More details on methods for analysis of HRA transfer and receiving areas are available in Appendix H.

SIGNIFICANCE CRITERIA

Implementation of the Regional Plan Update would result in a significant adverse effect related to coverage, geologic hazards, and soils if it would:

- allow compaction or coverage of soil with impervious surfaces beyond the aggregate base allowable limits per the Bailey land capability map (as shown in Table 3.7-5, above);
- cause a change in the topographic features of a site in a manner inconsistent with the natural surrounding conditions;
- substantially change undisturbed soil or native geologic substructures;
- cause an increase in wind or water erosion of soils;
- cause changes in siltation, deposition, or erosion that could modify the channel of a river or stream or the bed of a lake;
- substantially increase exposure of people or property to seismic hazards such as earthquakes, landslides, backshore erosion, avalanches, mud slides, ground failure, or similar hazards; or
- allow development in a geologic unit or on soil that is unstable or that would become unstable, potentially resulting in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse.

IMPACT ANALYSIS AND MITIGATION MEASURES

Impact 3.7-1 **Land Coverage**. Due to the potential availability of existing and proposed development rights and allocations, all Regional Plan Update alternatives would result in some increase in coverage throughout the Region; however, for all alternatives, the total increase would be well within the base allowable coverage for the Region. In addition, all development projects would be required to comply with existing and proposed land coverage policies and regulations, which establish the maximum allowable coverage (base plus transferred); prohibit additional coverage in sensitive lands; establish transfer ratios; and require mitigation of excess coverage. Therefore, any projects implemented under the Regional Plan Update that would result in additional coverage would be limited such that total coverage in the Region as established by the Bailey Land Classification System is not exceeded, and/or such that existing excess coverage is reduced.

Alternative 1 would result in the smallest coverage increase, an estimated 8 acres, because it would allow development of only the remaining 1987 Regional Plan allocations and would result in decreases in coverage on sensitive lands and increases in coverage on high-capability lands. Alternative 2 would result in a total estimated increase of 116 acres, with a decrease of 9 acres in LCD 1b (SEZ) and increases in coverage on high-capability lands. However, Alternative 2 would reduce the amount of total allowable coverage in Community Plan areas and DTZs and would increase transfer ratios, limiting the ability to transfer coverage compared to Alternative 1. Alternative 3 would result in a total estimated increase of 66 acres, with the largest decrease of coverage from SEZ (15 acres) and increases in coverage on high-capability lands, due to substantial changes to coverage policies providing incentives to transfer coverage from sensitive lands. Alternative 4, which would authorize more new development than Alternatives 1, 2, or 3, would result in an estimated coverage increase of 180 acres and an estimated decrease of 12 acres in SEZ. As in Alternative 3, Alternative 4 would change coverage policies to provide increased incentives for transfer of coverage from sensitive lands to high-capability lands in PTODs. Alternative 5 would authorize the most new development and would result in an estimated coverage increase of 202 acres, with a decrease of 10 acres in SEZ and increases in coverage on high-capability lands. However, Alternative 5, similar to Alternative 1, lacks any coverage policy changes to incentivize additional transfers of coverage from sensitive lands.

Although all alternatives would result in some increases in coverage, primarily through additional residential allocations, build-out of any of the Regional Plan Update alternatives would result in less than the total allowable coverage for the Region as determined by the Bailey System, and coverage of sensitive lands would be reduced. All alternatives would result in **less-than-significant** effects with regard to total coverage.

Land capability is defined as "the level of use an area can tolerate without sustaining permanent (environmental) damage through erosion and other causes" (Bailey 1974). Classification of land in this manner recognizes limitations on lands in the Region and is used to guide the types and intensities of uses on lands while controlling erosion and water quality and maintaining ecological balances. Impervious cover, or land coverage, such as asphalt, concrete, and roofs, prevents stormwater from being absorbed into the ground. When runoff bypasses this natural process, it is not filtered by the soil and does not contribute to local groundwater supplies. Excess runoff can overload stream channels and other receiving waters with both sediments and higher water volumes; erode stream banks; and unnecessarily damage vegetation.

The coverage policy passed as part of the 1987 Regional Plan limits the amount of impervious surface coverage allowed on parcels of land to protect water quality and soil function. The coverage policy consists of three primary elements:

- **Maximum Allowable Land Coverage.** The base allowable land coverage is determined by using the coefficients set forth in *Land Capability Classifications of the Lake Tahoe Basin* (Bailey 1974). Maximum land coverage is defined as allowable base land coverage plus allowed transferred coverage.
- **Land Coverage Transfer Ratios**. Land coverage transferred from one parcel ("sending parcel") to another parcel ("receiving parcel") must occur in accordance with ratios established in TRPA Code Chapter 30: Land Coverage (Section 30.4.4 Method of Transferring Land Coverage).
- **Excess Coverage Mitigation.** Land coverage in excess of the base allowable land coverage must be mitigated by the transfer of land coverage or through the land coverage mitigation program as defined in TRPA Code Chapter 30: Land Coverage (Section 30.6 Excess Land Coverage Mitigation Program).

Through revisions to the Goals and Policies, the five proposed Regional Plan Update alternatives would result in (1) different maximum allowable coverage coefficients in the community centers, (2) different land coverage transfer ratios, and (3) different policies regarding mitigation of excess coverage, as discussed in detail below. However, the total base allowable coverage for the Region as a whole—10,941 acres according to the Bailey map—would remain the same (Table 3.7-5). Hand-in-hand with the proposed transferable rights and allocations discussed in Section 3.2, Land Use, the proposed coverage policies would limit total coverage in the Region, encourage concentration of development and coverage on higher capability lands within targeted community centers, and require mitigation for coverage in excess of the allowable. Based on the methods and assumptions described above and in Appendix H, Table 3.7-8 (based on the Bailey map) and Table 3.7-9 (based on the 2007 soil survey) provide a range of the total change in coverage by LCD for residential, commercial, and tourist accommodation uses within community centers and outside community centers for each proposed Regional Plan Update Alternative. These estimates of change in coverage do not include coverage resulting from public facilities, public infrastructure, or recreation facilities. Nor do these estimates include coverage reductions from the excess coverage mitigation program, transfers of coverage outside community centers, or environmental improvement program (EIP) projects. After accounting for coverage transfers required for development in community centers, all alternatives would result in an increase in total coverage within the Region; however, all coverage increases would be within the total base allowable coverage (10,941 acres according to the land capability map, as shown in Table 3.7-5). All alternatives would reduce coverage within LCD 1b (SEZ) and would increase coverage in higher capability lands (LCD 4–7) due to the coverage coefficients, transfer ratios, and mitigation of coverage policies, which would intensify development within community centers and incentivize removal of coverage from sensitive lands, particularly SEZ.

Specific details regarding the change in coverage policies and the change in acreage of Regional coverage resulting from each alternative is provided below.

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Table 3.7-8. Estimated Change in Coverage from Development Authorized in Each Alternative (Land Capability from Bailey Map)

	Alternative 1				Alternative 2				Alternative 3				Alternative 4				Alternative 5			
Land Capability District	New Coverage in Community Centers (acres)	New Coverage Outside Community Centers (acres)	Coverage Reduction from Transfers (acres)	Net Difference (acres)	New Coverage in Communi ty Centers (acres)	New Coverage Outside Community Centers (acres)	Coverage Reductions from Transfers (acres)	Net Difference (acres)	New Coverage in Community Centers (acres)	New Coverage Outside Community Centers (acres)	Coverage Reductions from Transfers (acres)	Net Difference (acres)	New Coverage in Community Centers (acres)	New Coverage Outside Community Centers (acres)	Coverage Reductions from Transfers (acres)	Net Difference (acres)	New Coverage in Community Centers (acres)	New Coverage Outside Community Centers (acres)	Coverage Reductions from Transfers (acres)	Net Difference (acres)
1a	0	1	-3	-2	0	23	-5	18	0	15	-9	6	0	35	-7	28	0	36	-6	30
SEZ (1b)	0	0	-5	-5	0	0	-9	-9	0	0	-15	-15	0	0	-12	-12	0	0	-10	-10
1c	0	0	-1	-1	0	3	-2	1	0	2	-3	-1	0	4	-3	1	0	4	-2	2
2	0	0	-1	-1	0	6	-2	4	0	4	-3	1	0	10	-3	7	0	10	-2	8
3	0	0	-2	-1	0	11	-3	7	0	7	-5	2	0	16	-4	12	0	17	-3	13
4	2	1	-2	0	2	15	-5	13	3	10	-8	5	2	23	-6	19	3	23	-4	22
5	7	1	-5	4	10	37	-10	37	12	24	-16	20	9	56	-12	53	15	57	-10	62
6	8	1	-3	5	11	20	-6	25	21	13	-11	23	12	31	-8	35	16	32	-7	41
7	11	0	-3	8	15	11	-6	20	28	7	-11	25	25	17	-8	34	22	18	-6	33
Total Acres	28	4	-25	8	38	126	-49	116	64	82	-79	66	48	192	-61	180	56	196	-50	202

Source: TRPA 2012c
Appendix H provides a detailed description of the methods and assumptions used to generate this data.

Table 3.7-9. Estimated Change in Coverage from Development Authorized in Each Alternative (Land Capability from NRCS 2007 Soil Survey)

	Alternative 1				Alternative 2				Alternative 3				Alternative 4				Alternative 5			
Land Capability District	New Coverage in Community Centers (acres)	New Coverage Outside Community Centers (acres)	Coverage Reductions from Transfers (acres)	Net Difference (acres)	New Coverage in Community Centers (acres)	New Coverage Outside Community Centers (acres)	Coverage Reductions from Transfers (acres)	Net Difference (acres)	New Coverage in Community Centers (acres)	New Coverage Outside Community Centers (acres)	Coverage Reductions from Transfers (acres)	Net Difference (acres)	New Coverage in Community Centers (acres)	New Coverage Outside Community Centers (acres)	Coverage Reductions from Transfers (acres)	Net Difference (acres)	New Coverage in Community Centers (acres)	New Coverage Outside Community Centers (acres)	Coverage Reduction s from Transfers (acres)	Net Difference (acres)
1a	0	0	0	0	0	4	-1	3	0	3	-2	1	0	7	-1	5	0	7	-1	6
SEZ (1b)	0	0	-3	-3	0	0	-7	-7	0	0	-10	-10	0	0	-8	-8	0	0	-6	-6
1c	0	0	-2	-2	0	1	-4	-3	0	1	-5	-4	0	2	-4	-2	0	2	-3	-1
2	0	0	-1	-1	0	7	-2	5	0	5	-3	2	0	11	-2	9	0	11	-2	10
3	0	0	-1	-1	0	5	-3	3	0	3	-3	0	0	8	-3	5	0	8	-2	6
4	2	1	-4	-1	2	29	-9	23	3	19	-14	9	1	45	-11	35	3	46	-8	41
5	5	1	-4	2	7	22	-9	20	12	14	-13	14	8	33	-10	31	11	34	-8	37
6	10	1	-8	4	14	39	-17	36	21	25	-26	20	17	59	-20	57	20	61	-15	66
7	11	1	-5	7	15	18	-11	22	28	12	-17	23	22	28	-13	38	22	28	-9	41
Total Acres	28	4	-26	6	38	126	-61	103	64	82	-92	53	48	192	-71	169	56	196	-53	200

Source: TRPA 2012c
Appendix H provides a detailed description of the methods and assumptions used to generate this data.

ALTERNATIVE 1: NO PROJECT

Maximum Allowable Land Coverage (Base Plus Transferred)

Continuation of the existing 1987 Regional Plan Goals and Policies limits maximum allowable land coverage (base allowable plus transferred) in the Region based on land use type and designation (Bailey System) as follows:

- For redevelopment of commercial facilities on developed parcels within Community Plan areas, the maximum allowable coverage is 50 percent of the project area that is within LCDs 4-7.
- For commercial facilities proposed on vacant lands within Community Plan areas, the maximum allowable coverage is 70 percent of the project area within LCDs 4-7.
- Allowable coverage for tourist accommodation or residential (5 units for more), public service, and recreation uses within Community Plan areas is 50 percent of the entire project area, but that coverage must be placed only on LCDs 4-7.
- Allowable coverage for residential facilities (1 to 4 units) is based on a sliding scale depending on the size of the project area.
- Allowable coverage outside of Community Plan areas would range from 1 to 30 percent according to the Bailey System (Table 3.7-4), or the IPES system for some single-family residences (TRPA Code Chapter 53).
- Existing policies limit uses on sensitive lands (LCDs 1–3) to public outdoor recreation projects, public service facility projects, and single-family dwellings that meet certain conditional use requirements under the IPES program.

The existing maximum allowable coverage limitations, which would be maintained under Alternative 1, are depicted in Table 3.7-10.

Table 3.7-10. Alternative 1: Maximum Allowable Coverage (excluding residential less than five units)

Land Use Type	Within Community Plan Areas	Outside Community Plan Areas
Commercial Facilities on an existing developed parcel	50% of the high capability portion of the project area	As defined by Bailey System
Commercial Facilities on a legal vacant lot of record at time of 1987 Plan adoption	70% of the high capability portion of the project area	
Tourist Accommodation Facilities (five or more units)	50% of the total project area, but it must be placed on high capability lands	
Multi-Residential (five or more units)		
Public Service Facilities		
Recreation Facilities		
Linear Public Facilities and Public Health and Safety Facilities	Minimum amount necessary to achieve their public purpose	

Source: TRPA Code Chapter 30

Land Coverage Transfer Ratios

Under Alternative 1, coverage transfer ratios within the Region would adhere to all existing rules as described in Section 30.4 of the TRPA Code. The existing Regional Plan allows unused allowable base coverage (i.e., potential coverage) and verified legally existing soft and/or hard coverage to be transferred within HRAs as follows:

- Potential and soft coverage may not be transferred for the development of commercial facilities or TAUs.
- Transfer ratios are determined on a sliding scale based on the total resulting coverage on the receiving parcels.
- Except for transfers for commercial uses within Community Plan areas, the transfer of 1 square foot of land coverage to a receiving parcel requires the retirement of 1 square foot of land coverage on the sending parcel (1:1 transfer ratio). Receiving parcels must be less sensitive or equivalent to the sending parcels.
- For commercial facilities within Community Plan areas, the transfer ratios are:

- 1:1 (sending to receiving) for all transfers that would result in up to 50 percent coverage on a developed or undeveloped receiving parcel on high capability (LCD 4-7) land; and
- a sliding scale ranging from 1.05:1 to 2:1 (sending to receiving) for projects that would result in 51 percent up to 70 percent coverage on the undeveloped receiving parcel on high capability (LCD 4-7) land.

While these existing coverage transfer ratios provide an incentive to minimize coverage on the receiving parcel, result in an overall reduction of coverage, and require that coverage be transferred to equal or less sensitive lands, the transfer ratios are the same regardless of the land capability of the sending parcel, creating no incentive to transfer coverage out of SEZ and other sensitive lands, which are primarily LCDs that are currently over covered (LCD 1a, LCD 1b, and LCD 3 according to the Bailey map).

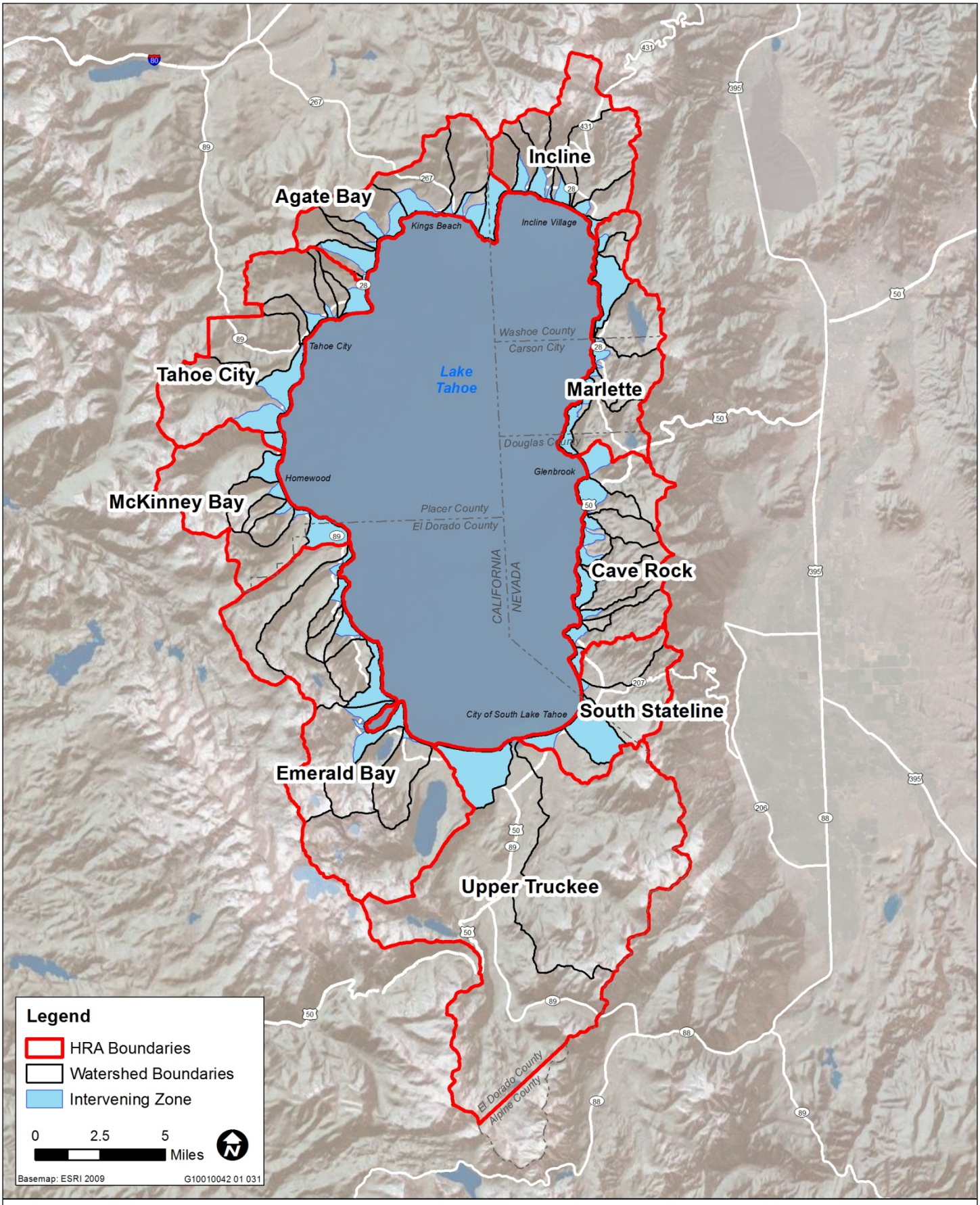
Land Coverage Transfer Areas

Under Alternative 1, as with the 1987 Regional Plan, transfers of coverage may occur only when the sending and receiving sites are within the same HRA (Exhibit 3.7-1). The intent of restricting coverage transfers to within HRA boundaries was to "limit transfers of coverage to a reasonable distance from the receiving site, so that the effect on water quality of coverage within the area is no worse than if the development were confined to the respective parcels" (TRPA 1984). Delineation of nine separate HRAs appears to be the result of a negotiated agreement between parties that wanted to allow coverage transfers across the entire Lake Tahoe watershed to facilitate commercial activities, and parties that wanted to restrict transfers to within sub-watersheds (Appendix H).

The restriction to limit coverage transfers to within HRAs has the effect of maintaining roughly the existing proportion of coverage within each HRA (Exhibit 3.7-1). The HRA boundaries ensure that coverage sending and receiving sites are in closer proximity than could occur without the HRA restrictions. However, each HRA contains multiple watersheds and intervening zones (i.e., areas that drain directly into Lake Tahoe), as shown in Exhibit 3.7-2. As a result, coverage can be transferred from one watershed to another within an HRA and, in the most extreme case, coverage could be transferred between sending and receiving areas more than 15 miles apart within the same HRA.

A receiving water is the water body into which stormwater flows (EPA 2012). If coverage transfers were restricted to individual watersheds, then the receiving water affected by the transfer would be the stream or river draining the watershed. However, because each HRA contains multiple watersheds and intervening zones, the receiving water affected by coverage transfers within HRAs is ultimately Lake Tahoe.

Limiting coverage transfers to within HRAs results in a fragmented market with more limited and more variable supplies of coverage available for transfers to any one site than would occur without HRA restrictions. The limited and variable supply of coverage available for transfer results in substantial variation in the actual cost to acquire coverage between HRAs (Barnett 2010), and in many cases higher costs to acquire coverage than would be expected if potential sellers of coverage had to compete with each other Region-wide. The limited supply and increased cost of coverage serve as disincentives for the transfer of coverage. These disincentives limit the total amount of coverage transferred. Coverage transfer ratios result in a net reduction in coverage and/or a relocation of coverage from more sensitive to less sensitive lands. Transferred coverage is required to comply with the LCD coverage limitations of the receiving parcel and current regulatory requirements for BMPs, which results in a water quality benefit by removing coverage from low-capability lands and bringing the transferred coverage into conformance with water quality regulations. However, the existing restriction on coverage transfers to within HRAs serves as a barrier to coverage removal and relocation of coverage from sensitive lands. As of 2011, only 35 percent of existing developed parcels had Water Quality BMP certifications (TRPA 2011). Therefore, it would be reasonable to assume that at least 65 percent of transferred coverage would result in the removal of coverage without BMPs and the placement of coverage with BMPs, and that existing restrictions on coverage transfers serve as a barrier to accelerated implementation of water quality BMPs on coverage.



Source: TRPA 2011

Exhibit 3.7-2. Hydrologically Related Areas Compared to Watersheds and Intervening Zones

Excess Coverage Mitigation

To mitigate the impacts of any new coverage in sensitive lands, TRPA established the Sensitive Lands Mitigation Program. Alternative 1 would continue to implement a Sensitive Lands Mitigation Program that requires new coverage in LCDs 1a, 1c, 2, and 3 exceeding allowable base coverage to be mitigated by restoring existing hard or soft coverage on sensitive lands at a mitigation-to-impact ratio of 1.5:1, and that requires all new coverage and disturbance in LCD 1b to be mitigated by restoring or enhancing these lands at a mitigation-to-impact ratio of 1.5:1.

To address the issue of existing coverage in excess of the Bailey coefficients, TRPA developed the Excess Land Coverage Mitigation Program (Section 30.6 of the TRPA Code). This existing program, which would continue under Alternative 1, applies to properties that have legally verified coverage in excess of the base allowable coverage as defined by the Bailey System. Under Alternative 1, property owners may retain this excess coverage as long as the property is unchanged such that no project permit is sought from TRPA. However, property owners that seek any type of TRPA permit must reduce excess coverage, either on-site or off-site within the same HRA, or pay an excess coverage mitigation fee based on the project cost and the amount of coverage beyond the limit allowed by the land capability. Fees are remitted to CTC and NDSL, the designated land banks for the Tahoe Region, which use the proceeds to purchase and restore existing coverage or purchase and retire potential coverage, thereby preventing the creation of additional coverage that would otherwise be allowed.

Alternative 1 maintains the existing excess coverage mitigation program as described in Section 30.6 of the TRPA Code. Excess coverage mitigation fees are required to be used to remove existing coverage or retire potential coverage within the same HRA as the project generating the impact. As described above, the restriction is intended to ensure mitigation occurs in close proximity to the impacts, so the receiving water affected by the excess coverage (i.e., tributary to Lake Tahoe) would benefit from the mitigation. However, the existing HRAs are limited in their ability to achieve this goal because each HRA consists of multiple watersheds and intervening zones (Exhibit 3.7-2). Under Alternative 1, mitigation funds could be used within a different watershed within the same HRA as the project generating the impact. As a result, this mitigation would benefit a different tributary than the tributary impacted by the coverage. Thus, the receiving water affected by the existing excess coverage mitigation program is Lake Tahoe, not individual tributaries.

Major factors affecting the water quality and erosion impacts from coverage are the capability of the land where the coverage occurs (Bailey 1974) and the total amount of coverage within a watershed (Center for Watershed Protection 2003). As such, the proximity of coverage mitigation to the site requiring the mitigation is less important than allowing mitigation to occur in more sensitive lands or watersheds with more coverage. Watersheds draining into Lake Tahoe show major differences in the level of fine sediment loading, which is a primary pollutant of concern and an indicator of overall watershed condition (Simon 2006). Allowing coverage mitigation to occur farther from the site requiring mitigation would be beneficial if that mitigation were implemented in watersheds that are more degraded.

The restriction on use of mitigation funds limits the amount of coverage that is available for restoration. Several HRAs have very limited supplies of coverage available (Appendix H). Priority coverage removal projects exist, particularly in HRAs with more available coverage, but mitigation fees generated in HRAs with more limited supplies of coverage are often not able to be utilized (Eisner pers. comm. 2012). In addition, HRA restrictions prevent land banks from pooling mitigation fees to restore coverage on larger-scale projects, which can have greater environmental benefits. TRPA adjusts its excess coverage mitigation fee in an attempt to reflect market conditions within each HRA. In 2011, these fees varied from $8.50 per square foot to $20.00 per square foot, although they were often unable to cover the actual costs of acquiring and restoring coverage that result from the inflated costs and increased price volatility caused by a fragmented coverage market (Environmental Incentives, unpublished data, 2012; Barnett 2010).

As a result of the limited supply of coverage in some HRAs and the variation in coverage prices, excess coverage mitigation fees are often unable to be expended, and the intended mitigation is not realized. Since 1987, a total of 1,863,995 square feet of excess coverage has utilized the excess coverage mitigation fee program, resulting in the payment of slightly less than $7,000,000 in mitigation fees. As of 2011, 414,252 square feet of this coverage had not been mitigated. Table 3.7-11 provides a breakdown of the existing excess coverage mitigation deficits (i.e., remaining coverage mitigation obligations) for each HRA.

Table 3.7-11. Excess Coverage Mitigation Deficits per HRA

	HRA										
	South Stateline		Upper Truckee	Emerald Bay	McKinney Bay	Tahoe City	Agate Bay		Cave Rock	Incline	Marlette
	CA	NV					CA	NV			
Mitigation Deficit (square feet)	156,920	83,912	0	19,650	7,905	1,965	28,035	24,869	85,273	0	5,723

Source: CTC 2011a, CTC 2011b, and NDSL 2011

Total Change in Coverage

Alternative 1 would authorize no additional allocations beyond those authorized in the 1987 Regional Plan. Consequently, Alternative 1 would result in a reduced level of development compared to the 1987 Plan, as only the remaining allocations authorized under that Plan would be allocated and used. Continuation of the existing Regional Plan coverage policies would focus on limiting coverage Region-wide, with some incentives for concentrating development within Community Plan areas (e.g., bonus units) and a continuation of environmental improvement projects to remove coverage and restore SEZs and other sensitive lands. Continuation of the existing coverage policy would encourage development of vacant, high-capability land within Community Plan areas and provide an incentive for redevelopment in Community Plan areas by allowing 50 percent coverage within Community Plan areas instead of the 30 percent coverage allowed outside of Community Plan areas.

As shown in Table 3.7-8, the continuation of existing coverage policies under Alternative 1 would result in an estimated total increase of 8 acres of coverage in the Region (using the Bailey map), with a total increase of 28 acres within Community Plan areas (due to development of remaining unused CFA, TAUs, unassigned residential bonus units, and a portion of the remaining residential allocations), an increase of 4 acres outside of Community Plan areas (due to development of remaining residential allocations), and a reduction of 25 acres (due to coverage transfers necessary to achieve the increased coverage in Community Plan areas). Alternative 1 would result in small decreases in coverage in sensitive lands (LCDs 1a, 1b, 1c, 2, and 3) and increases in coverage within higher capability lands (LCDs 5, 6, and 7) as development is further concentrated into the Community Plan areas on higher capability lands. When utilizing the 2007 soil survey (Table 3.7-9), Alternative 1 is estimated to result in a total increase of 6 acres of coverage in the Region, with decreases in coverage in more sensitive lands (LCDs 1b, 1c, 2, 3, and 4) and increases in coverage in higher capability lands (LCDs 5, 6, and 7).

Although Alternative 1 would remove, relocate, and add coverage to parcels within the Region, all development projects would be required to comply with existing land coverage policies and regulations (discussed above), which establish the maximum allowable coverage; prohibit additional coverage in sensitive lands (with few exceptions); establish transfer ratios; and require mitigation of excess coverage. Therefore, any projects implemented under Alternative 1 that would result in additional coverage would be limited such that total coverage in the Region as established by the Bailey System is not exceeded, and/or such that existing excess coverage is reduced. The increase in coverage of 8 acres in Alternative 1 is not a substantial increase, particularly in light of the reduction in coverage from sensitive lands. Therefore, coverage impacts under Alternative 1 would be **less than significant.**

ALTERNATIVE 2: LOW DEVELOPMENT, INCREASED REGULATION

Maximum Allowable Land Coverage (Base Plus Transferred)

- The maximum allowable coverage (base plus transferred) in Community Plan areas and DTZs would be 50 percent of high capability lands(LCDs 4–7) for both developed and undeveloped lands (as opposed to 70 percent on undeveloped lands and 50 percent on developed lands under existing conditions).
- Allowable coverage outside of Community Plan areas and DTZs would range from 1 to 30 percent according to the Bailey System (Table 3.7-4) or the IPES system for some single-family residences (TRPA Code Chapter 53).

Land Coverage Transfer Ratios

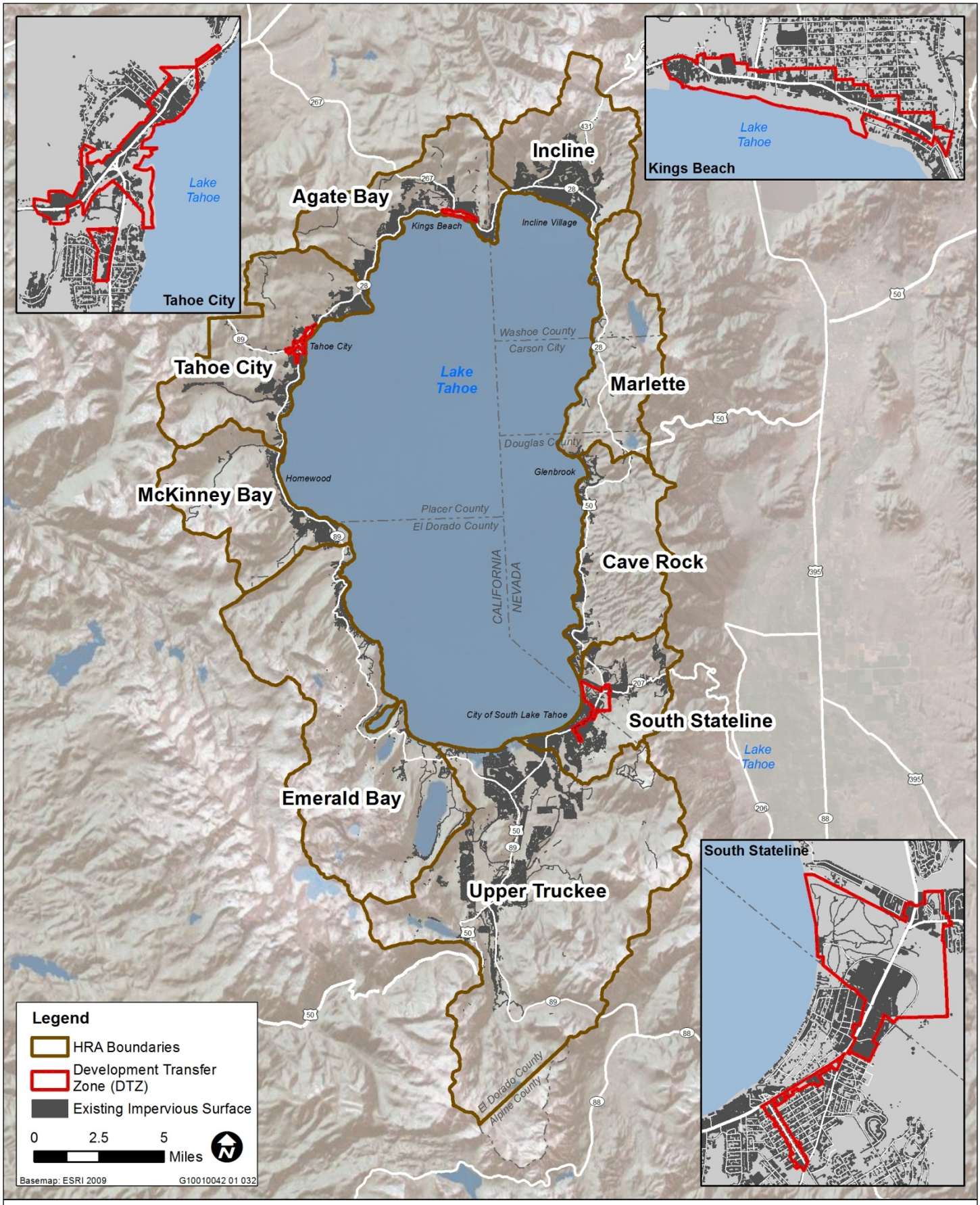
Coverage transfer location policies under Alternative 2 would allow coverage transfers from anywhere in the Region to the South Stateline DTZ, and from any Placer County HRA to the Tahoe City or Kings Beach DTZ. All other coverage transfers would be permitted to occur only within the same HRA. These policies would allow additional flexibility compared to the existing policy, such that coverage could be transferred across HRA boundaries into South Stateline DTZ and across Placer County HRA boundaries into Tahoe City or Kings Beach DTZs. Soft coverage transfers would be allowed only for Class II bike trails that use pervious pavement and would no longer be allowed for residential uses.

Transfers of coverage into Community Plan areas and DTZs would be subject to a transfer ratio based on the sensitivity of the sending parcel rather than the resulting amount of coverage on the receiving parcel, thus resulting in a relative increase in the incentive to transfer coverage from sensitive lands. Under Alternative 2, transfers of coverage into DTZs and Community Plan areas would adhere to the following ratios (sending to receiving), based on the sensitivity of the sending parcel:

- 1:1 for transfers from SEZ (LCD 1b);
- 1.25:1 for transfers from LCDs 1a, 1c, 2, and 3;
- 2:1 for transfers from LCDs 4 and 5; and
- 3:1 for transfers from LCDs 6 and 7.

Land Coverage Transfer Areas

Alternative 2 would change the existing coverage transfer area provisions to allow the transfer of existing hard coverage from any HRA to the South Stateline DTZ, and from any HRA in Placer County to the Kings Beach or Tahoe City DTZ. All other transfers of coverage would occur only when the sending and receiving sites are within the same HRA. This change to the restriction on coverage transfers could allow a higher-than-existing proportion of coverage to occur within the DTZs and a lower proportion of coverage to occur outside DTZs (Exhibit 3.7-3). While these policies incentivize the transfer of coverage into DTZ areas, the reduced total allowable coverage limits in these areas (50 percent maximum) could be a limiting factor, creating a lower ceiling on the amount of coverage that could be transferred. Major factors affecting the water quality and erosion impacts of coverage are the capability of the land where the coverage occurs (Bailey 1974) and the total amount of coverage within a watershed (Center for Watershed Protection 2003). As such, coverage transfers have a beneficial effect; however, this effect is limited by HRA restrictions that serve as barriers to coverage transfers. Coverage transfer ratios in Alternative 2 would result in a reduction of coverage in sensitive lands and an overall reduction in coverage.



Source: TRPA 2011

Exhibit 3.7-3. Existing Impervious Surfaces, Hydrologically Related Areas, and Development Transfer Zones

Alternative 2 would place additional restrictions on the transfer of soft coverage and potential coverage, and it would increase coverage transfer ratios. These changes would result in a higher proportion of coverage transfers coming from existing hard coverage, but would serve as disincentives for coverage transfers overall. Alternative 2 would also place greater restrictions on allocations (e.g., new CFA would be authorized only after 70 percent occupancy of existing CFA is achieved, with some exceptions) and on the transfers of CFA and TAUs (e.g., increased transfer ratios and restrictions on the placement of TAUs). Taken together, these additional restrictions would serve as a disincentive for redevelopment and new development, making development less likely to occur than under existing conditions. Less redevelopment and new development would decrease the demand for coverage transfers, which would be expected to result in a net decrease in coverage transfers compared to existing conditions.

All coverage transfers outside of the DTZs would occur within HRA boundaries, which would result in coverage sending and receiving sites being in closer proximity than would occur without the HRA restrictions. As described above, a receiving water is the water body into which stormwater flows (EPA 2012). If both the sending and receiving sites for coverage transfers were restricted to individual watersheds, then the receiving water affected by the transfer would be the stream or river draining the watershed. However, each HRA contains multiple watersheds and intervening zones (Exhibit 3.7-2), and coverage can be transferred from one watershed to another within an HRA. In the most extreme case, coverage could be transferred between sending and receiving areas more than 15 miles apart within the same HRA. As a result, the receiving water affected by coverage transfers within each HRA is ultimately Lake Tahoe. No evidence has been found that coverage transfers affecting the same receiving water are more beneficial when they are in closer proximity. Current EPA policy promotes water quality trading programs that occur at the watershed scale or for an area where a TMDL has been adopted (i.e., Lake Tahoe Basin Watershed) because they increase the effectiveness and efficiency of achieving water quality goals (EPA 2003). Restricting coverage transfers to HRA boundaries is inconsistent with EPA policy on water quality transfer programs because HRA boundaries are not coincident with watersheds or areas where a TMDL has been approved. Restricting coverage transfers to HRA boundaries does not ensure that transfers affect the same tributary or watershed.

The existing limits on coverage transfers within HRAs has resulted in a fragmented coverage market with more limited and more variable supplies of coverage available for transfers to any one site than would occur without HRA restrictions. The limited and variable supply of coverage available for transfer results in substantial variation in the actual cost to acquire coverage between HRAs (Barnett 2010) and, in many cases, higher costs to acquire coverage than would be expected if potential sellers of coverage had to compete with each other Region-wide. The allowances for transfers of existing hard coverage into DTZs would increase the supply of coverage available to be transferred into DTZs. This would be expected to decrease the cost of coverage within DTZs, but the HRA restrictions outside DTZs would maintain a fragmented market and the coverage prices would not be expected to change substantially. The limited supply and variable and increased cost of coverage would continue to serve as disincentives for the transfer of coverage. Furthermore, the changes to transfer areas, along with other regulatory changes discussed above, would provide additional disincentives to the transfer of coverage, which would serve as a barrier to coverage removal and relocation of coverage from sensitive lands.

Water quality BMPs are required to be placed on any transferred coverage. As of 2011, only 35 percent of existing developed parcels had Water Quality BMP certifications (TRPA 2011). It would be reasonable to assume that at least 65 percent of transfers of existing coverage would result in the removal of coverage without BMPs and the placement of coverage with BMPs. Alternative 2 would likely increase the proportion of existing hard coverage transfers but would decrease the total amount of transfers, potentially resulting in a negligible change in the amount of existing hard coverage transferred. Alternative 2 would have a negligible effect on disincentives for coverage transfers that serve as a barrier to accelerated implementation of water quality BMPs.

Excess Coverage Mitigation

Under Alternative 2, the excess coverage mitigation program would be updated to prioritize removal of on-site coverage. Projects with excess coverage would be required to mitigate the impact in the following priority order:

1. remove a minimum of 15 percent of the excess coverage on-site;
2. remove coverage off-site within the same HRA subject to the coverage transfer ratios listed above; and
3. pay excess coverage mitigation fee.

On-site Coverage Removal

Under Alternative 2, new excess coverage mitigation policies would require that a project first exhaust options for on-site coverage removal before allowing off-site coverage removal. A project would be eligible to pay an increased excess coverage mitigation fee only if all feasible direct coverage reduction options were exhausted. This change would decrease the lag time between when a project occurs and when the benefit of mitigation is realized, when feasible direct coverage removal options exist. On-site coverage removal would be most feasible on large-scale projects that have a larger area of existing coverage and on projects in higher capability lands that have more allowable coverage. Single-family developments and other small projects in sensitive lands may not be able to feasibly meet the on-site coverage reduction requirements due to the smaller amount of allowable coverage, and they would therefore be required to remove coverage off-site or pay an excess mitigation fee.

Off-site Coverage Removal

After removal of any feasible coverage on-site, a project would be required to identify and remove coverage off-site within the same HRA. Off-site coverage removal would be subject to ratios that incentivize coverage removal in more sensitive lands. For example, off-site mitigation of 100 square feet of coverage would require the removal of 100 square feet of coverage in an SEZ, or the removal of 300 square feet of coverage in LCD 7 lands. Off-site coverage removal would reduce the lag time between when a project occurs and when the mitigation is realized. As shown in Table 3.7-11, however, the California and Nevada land banks have not been able to find enough opportunities for coverage removal in many HRAs, due to the limited supply of coverage for sale within each HRA. Therefore, it is reasonable to assume that many project proponents may not be able to locate off-site coverage removal opportunities within the HRA where their project is occurring. Under the existing excess coverage mitigation program, typically only large-scale redevelopment projects remove coverage off-site because the administrative burden and small scale of coverage reductions required for smaller projects makes direct off-site coverage removal by project applicants infeasible for smaller-scale projects (Appendix H). Under Alternative 2, requiring off-site coverage removal by project applicants would not allow excess coverage mitigation from multiple projects to be combined to address larger-scale coverage removal opportunities, which could generate economies of scale and result in increased environmental benefits. In addition, Alternative 2 would not allow coverage removal to occur across HRA boundaries, where it could remove coverage in higher priority watersheds or at sites more hydrologically connected to Lake Tahoe or its tributaries. The off-site coverage removal requirements would incentivize removal in more sensitive lands and would reduce the lag time between project approval and implementation of mitigation, when feasible options exist. .

Excess Coverage Mitigation Fee

Under Alternative 2, after a project proponent exhausted all feasible options for direct coverage removal within the same HRA as the project, they would be allowed to pay an excess coverage mitigation fee to mitigate the remaining excess coverage. The excess coverage mitigation fee would be increased to ensure that it more accurately reflects the cost of acquiring and restoring existing hard coverage. Based on a recent appraisal of actual (2010) coverage acquisition and removal costs, this fee would likely vary between $17.50 and $85.00 per square foot, depending on the HRA (Barnett 2010). This would represent a substantial increase from the 2011 fees, which ranged from $8.50 to $20 per square foot. Mitigation fees would still be restricted to the HRA in which they were generated and would be further restricted to the removal of existing hard coverage only. These mitigation fees would be prioritized for the removal of structures in SEZs.

Increasing the excess coverage mitigation fee would ensure that, when available, existing hard coverage can be acquired and restored with the fees generated. Requiring that fees be used for removal of existing hard coverage and prioritizing removal of structures in SEZs would have beneficial effects when the mitigation fees are used. However, as shown in Table 3.7-11, the existing restriction on the use of mitigation fees within the HRA where they were generated limits the supply of available coverage that can be removed and has resulted in deficits of unmitigated coverage in many HRAs. Further restricting the use of mitigation funds, without changing HRA boundaries to increase the supply of coverage that could be removed, would exacerbate these negative effects and could lead to greater deficits of unmitigated coverage. Increasing coverage mitigation fees would partly offset that effect by allowing land banks to acquire more expensive coverage within each HRA. However, higher mitigation fees would also serve as a disincentive for redevelopment projects, which, in combination with other disincentives for redevelopment in Alternative 2, would reduce the total number of projects that mitigate excess coverage.

Change in Coverage

Alternative 2 would include a limited number of new residential allocations and CFA (but only after the 1987 Regional Plan remainder is used and 70 percent commercial occupancy is achieved). No new TAU allocations or bonus units would be included, and remaining unassigned residential bonus units from the 1987 Plan would be distributed in accordance with existing procedures. The maximum allowable coverage (base plus transferred) in Community Plan areas and DTZs would be reduced to 50 percent of the area in LCDs 4–7 for both developed and undeveloped lands.

As shown in Table 3.7-8, Alternative 2 would result in an estimated increase of 116 acres in the Region due to a limited number of new residential allocations and CFA, as well as use of existing TAUs and residential bonus units. Alternative 2 would result in a coverage increase of 38 acres in Community Plan areas and DTZs, 126 acres outside of these community centers, and a reduction of 49 acres of coverage due to coverage transfers. Although Alternative 2 would increase coverage on high-capability lands (LCDs 4–7) and decrease coverage within LCD 1b (SEZ), Alternative 2 would also result in an increase of coverage within LCDs 1a, 1c, 2, and 3 due to a smaller proportion of development occurring in community centers where development is limited to high-capability lands and requires coverage reductions through transfers, and a greater proportion of development occurring outside community centers where single-family developments can occur on sensitive lands under the IPES program. Similar to the Bailey map, when utilizing the 2007 soil survey, Alternative 2 is estimated to result in a total increase of 103 acres of coverage in the Region (38 acres in the community centers and 126 acres outside the community centers), with decreases in coverage in sensitive lands (LCDs 1b and 1c) and increases in coverage in high-capability lands (LCDs 4 – 7) (Table 3.7-9).

The coverage increase of 116 acres from Alternative 2 amounts to less than 2 percent of the existing coverage of 7,254 acres (based on the Bailey map). In addition, all development projects would be required to comply with proposed land coverage policies and regulations (discussed above), which establish the maximum allowable coverage; prohibit additional coverage in sensitive lands (with limited exceptions); establish transfer ratios; and require mitigation of excess coverage. Therefore, any projects implemented under Alternative 2 that would result in additional coverage would be limited such that total coverage in the Region as established by the Bailey System is not exceeded, and/or such that existing excess coverage is reduced. Therefore, coverage impacts under Alternative 2 would be **less than significant.** However, Alternative 2 would reduce the amount of total allowable coverage in Community Plan areas and DTZs and increase transfer ratios, limiting the ability to transfer coverage compared to Alternative 1.Thus, Alternative 2 would result in less coverage transferred from sensitive lands.

ALTERNATIVE 3: LOW DEVELOPMENT, HIGHLY INCENTIVIZED REDEVELOPMENT

Maximum Allowable Land Coverage (Base Plus Transferred)

Under Alternative 3, maximum allowable coverage (base plus transferred) within Town Centers, the Regional Center, and the High Density Tourist District would be increased to 70 percent of high capability lands for both undeveloped and developed parcels. This would incentivize transfers of coverage into these areas, which would result in the relocation of coverage from more sensitive to less sensitive lands and a net reduction in coverage Region-wide. To streamline the administrative process, Alternative 3 would waive the requirement for site-specific land capability verification in limited cases for high-capability land where mapped capability is already well known. This change would affect only parcels on entirely high-capability lands with uniform slopes, where there is no evidence of high ground water, where field verifications have been conducted in the immediate vicinity, and where the mapped LCD and the LCD from the 2007 soil survey are identical. Due to these limitations on when the requirement for site-specific verification would be waived, this waiver is not likely to have an impact on total coverage.

Land Coverage Transfer Ratios

- Alternative 3 would incentivize the removal of coverage on sensitive land by reducing the coverage transfer ratio to 1:1 when coverage is transferred from sensitive lands (LCDs 1, 2, or 3) into Town Centers, the Regional Center, and the High Density Tourist District.
- For sending parcels within LCDs 4–7, the transfer ratio would be 1:1 up to 50 percent coverage; then, for coverage over 50 percent, the transfer ratio would convert to a sliding scale ranging from 1.05:1 to 2:1 from 51 percent to 70 percent coverage, as under existing conditions.
- With restoration and retirement of the sending sites, Alternative 3 would permit transfer of non-conforming coverage and transfer of soft coverage from SEZs for use in Town Centers, the Regional Center, and the High Density Tourist District.
- Redevelopment projects in Town Centers, the Regional Center, and the High Density Tourist District would be allowed to earn one "bonus unit" of CFA (1,000 square feet), TAU (1 unit), or residential bonus unit (1 unit) when coverage is removed and permanently retired as follows:
  - 700 square feet from SEZ (LCD 1b); or
  - 1,400 square feet from LCDs 1a, 1c, 2, 3; or
  - 2, 100 square feet from LCDs 4-7.

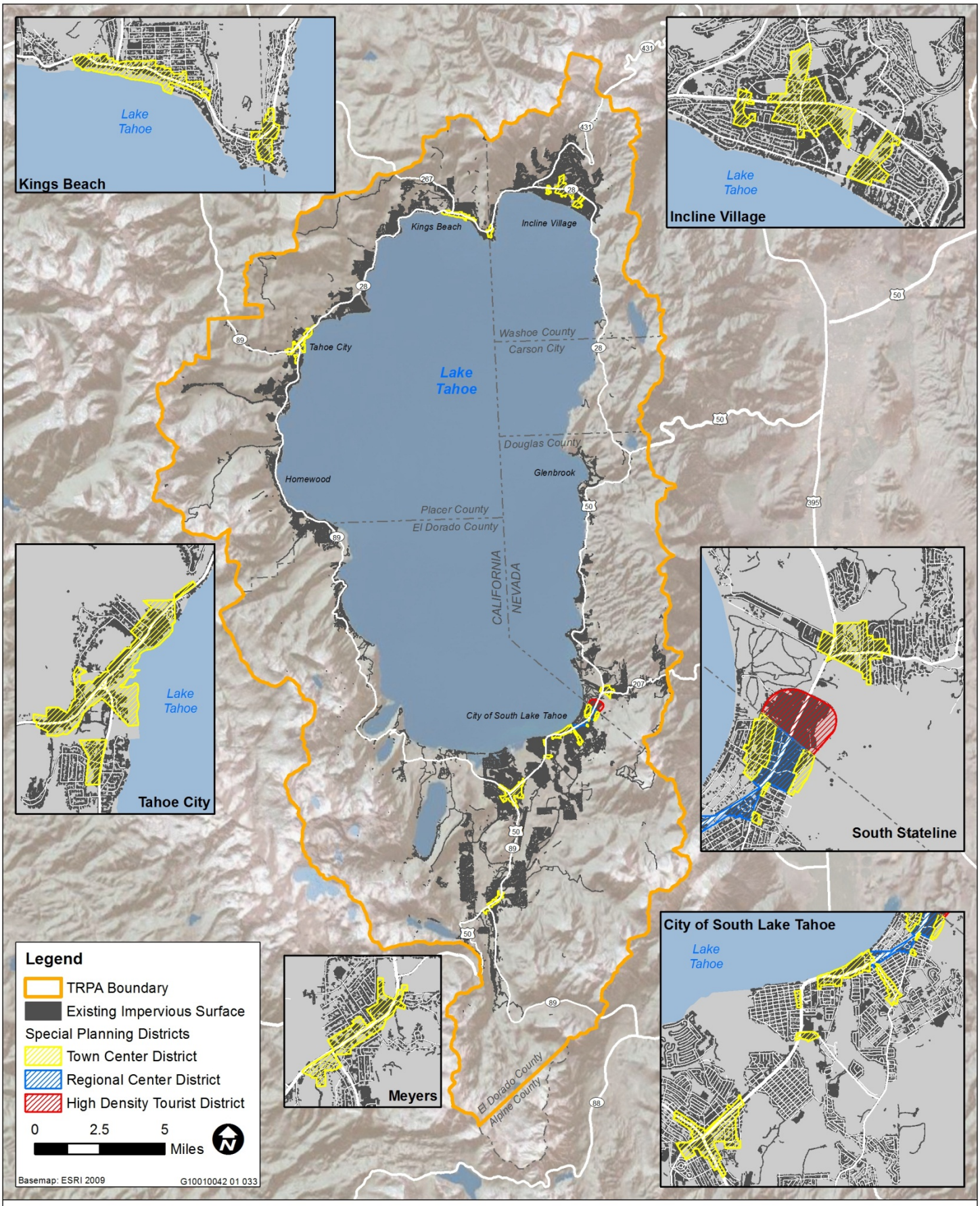
Land Coverage Transfer Areas

Alternative 3 would change the existing coverage transfer area provisions to allow the transfer of coverage across HRA boundaries. Removing the HRA restriction would allow the proportion of existing coverage within some HRAs to decrease, while the proportion of coverage in others could increase. As described above, the receiving water affected by coverage transfers within each HRA is Lake Tahoe. Allowing coverage transfers to occur across HRA boundaries would not change the receiving water that is currently affected by coverage transfers. No evidence has been found that coverage transfers affecting the same receiving water are more beneficial when they are in closer proximity. Current EPA policy promotes water quality trading programs that occur at the watershed scale or for an area where a TMDL has been adopted (i.e., Lake Tahoe Basin Watershed) because they increase the effectiveness and efficiency of achieving water quality goals (EPA 2003). Major factors affecting water quality impacts and erosion resulting from coverage are the capability of the land where the coverage occurs (Bailey 1974) and the total amount of coverage within a watershed (Center for Watershed Protection 2003). As such, coverage transfers out of sensitive lands have a beneficial effect. Coverage transfer ratios in Alternative 3 would result in a reduction of coverage in sensitive lands and an overall reduction in coverage. Removal of the HRA restrictions that serve as a barrier to coverage transfers would have a beneficial effect in that it would remove a barrier to coverage transfers, which could accelerate coverage reduction and removal of coverage from sensitive lands.

Alternative 3 includes many incentives to transfer and concentrate development within community centers (e.g., bonus units, CFA, and TAUs as match for transferred development, increased height, and increased density). These incentives would increase the financial feasibility of redevelopment projects in these areas, which is expected to stimulate redevelopment and new development within the community centers. Since coverage beyond that allowed by the Bailey coefficients must be transferred into community centers, increased redevelopment and new development would create a demand for coverage transfers. Eliminating the requirement that coverage transfers be within HRA boundaries would increase the supply of coverage available to be transferred into any community center. As a result, the removal of HRA restrictions is expected to result in an increased proportion of coverage within Town Centers, the Regional Center, and the High Density Tourist District and a decreased proportion of coverage outside these areas (Exhibit 3.7-4).

Although it is not possible to be certain where coverage transfers would come from and be transferred to, TRPA identified factors that provide an indication of which HRAs could send or receive a greater proportion of coverage Region-wide. These factors are land values, existing market price of coverage, and the inventory of coverage available for sale in each HRA. HRAs with higher land values would be more likely to receive coverage from HRAs with lower land values because coverage is a development right associated with individual parcels of land. It would be more economically feasible to purchase land and transfer the coverage from it in HRAs where land values are lower. The existing market price of coverage is a result of the demand for coverage in the HRA and the supply of coverage available for transfer in that HRA. A high market price for coverage would indicate that the HRA has a high demand for transferred coverage and/or a limited supply of coverage available for transfer, which would make that HRA more likely to receive coverage transferred from other HRAs. A large inventory of coverage for sale indicates that the supply of coverage for sale is greater than the demand for coverage in the HRA, in which case the HRA would more likely transfer more coverage to other HRAs than it would receive. Conversely, a low inventory of available coverage indicates that demand for coverage has kept up with the supply of available coverage and that HRA would be more likely to receive transfers of coverage. Information on the relative land values, market price of coverage, and the existing supply of coverage available for sale within each HRA is summarized in Appendix H. Based on these factors, TRPA estimates that removal of the HRA restrictions under Alternative 3 could result in an increased proportion of coverage in the Marlette HRA, Cave Rock HRA, and Nevada portion of the Agate Bay HRA. Conversely, decreases in the proportion of coverage could occur in the South Stateline HRA, Upper Truckee HRA, Emerald Bay HRA, McKinney Bay HRA, and California portion of the Agate Bay HRA. (See Appendix H for further details on the assumptions and source data utilized for this HRA analysis.)

Monitoring of fine sediment loading into Lake Tahoe indicates that the following priority watersheds contribute a disproportionately large amount of fine sediment into the lake: Upper Truckee River, Blackwood Creek, Trout Creek, Ward Creek, Third Creek, and Incline Creek (Simon 2006). Since the total amount of coverage in a watershed is one factor that contributes to pollutant loads (Center for Watershed Protection 2003), a reduction of coverage in HRAs containing these priority watersheds could have a beneficial effect. Conversely, increases in coverage within these priority watersheds could have a detrimental effect. The HRAs that TRPA has estimated may receive an increased proportion of coverage under Alternative 3 do not include any of the priority watersheds. Conversely, the HRAs that could experience a decrease in the proportion of coverage include three of the six priority watersheds (Upper Truckee River, Trout Creek, and Blackwood Creek). Therefore, to the extent that the identified market forces influence transfers of coverage, the removal of HRA restrictions could have a beneficial effect.



Source: TRPA 2011

Exhibit 3.7-4. Existing Impervious Surfaces and Town Center, Regional Center, and High Density Tourist Districts

Removing HRA restrictions on transfers of coverage would eliminate the existing fragmented coverage market. Potential sellers of coverage would have to compete with other sellers Region-wide, rather than competing only with other sellers within a specific HRA. As a result, the price of coverage would be expected to decrease in many areas and to stabilize Region-wide. The supply of coverage available for transfer would be the same for every receiving area, and a greater supply would be available to any one site than under conditions with HRA restrictions. This would eliminate the variable and volatile coverage prices that result from the existing fragmented market.

An increased demand for coverage transfers in community centers is expected to result from the redevelopment and transfer incentives in Alternative 3. More stable coverage costs would result from the removal of HRA boundaries. As a result of the increased demand and stable prices, the rate and total volume of coverage transfers would increase compared to existing conditions.

Existing regulations would still apply to transferred coverage, requiring a verification of land capability to ensure that transferred coverage does not exceed the maximum allowable coverage at the project level (TRPA Code Chapter 30). Water quality BMPs are also required to be installed on any transferred coverage. As of 2011, only 35 percent of existing developed parcels had Water Quality BMP certifications (TRPA 2011). It would be reasonable to assume that at least 65 percent of transfers of existing coverage would result in the removal of coverage without BMPs and the placement of coverage with BMPs. As such, an increase in the rate and volume of coverage transferred would likely result in an increase in the rate of water quality BMP implementation and an increase in the total amount and proportion of coverage with BMPs.

In Alternative 3, coverage transfer ratios would result in a net reduction in coverage and a relocation of coverage from more sensitive to less sensitive lands. As with existing conditions, a portion of the coverage transferred for residential uses could be potential coverage rather than existing coverage. Transfers of potential coverage restrict the creation of future coverage on the sending parcel that would otherwise be allowed. This results in an environmental benefit, but to a lesser extent than transfers of existing coverage, because transfers of existing coverage result in an immediate reduction in coverage. Increased coverage transfers would lead to increased coverage removal Region-wide, reductions in future coverage through transfers of potential coverage, and relocation of coverage from more sensitive lands to less sensitive lands.

Changes to transfer areas in Alternative 3 would change the distribution of coverage within the Region, increase the rate of BMP implementation, contribute to a net reduction of existing and potential coverage, and relocate coverage from more sensitive lands to less sensitive lands. Such changes would also make the coverage transfer program consistent with EPA policy on water quality trading programs by basing the transfer areas on the boundaries of the Lake Tahoe watershed, an area for which there is an adopted TMDL (EPA 2003).

Excess Coverage Mitigation

The structure of the excess coverage mitigation program under Alternative 3 would be similar to Alternative 1, but with allowances to mitigate outside the HRA where the excess coverage is located. Excess coverage would continue to be mitigated through direct removal, either on-site or off-site, or through the payment of excess coverage mitigation fees. Off-site coverage reduction could be conducted anywhere in the Region. Under Alternative 3, excess coverage mitigation fees could be used to remove coverage from anywhere in the Region, regardless of the location of the project generating the fee.

Allowing off-site coverage removal anywhere in the Region would increase the amount of coverage available to each project proponent for direct removal. Providing each project proponent more options for direct coverage removal would increase the number of projects that implement direct off-site coverage removal. This would increase the amount of coverage that is directly removed by project proponents, reduce reliance on excess coverage mitigation fees, and reduce the lag time between when a project occurs and when mitigation is implemented.

As described in Alternative 1, the existing restriction on the use of mitigation funds to within an HRA has resulted in a backlog of 414,252 square feet of excess coverage for which mitigation fees have been paid but mitigation has not yet occurred. This backlog is attributable to the limited supply and high cost of coverage available for removal in many HRAs. Allowing mitigation funds to be used to remove coverage across HRA boundaries would expand the amount of coverage that is available for removal. As described under "Land Coverage Transfer Areas," Alternative 3 would eliminate HRA boundary restrictions for coverage transfers, which would reduce the cost to acquire coverage in many areas. In combination, increasing the amount of coverage that is available to be removed with mitigation funds and reducing the cost to acquire coverage would reduce or eliminate the backlog of unmitigated coverage. Opportunities for removal of existing coverage in high-priority areas are currently available, so this change would be expected to have an immediate beneficial effect.

In addition, the existing HRA boundary restrictions have prevented mitigation funds from being used for high-priority projects. Coverage removal opportunities exist in sensitive lands, high-priority watersheds, and areas hydrologically connected to Lake Tahoe and its tributaries. However, mitigation fees often cannot be used for this high-priority coverage removal because they were generated in a different HRA. Allowing mitigation funds to be used for removal of coverage outside the HRA where the funds were generated would allow mitigation funds to be used for the highest priority coverage removal with the greatest environmental benefit Region-wide. It would also allow mitigation fees generated in multiple HRAs to be combined and used for larger-scale coverage removal and restoration projects. This would allow the land banks to achieve economies of scale and implement large-scale restoration projects, which can result in greater environmental benefits.

Allowing off-site coverage removal and the use of mitigation fees outside the HRA where the excess coverage is located would result in some mitigation occurring farther from the site being mitigated than under existing conditions. As described above, each HRA includes multiple watersheds and intervening zones (Exhibit 3.7-2) and, as a result, Lake Tahoe is ultimately the receiving water affected by coverage mitigation within each HRA. As such, allowing mitigation to occur across HRA boundaries would not result in the mitigation affecting a different receiving water because ultimately Lake Tahoe is the receiving water that benefits from that mitigation.

Major factors affecting the water quality and erosion impacts from coverage are the capability of the land where the coverage occurs (Bailey 1974) and the total amount of coverage within a watershed (Center for Watershed Protection 2003). As such, the proximity of coverage mitigation to the site requiring the mitigation is less important than allowing mitigation to occur in more sensitive lands or watersheds with more coverage. Watersheds draining into Lake Tahoe show major differences in the level of fine sediment loading, which is a primary pollutant of concern and an indicator of overall watershed condition (Simon 2006). Allowing excess coverage mitigation to occur across HRA boundaries has a beneficial effect because the mitigation can target coverage removal in more sensitive lands and in more degraded watersheds.

Other Coverage Policies

Alternative 3 would allow an Area Plan, which is found to be in conformance with the Regional Plan, to manage coverage comprehensively within the area (or a subset of the area) covered by the Area Plan, rather than at the individual parcel scale. In order for an Area Plan to manage coverage comprehensively, it would have to demonstrate that the approach would be (1) more effective at reducing coverage overall, and (2) more effective at reducing coverage in the most sensitive lands (LCDs 1-2). Due to these two requirements, this change in coverage management would be beneficial.

Alternative 3 includes proposed changes to the TRPA Code of Ordinances that would exempt non-motorized public trails from the calculation of land coverage, subject to several siting and design requirements that would minimize disturbances to SEZs and sensitive wildlife habitat. Alternative 3 assumes the construction of 60 miles of bike trails during the planning period, which would require 148 acres of new coverage for trails, with

approximately 7 acres of that occurring in SEZ. However, under Alternative 3, this new coverage would be exempt from land coverage calculations, restrictions, and mitigation requirements established in Chapter 30 of the Code. However, for the coverage occurring in sensitive SEZ lands, SEZ is also protected by TRPA as a sensitive wildlife resource as described in Chapter 62 of the Code (Wildlife Resources), and SEZ and riparian habitats are considered "habitats of special significance," which is a TRPA threshold resource for which a nondegradation standard applies. Additionally, most of the SEZ and riparian habitats affected by implementation of Alternative 3 would likely be considered jurisdictional waters by USACE and, in California, by LRWQCB under CWA Section 404 and the Porter-Cologne Act. Existing federal and state regulations would provide habitat compensation for the loss of riparian, wetland, and other SEZ habitats through the permitting processes required by CWA Section 404, CWA Section 401 (in California), waste discharge requirements (for waters of the state pursuant to the Porter-Cologne Act), California Fish and Game Code Section 1600 *et seq.* (in California), and CEQA review (in California). (These regulations are described in detail in Section 3.10, Biological Resources.) Therefore, although impacts of non-motorized public trails would be exempt from TRPA mitigation requirements specific to land coverage, mitigation would still be required for any significant impact to the biological functions and values of SEZs, to achieve TRPA's nondegradation standard for habitats of special significance and comply with other applicable federal and state permitting requirements. Despite exemptions of public trails from TRPA land coverage calculations and requirements under Alternative 3, the beneficial effects on SEZs and other sensitive habitats described above would still be realized. (See Impact 3.10-1 for an in-depth discussion of this issue.)

Alternative 3 includes a proposed exemption for "re-locatable" (i.e., temporary) coverage without a permanent foundation, up to 120 square feet in non-sensitive lands. If every existing parcel with a single-family residence on high capability lands (LCDs 4 through 7) in the Region (19,397 parcels) were to take advantage of this exemption (120 square feet), it would result in a maximum of 60 acres of exempt coverage. This is a worst-case estimate; it is highly unlikely that every parcel in the Region would utilize this exemption. Nonetheless, even at the maximum potential coverage under this exemption, Alternative 3 would remain within the total allowable coverage on high capability lands in the Region as established by the Bailey System. Furthermore, use of this exemption would require that the entire property has water quality BMPs in place. Currently only 35 percent of developed parcels have BMPs in place (TRPA 2011). As a result, the impacts of increased coverage from this exemption would be balanced by the benefits of increased BMP implementation. With adoption of proposed design and maintenance requirements (see Section 3.8, Hydrology and Water Quality), the exemption would not impair water quality.

To promote the use of pervious pavement, Alternative 3 proposes a 25-percent coverage exemption for the use of pervious pavement in non-sensitive lands (excluding roadways), subject to design and maintenance requirements (see Section 3.8, Hydrology and Water Quality). Adoption of proposed design and maintenance requirements would ensure that the pervious pavement continues to allow infiltration and would not impair water quality. This exemption would lead to a net reduction in the total area of impervious surfaces. For example, an existing 100 square foot impervious patio in high capability land could be removed and replaced with a 100 square foot pervious patio, resulting in a 100 square foot decrease in existing impervious surfaces. The 100 square foot pervious patio would count as 75 square feet of coverage. As a result, 25 square feet of coverage associated with the original impervious patio would be available for use, potentially resulting in 25 square feet of new impervious surface. The result in this example would be a net decrease of 75 square feet of impervious surface. For the specific areas of coverage where this pervious pavement exemption is applied, it could result in a 25 percent increase in the amount of land disturbed, which could have adverse impacts. However, this increased land disturbance would be more than offset by the 75 percent reduction of impervious surface and associated water quality benefits.

Alternative 3 also includes a partial coverage exemption for new pervious decks that allow at least 75 percent of water to pass through the deck and infiltrate directly beneath it. This exemption would apply only to single family residences and would require that the entire property have water quality BMPs in place in order to

receive the exemption. This exemption could result in additional land disturbance, which could have negative impacts. However, this disturbance would only occur on parcels with residential development, which are already altered from a natural state. In addition, the exemption would serve as an incentive for accelerated BMP retrofits of residential developments. Only 35 percent of developed parcels have BMPs in place (TRPA 2011), so the impacts of additional land disturbance from the exemption would be balanced by benefits of increased BMP implementation. With adoption of proposed design and maintenance requirements (see Section 3.8, Hydrology and Water Quality), the exemption would not prevent infiltration and would not impair water quality.

Impact 3.8-4 in Section 3.8, Hydrology and Water Quality, identifies potentially significant stormwater runoff and pollutant loading impacts from the proposed coverage exemptions in Alternative 3. As described in that section, implementation of Mitigation Measure 3.8-4 would be required to reduce these potential impacts to a less-than-significant level by requiring eligibility for coverage exemptions to be based on implementation of BMP requirements, design guidelines, and the coverage limits of the Bailey land capability system.

Total Change in Coverage

Incentivizing coverage transfers and redevelopment by allowing up to 70 percent coverage on high-capability developed parcels in Town Centers, the Regional Center, and the High Density Tourist District would increase coverage in these target areas, as compared to Alternative 1. However, the additional coverage allowed on higher capability lands within Town Centers, the Regional Center, and the High Density Tourist District would be directly offset by coverage transferred from sensitive land or more than offset on an acre-for-acre basis by transfers from high-capability land, resulting in an overall reduction of coverage in the Region and, importantly, reduction of coverage from SEZs and other sensitive lands.

As shown in Table 3.7-8, Alternative 3 would result in an estimated increase of 66 acres throughout the Region, with a total increase of 64 acres within Community Plan areas (due to new CFA, new residential bonus units, transfers of residential units, and existing TAUs) and a total increase of 82 acres outside of Community Plan areas (due to development of new residential units). Coverage transfers under Alternative 3, estimated at 79 acres, would result in a net decrease of 15 acres from LCD 1b (SEZ) and increases in coverage in higher capability LCDs 4–7) as development is further concentrated into the Town Centers, the Regional Center, and the High Density Tourist District. Similar to the Bailey map, when utilizing the 2007 soil survey (Table 3.7-9), Alternative 3 is estimated to result in a total increase of 53 acres of coverage in the Region (64-acre increase in community centers, 82 acres outside of community centers, and a 92-acre reduction through transfers), with decreases in coverage in sensitive lands (LCDs 1b and 1c) and increases in coverage in high-capability lands (LCDs 4–7).

Development projects implemented under Alternative 3 have the potential to remove, relocate, and add coverage to parcels within the Region, resulting in a total increase of coverage. However, all development projects would be required to comply with the proposed Regional Plan Update land coverage policies (discussed above), which establish maximum base allowable plus transferred coverage; prohibit additional coverage in sensitive lands; establish transfer ratios; and require mitigation of excess coverage. Therefore, any projects under Alternative 3 that would result in additional coverage would be limited such that total coverage in the Region as established by the Bailey System is not exceeded, and/or such that existing excess coverage is reduced. Furthermore, as described above, Alternative 3 includes several targeted changes to policies and implementation measures to reduce coverage from sensitive lands and incentivize redevelopment within Town Centers, the Regional Center, and the High Density Tourist District. There would be an increase in coverage on higher capability land within community centers where neighborhood-scale, area-wide BMPs may be implemented since Alternative 3 would provide the greatest incentives for the concentration of coverage within targeted community areas. Alternative 3 would also result in the greatest reduction in coverage on SEZ. Additionally, the proposed policy change to exempt public trails from coverage requirements would facilitate the construction of such trails, which would be expected to offset vehicle miles traveled in the Region to some degree. A reduction in vehicle miles traveled would have associated benefits to air quality, traffic, recreation,

and greenhouse gas emissions. However, the exemption would allow for increased coverage for public trails that would not be fully mitigated. When balanced against the reduced coverage from residential, commercial, and tourist uses in Alternative 3, and the greatest reduction in SEZ land coverage of any of the other alternatives, Alternative 3 would have a **less-than-significant** impact on coverage in the Region. Furthermore, implementation of Mitigation Measure 3.8-4 in Hydrology and Water Quality would reduce any potentially significant stormwater runoff or pollutant loading impacts associated with increased coverage from the Alternative 3 proposed coverage exemptions to a less-than-significant level.

ALTERNATIVE 4: REDUCED DEVELOPMENT, INCENTIVIZED REDEVELOPMENT

Maximum Allowable Land Coverage (Base Plus Transferred)

Redevelopment projects within PTODs and Community Plan areas would be allowed to transfer in up to 70 percent total coverage of high capability lands on both developed and undeveloped parcels.

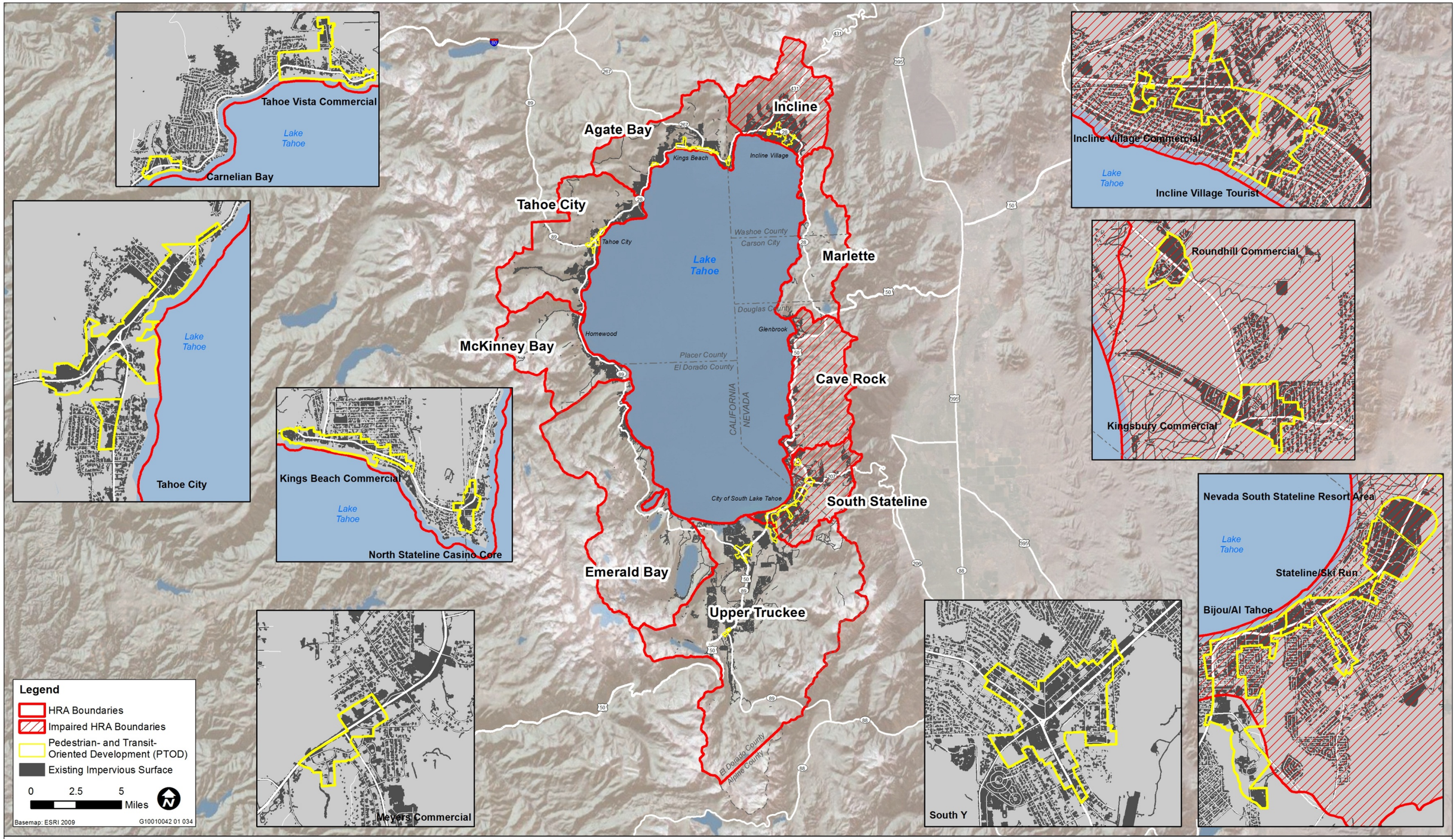
Land Coverage Transfer Ratios

Alternative 4 would incentivize the removal of coverage on sensitive lands by reducing the coverage transfer ratio to 1:1 (sending to receiving) when coverage is transferred from sensitive lands (LCDs 1–3) and increasing the transfer ratio to 2:1 for transfer from non-sensitive lands (LCDs 4–7) to PTODs or Community Plan areas. To further promote coverage transfer and removal, transfer of coverage across HRA boundaries would be allowed if the transfer is from an impaired watershed into an HRA that is not impaired (explained further below). Any coverage transferred across HRA boundaries would still have to comply with land capability limitations and all other ordinances regulating coverage. Alternative 4 would also allow the transfer of soft coverage from sensitive lands (LCDs 1–3) into Community Plan areas and PTOD areas. This policy would allow coverage that would otherwise have few incentives for removal to be transferred into targeted community centers. This would result in a beneficial environmental effect in that it would incentivize coverage removal from sensitive lands, including SEZ, which would result in benefits to water quality, soil conditions, and plant and wildlife habitat.

Land Coverage Transfer Areas

Alternative 4 would change the existing coverage transfer area provisions to allow the transfer of coverage across HRA boundaries when the transfer would be from an HRA that has been defined as impaired to an HRA that that has not been defined as impaired. An HRA would be defined as impaired if, in aggregate, it had more than its allowable coverage as determined by the Bailey System. Three HRAs have been determined to meet this definition of impaired: Incline, Cave Rock, and South Stateline (Exhibit 3.7-5). Allowing coverage transfers out of these three impaired HRAs would allow the proportion of coverage in those HRAs to decrease and the proportion of coverage in other HRAs to increase.

Alternative 4 includes incentives for redevelopment within community centers (PTODs), including new CFA and TAUs as a match for CFA and TAUs transferred into community centers, allowances for mixed-use development, and increased density. These incentives are expected to increase the amount of redevelopment and new development within the community centers, which would increase the demand for coverage transfers into the community centers with corresponding coverage reductions occurring outside of the community centers.



Source: TRPA 2011

Exhibit 3.7-5. Existing Impervious Surfaces, Hydrologically Related Areas, Impaired HRAs, and PTODs

As described in Alternative 3, TRPA estimated the relative likelihood of whether more coverage would be transferred into an HRA from other areas or whether more coverage would be transferred out of an HRA to other HRAs based on land value, the existing market price for coverage, and the existing inventory of coverage available for sale. As shown in Appendix H, the Cave Rock HRA has relatively high land values, a high market price for coverage, and no existing inventory of coverage available for transfer. As a result, few transfers of coverage out of the Cave Rock HRA would be expected under Alternative 4. The Incline HRA has relatively high land values and a high existing market price for coverage, which would indicate that few transfers out of the Incline HRA would occur. However, the Incline HRA has a relatively high existing inventory of coverage available for transfer. When considered together, these factors would indicate that a low to moderate amount of coverage would likely be transferred out of the Incline HRA under Alternative 4. The South Stateline HRA has low land values, low to average market prices for coverage, and an average supply of coverage currently available for sale. When taken together, these factors would indicate that more coverage would be transferred out of the South Stateline HRA than the Cave Rock or Incline HRA. Furthermore, the land values, coverage prices, and inventory of available coverage in the Marlette, Cave Rock, and Nevada portion of the Agate Bay HRAs indicate that these HRAs would likely have the greatest demand for coverage transferred in from other HRAs (Appendix H).

In Alternative 4, allowing coverage transfers out of the South Stateline, Incline, and Cave Rock HRAs would likely result in a lower proportion of coverage in the South Stateline HRA and Incline HRA, although the Incline HRA would likely experience less coverage reduction than the South Stateline HRA. Based on market conditions, the Cave Rock HRA would likely experience little change since any supply of coverage available for transfer would likely be absorbed within that HRA. Current market conditions indicate that the Marlette HRA and the Nevada portion of the Agate Bay HRA would likely experience increased proportions of coverage (Appendix H). Due to incentives for development and redevelopment within PTODs, these community centers would likely see an increased proportion of coverage with corresponding coverage reductions occurring outside the PTODs. The increased demand for coverage transfers into PTODs and the increased supply of coverage available for transfers to all HRAs not designated as impaired would lead to a net increase in coverage transfers throughout the Region. Based on the amount of redevelopment incentives offered and the restrictions on coverage transfers, this increase in coverage transfers would be greater than in Alternatives 1, 2, and 5, but less than in Alternative 3. An increase in the amount of coverage transferred throughout the Region could have negative impacts in the location where that coverage is placed. However, existing regulations would still apply to the transferred coverage, including a verification of land capability to ensure that transferred coverage does not exceed the maximum allowable coverage at the project level (TRPA Code Chapter 30) and a requirement to install water quality BMPs on any transferred coverage. As of 2011, only 35 percent of existing developed parcels had Water Quality BMP certifications (TRPA 2011). It would be reasonable to assume that at least 65 percent of transfers of existing coverage would result in the removal of coverage without BMPs and the placement of coverage with BMPs. As such, an increase in the rate and volume of coverage transferred would result in an increase in the rate of water quality BMP implementation and an increase in the total amount and proportion of coverage with BMPs.

In Alternative 4, coverage transfer ratios would result in a net reduction in coverage and a relocation of coverage from more sensitive to less sensitive lands. As with existing conditions, a portion of the coverage transferred for residential uses could be potential coverage rather than existing coverage. Transfers of potential coverage restrict the creation of future coverage on the sending parcel that would otherwise be allowed. This results in an environmental benefit, but to a lesser extent than transfers of existing coverage, because transfers of existing coverage result in an immediate reduction in coverage. Increased coverage transfers would lead to increased coverage removal Region-wide, reductions in future coverage through transfers of potential coverage, and relocation of coverage from more sensitive lands to less sensitive lands.

Excess Coverage Mitigation

Under Alternative 4, the excess coverage mitigation program would require large projects (i.e., projects defined as a Redevelopment or Special Project pursuant to the Code) with excess coverage to mitigate the impact in the following priority order:

1. implement all feasible on-site coverage reduction;
2. allow off-site reductions; and
3. allow payment of excess coverage mitigation fees after all feasible direct coverage reduction options have been exhausted.

Under Alternative 4, large projects (i.e., projects defined as a Redevelopment or Special Project pursuant to the Code) would be able to pay an excess coverage mitigation fee only after they have exhausted all feasible options for direct coverage removal within the same HRA where the project is occurring. All other projects would be able to mitigate excess coverage using any of the mitigation options. Under Alternative 4, excess coverage mitigation fees could be used to remove existing coverage in sensitive lands (LCDs 1–3) anywhere in the Region, regardless of the location of the project generating the fee. Excess coverage mitigation fees could still be used to remove existing or potential coverage from any LCD within the HRA where the fee was generated.

Direct Coverage Removal

Requiring large projects to exhaust all options for direct on- or off-site coverage removal within the same HRA would increase the amount of coverage that is directly removed by project proponents, reduce reliance on excess coverage mitigation fees and reduce the lag time between when a project occurs and when mitigation is implemented. The large scale projects that would be required to implement off-site coverage reductions typically have more means to pursue direct coverage removal than smaller projects. But, as shown in Table 3.7-11, the Land Banks have not been able to find enough opportunities for coverage removal in many HRAs, due to the limited supply of coverage for sale within each HRA. Therefore, it would be likely that some project proponents would not be able to locate off-site coverage removal opportunities within the HRA where their project is occurring.

Requiring off-site coverage removal by project applicants would not allow excess coverage mitigation from multiple projects to be combined to address larger-scale coverage removal opportunities, which could generate economies of scale and result in increased environmental benefits. Project proponents would have an incentive to identify the most cost-effective coverage removal opportunities rather than the most environmentally beneficial coverage removal opportunities. Requiring large projects to remove coverage off-site within the same HRA would also not allow coverage removal to occur across HRA boundaries, where it could remove coverage in high priority watersheds or at sites more hydrologically connected to Lake Tahoe or its tributaries.

Excess Coverage Mitigation Fees

As described in Alternative 1, the existing restriction on the use of mitigation funds to within an HRA has resulted in a backlog of 414,252 square feet of excess coverage, for which mitigation fees have been paid but mitigation has not yet occurred. This backlog is attributable to the limited supply and high cost of coverage available for removal in many HRAs. Allowing mitigation funds to be used to remove existing coverage on sensitive lands across HRA boundaries would expand the amount of coverage that is available for removal. As described under “Land Coverage Transfer Areas,” Alternative 4 would remove HRA restrictions on coverage transfers out of three impaired HRAs, which could reduce the cost to acquire coverage in some areas. IN combination, increasing the amount of coverage that is available to be removed with mitigation funds and reducing the cost to acquire coverage would reduce or eliminate the backlog of unmitigated coverage. Opportunities for removal of existing coverage in sensitive lands currently exist, so this change would be expected to have an immediate beneficial effect.

In addition, the existing HRA restrictions have prevented mitigation funds from being used for high-priority projects. Coverage removal opportunities exist in sensitive lands, priority watersheds, and in areas hydrologically connected to Lake Tahoe and its tributaries. However, mitigation fees often cannot be used for this high-priority coverage removal because they were generated in a different HRA. Allowing mitigation funds to be used for removal of existing coverage in sensitive lands outside the HRA where the fee was generated would allow mitigation funds to be used for the highest priority coverage removal with the greatest environmental benefit Region-wide. This would also allow mitigation fees generated in multiple HRAs to be combined and used for larger-scale coverage removal and restoration projects on sensitive lands. This would allow the land banks to achieve economies of scale and implement large-scale restoration projects, which can result in greater environmental benefits.

Allowing the use of mitigation fees for coverage removal in sensitive lands outside the HRA where the excess coverage is located would result in some mitigation occurring farther from the site being mitigated than under existing conditions. Allowing some mitigation to occur across HRA boundaries would not result in the mitigation affecting a different receiving water because ultimately Lake Tahoe is the receiving water that benefits from that mitigation. Major factors affecting the water quality and erosion impacts from coverage are the capability of the land where the coverage occurs (Bailey 1974) and the total amount of coverage within a watershed (Center for Watershed Protection 2003). Thus, the proximity of coverage mitigation to the site requiring the mitigation is less important than allowing mitigation to occur in more sensitive lands or watersheds with more coverage. Watersheds draining into Lake Tahoe show major differences in the level of fine sediment loading to Lake Tahoe, which is a primary pollutant of concern and an indicator of overall watershed condition (Simon 2006). Allowing excess coverage mitigation to occur across HRA boundaries has a beneficial effect because the mitigation can target coverage removal in more sensitive lands and in more degraded watersheds.

Other Coverage Policies

As with Alternative 3, Alternative 4 includes proposed changes that would exempt non-motorized public trails from the calculation and mitigation of land coverage, as described in TRPA Code Chapter 30, subject to siting and design requirements that would minimize disturbances to SEZs and sensitive wildlife habitats. Despite exemptions of public trails from land coverage calculations and requirements, the protections for sensitive habitats and jurisdictional wetlands would remain and the net beneficial effects on SEZs and other sensitive habitats as described for Alternative 3 would also be realized under Alternative 4.

Alternative 4 would also include a 25-percent coverage exemption for non-roadway pervious pavement on high-capability land and exemptions for pervious decks and temporary coverage in non-sensitive lands, as described under Alternative 3. Additionally, Alternative 4 would include an exemption for ADA-compliant access to existing structures. These exemptions could result in additional coverage in the Region, which could result in associated water quality impacts. However, implementation of Mitigation Measure 3.8-4 would be required to reduce potential water quality impacts to a less-than-significant level by requiring eligibility for coverage exemptions to be based on implementation of BMP requirements, design guidelines, and the coverage limits of the Bailey land capability system. (See Section 3.8, Hydrology and Water Quality, for more information.)

Total Change in Coverage

Alternative 4 would incentivize redevelopment by allowing up to 70 percent coverage on already developed parcels in Community Plan areas and PTOD areas.

As shown in Table 3.7-8, Alternative 4 would result in an estimated coverage increase from residential, commercial, and tourist accommodations of 180 acres in the Region, with a total increase of 48 acres within Community Plan areas (due to development of new CFA, TAUs, and residential units) and a total increase of 192 acres outside of Community Plan areas (due to development of new residential units). Increasing the maximum coverage, along with other incentives for concentrated redevelopment, combined with a 1:1 transfer ratio from

sensitive lands, would incentivize coverage transfers into Community Plan areas and PTODs. These transfers would result in a removal of coverage, especially in sensitive lands. Alternative 4 is estimated to result in 62 acres of coverage transfers, resulting in a decrease in coverage of 12 acres from LCD 1b (SEZ) and increases in coverage in higher capability lands (LCDs 4–7). Similar to the Bailey map, when utilizing the 2007 soil survey (Table 3.7-9), Alternative 4 is estimated to result in a total increase of 169 acres of coverage in the Region, with decreases in coverage in sensitive lands (LCDs 1b and 1c) and increases in coverage in high capability lands (LCDs 4–7).

Development projects implemented under Alternative 4 have the potential to remove, relocate, and add coverage to parcels within the Region. However, all development projects would be required to comply with the proposed Regional Plan Update land coverage policies (discussed above), which establish maximum allowable coverage; prohibit additional coverage in sensitive lands (with limited exceptions); establish transfer ratios; and require mitigation of excess coverage. Therefore, any projects under Alternative 4 that would result in additional coverage would be limited such that total coverage in the Region as established by the Bailey System is not exceeded and/or such that existing excess is reduced.

Alternative 4 includes several targeted changes to policies and implementation measures to incentivize the transfer of coverage to Community Plan areas and PTODs. As in Alternative 3, the additional coverage allowed on higher capability land within PTODs or Community Plan areas would be directly offset by coverage transferred from sensitive land or more than offset on an acre-for-acre basis by transfers from higher capability land. As in Alternative 3, Alternative 4 would increase coverage on higher capability land within community centers where neighborhood-scale, area-wide BMPs may be implemented. Alternative 4 would also result in a reduction in coverage on SEZs. Additionally, the proposed policy change to exempt public trails from coverage requirements would facilitate the construction of such trails, which would be expected to offset vehicle miles traveled in the Region to some degree. A reduction in vehicle miles traveled would have associated benefits to air quality, traffic, recreation, and greenhouse gas emissions. However, the exemption would allow increased coverage for public trails that would not be fully mitigated. When balanced against the reduced coverage from residential, commercial, and tourist uses and the reduction in SEZ land coverage, Alternative 4 would have a **less-than-significant** impact on coverage in the Region.

Alternative 5: Similar Rate of Development and Regulatory Structure to 1987 Regional Plan

Maximum Allowable Land Coverage (Base Plus Transferred)

Alternative 5 would have the same maximum allowable coverage limitations in Community Plan areas as Alternative 1, which are described in Table 3.7-8.

Land Coverage Transfer Ratios

Alternative 5 would have the same coverage transfer ratios as described above for Alternative 1.

Excess Coverage Mitigation

Coverage policies and implementation measures as discussed under Alternative 1 would continue to be implemented under Alternative 5.

Total Change in Coverage

Alternative 5 would result in the highest level of new development. As shown in Table 3.7-8, Alternative 5 would result in an increase of 202 acres in the Region, with a total increase of 56 acres within Community Plan areas (due to development of new CFA, TAUs, and residential units) and a total increase of 196 acres outside of Community Plan areas (due to development of new residential units). Based on the same transfer ratios as Alternative 1 and the increased allocations, Alternative 5 is estimated to result in 50 acres of coverage transfers.

Similar to the Bailey map, when utilizing the 2007 soil survey (Table 3.7-9), Alternative 5 is estimated to result in a total increase of 200 acres of coverage in the Region, with decreases in coverage in sensitive lands (LCDs 1b and 1c) and increases in coverage in high-capability lands (LCDs 4–7).

Development projects implemented under Alternative 5 have the potential to remove, relocate, and add coverage to parcels within the Region. However, all development projects would be required to comply with the Regional Plan Update land coverage policies (discussed above under Alternative 1), which establish maximum allowable coverage; prohibit additional coverage in sensitive lands (with limited exceptions); establish transfer ratios; and require mitigation of excess coverage. Therefore, any projects under Alternative 5 that would result in additional coverage would be limited such that total coverage in the Region as established by the Bailey System is not exceeded. The increase in coverage of 200 acres in Alternative 5 is not a substantial increase, particularly in light of the reduction in coverage from sensitive lands. Therefore, coverage impacts under Alternative 5 would be **less than significant.** However, in comparison to Alternative 3 and, to a lesser degree, Alternative 4, Alternative 5 lacks incentives to increase the amount and rate of restoration of sensitive lands and transfer of coverage from lower to higher capability lands.

MITIGATION MEASURES

No mitigation is required for any of the alternatives.

Impact 3.7-2 **Site Topography, Grading, and Soil Erosion**. Development pursuant to the Regional Plan Update could expose soils and SEZs to adverse effects from erosion during construction activities for new residential units, tourist accommodation units, commercial, and public service facilities. Proposed projects could involve grading more than 5 feet below ground surface, requiring findings pursuant to TRPA Code of Ordinances Section 33.3.6. However, development projects implemented as part of the Regional Plan Update would be required to obtain grading and excavation permits and approvals in accordance with TRPA Code Chapter 33 as well as meet local, state and federal regulations. For all alternatives (1 through 5), the impact to soil erosion and loss of topsoil would be **less than significant** because all alternatives involve a continuation of existing goals, policies, and implementation measures, which are protective of water quality.

The risk of soil erosion increases with increasing slope, precipitation, ground disturbance, and decreasing vegetative cover. Ground-disturbing activities, including excavation, grading, and other construction activities conducted for development allowed by the Regional Plan Update could result in soil erosion or the loss of topsoil. Removal of soil and vegetation exposes bare earth and could cause unstable conditions, resulting in soils that are easily disturbed by equipment and eroded by rain and wind. Additionally, project construction activities or road/trail alignments situated on steep slopes in areas underlain by unstable geology or sensitive soils are prone to higher erosion hazard that could result in erosion of surface soils during construction activities.

Under all alternatives, the timing, location, and duration of construction activities could result in the temporary disturbance of soil, exposure of disturbed areas to storm events, and/or excavation more than 5 feet below ground surface. Project development activities would likely include grading, excavations, cut and fill, and trenching, all of which could alter the existing topography or ground surface of individual sites within the Region. All proposed projects would be assessed on a project-by-project basis and would be required to conform to existing regional and local regulations to minimize excessive grading and soil instability. As discussed in Section 3.7.1, Regulatory Background, and in Impact 3.8-1 in Section 3.8, Hydrology and Water Quality, construction projects in the Tahoe Region must meet multiple requirements and regulations of TRPA, LRWQCB (California), NDEP (Nevada), and federal and local (city and county) agencies, which include coverage restrictions

(TRPA Code Chapter 30), implementation of BMPs (TRPA Code Chapter 60), and grading and excavation permits (TRPA Code Chapter 33).

To minimize erosion, as required by TRPA and local jurisdictions, grading and excavation permits and approvals would be obtained. Chapter 33 of the TRPA Code requires the preparation of soil reports to determine the effects of proposed grading activities on soil stability and groundwater where there have been recorded landslides or topographical evidence of landslides and where proposed or existing cuts or fills will exceed 20 feet. Chapter 33 identifies various standards and regulations related to grading to protect against significant adverse effects from excavation, filling, and clearing. Chapter 33 also prohibits excavation more than 5 feet below ground surface (or less in areas of known high groundwater) because of the potential for groundwater interception or interference, except under certain defined and permitted conditions (TRPA Code Section 33.3.6). Projects involving grading must also meet the standard conditions of approval established by TRPA (TRPA 2006). TRPA requires that final construction plans are submitted for review and conformance with TRPA rules, regulations, and ordinances as part of standard conditions of approval of a project.

Furthermore, all construction projects on the California side of the Tahoe Region with greater than 1 acre of disturbance are required, by LRWQCB, to prepare a stormwater pollution prevention plan (SWPPP) that includes a site specific Construction Site Monitoring and Reporting Plan (CSMRP) pursuant to the National Pollution Discharge Elimination System (NPDES) 2011 Tahoe Construction Stormwater permit. In Nevada, projects are required to comply with NDEP's Stormwater General Permit, which also includes a requirement for the preparation and implementation of a SWPPP. Project SWPPPs are required to describe the site, construction activities, proposed erosion and sediment controls, means of waste disposal, maintenance requirements for temporary BMPs, and management controls unrelated to stormwater. Temporary BMPs to protect water quality would be required during all site development activities. Water quality controls outlined in a SWPPP would be required to be consistent with TRPA requirements. Controls would be required to ensure that runoff quality meets or surpasses TRPA water quality objectives and the federal and state antidegradation policies, remains within the TRPA and LRWQCB discharge limits to surface water and groundwater sources, and maintains beneficial uses of Lake Tahoe. Stormwater quality sampling and reporting requirements outlined as a Construction Site Monitoring and Reporting Plan are also part of the SWPPP under the California permit and may also be a requirement in Nevada on a project-specific basis.

All alternatives include TMDL achievement strategies and site-specific projects designed to improve erosion control and water quality through advanced stormwater infrastructure, retention and biofilter installations, and other water quality protection elements within the context of planned transportation facilities. All development pursuant to all proposed Regional Plan Update alternatives would be required to adhere to existing regulations and permit requirements, which reduce the potential for substantial soil erosion or loss of topsoil. Therefore, this impact is considered to be **less than significant** for all alternatives.

MITIGATION MEASURES

No mitigation is required for any of the alternatives.

Impact 3.7-3 **Seismic Hazards**. Implementation of any of the Regional Plan Update alternatives would result in some level of additional development that could expose people and property to soil hazards resulting from seismic activity. However, the Region is already subject to such hazards including strong ground shaking, seismic-related ground failure caused by unstable soils (landslides, backshore erosion, avalanches, mud slides, ground failure, liquefaction, lateral spreading, or collapse), tsunami, or seiche. Development and redevelopment projects implemented under any of the Regional Plan Update alternatives would largely occur in already developed areas and not in areas known to be particularly susceptible to seismic hazards. In

addition, structures would be designed and constructed in accordance with the current design requirements of UBC Seismic Zone 3. Therefore, the Regional Plan Update alternatives would not result in a substantial change in development patterns or design requirements and would not result in a substantial increase in the risk of loss, injury, or death or property damage from strong ground shaking or earthquake induced ground failure caused by unstable soils. This impact would be **less than significant** for all alternatives.

The Lake Tahoe Basin lies within a tectonically active, asymmetric half-graben, a depressed block of land bordered by a major fault. Evidence shows that Tahoe Basin faults have had pre-historic earthquakes of a magnitude of 7.0 within the past 10,000 years. However, scientists believe that large quakes are "rare events" in the Tahoe Basin, meaning earthquakes of magnitude 6.5 or greater occur on individual faults about every 3,000 to 4,000 years (Segale and Cobourn 2005: p. 1). The Carson Range fault system is one of the largest fault systems east of the Basin and runs for 60 miles along the east face of the Carson Range from Reno to Markleeville. The probability of at least one magnitude ≥6.0 event occurring in the Reno-Carson City urban corridor over a 50-year period is estimated to be between 34 percent and 98 percent, the probability of a magnitude ≥6.6 event between 9 percent and 64 percent, and the probability of a magnitude ≥7.0 event between 4 percent and 50 percent. These probabilities are relatively high and are commensurate with many parts of California (dePolo et al. 1997: p. 3).

According to the Earthquake Potential Map for Portions of Eastern California and Western Nevada (CGS 2005), the Tahoe Basin is considered to have relatively low to moderate potential for shaking caused by seismic-related activity. However, earthquakes occurring nearby, such as the Reno-Carson urban corridor, have the potential to trigger secondary hazards in the Basin.

Slope failure results in landslides and mudslides from unstable soils or geologic units. Slope failure can occur over time as a result of rainfall, seismic activity, or human activity such as earthwork or grading. Landslides are often triggered when the soil pore pressure (i.e., water pressure in the ground) reaches a critical level. Soil liquefaction occurs when ground shaking from an earthquake causes a sediment layer saturated with groundwater to lose strength and take on the characteristics of a fluid, thus becoming similar to quicksand. Factors determining the liquefaction potential are soil type, the level and duration of seismic ground motions, the type and consistency of soils, and the depth to groundwater. Liquefaction poses a hazard to engineered structures. The loss of soil strength can result in bearing capacity insufficient to support foundation loads, increased lateral pressure on retaining walls, and slope instability.

Other potential seismic hazards include tsunami or seiche. While there is known risk of inundation from a tsunami or seiche triggered by a seismic event at Lake Tahoe, Goal 1, Policy 2, of the Natural Hazards Subelement addresses such risks by prohibiting construction, grading, and filling of lands within the 100-year floodplain and in the area of wave run-up except as necessary to implement the goals and policies of the plan. This Subelement also requires all public utilities, transportation facilities, and other necessary public uses located in the 100-year floodplain and area of wave run-up to be constructed or maintained to prevent damage from flooding and to not cause flooding.

Soil hazards related to seismic activity, which could affect future development in the Region under the Regional Plan Update, are the same hazards that currently affect the Region. The proposed Regional Plan Update alternatives would continue to concentrate development within community centers, consistent with the current development pattern, and the location, distribution, density, and growth of the human population in the Region would be expected to remain similar to those under the existing conditions. Therefore, new areas of the Region would not be opened up to substantial development and, as described in Table 3.12-1 of Section 3.12, limited increases in the Regional population would occur (limited by the development rights and allocations). Therefore, there would not be a significant increase in exposure of people in the Region to soil hazards. Furthermore, all

proposed projects would be assessed on a project-by-project basis and would be required to conform to existing regional and local regulations to minimize excessive grading and soil instability. As discussed above in Section 3.7.1, Regulatory Background, and under Impact 3.8-1 in Section 3.8, Hydrology and Water Quality, construction projects in the Tahoe Region must meet multiple requirements and regulations of the TRPA, LRWQCB (California), NDEP (Nevada), and federal and local (city and county) agencies. Further, development would be required to undergo site-specific geotechnical analysis (TRPA Code Section 33.4), and, if applicable, employ design standards that consider seismically active areas and comply with current building codes and local jurisdiction seismic standards. Adherence to these laws and regulations would ensure impacts related to seismic hazards under all Regional Plan Update Alternatives would be **less than significant**.

Alternative 1: No Project

Potentially active faults in and close to the Tahoe Basin may subject new development and infrastructure projects associated with Alternative 1 to seismic hazards, including strong ground shaking. Through adherence to existing laws and regulations, developments associated with Alternative 1 would be required to undergo site-specific geotechnical analysis (TRPA Code Section 33.4), and, if applicable, employ design standards that consider seismically active areas and comply with current building codes and local jurisdiction seismic standards. Adherence to these laws and regulations would ensure impacts would be **less than significant**.

Alternative 2: Low Development, Increased Regulation

In addition to development rights and allocations remaining from the 1987 Regional Plan, Alternative 2 would include 2,600 new residential allocations and an additional 200,000 square feet of CFA. Potentially active faults in and close to the Tahoe Basin may subject new development and infrastructure projects associated with Alternative 2 to seismic hazards, including strong ground shaking. Through adherence to existing laws and regulations, developments associated with Alternative 2 would be required to undergo site-specific geotechnical analysis (TRPA Code Section 33.4), and, if applicable, employ design standards that consider seismically active areas and comply with current building codes and local jurisdiction seismic standards. Adherence to these laws and regulations would ensure impacts would be **less than significant**.

Alternative 3: Low Development, Highly Incentivized Redevelopment

In addition to development rights and allocations remaining from the 1987 Regional Plan, Alternative 3 would include 2,600 new residential allocations, 600 new residential bonus units, and an additional 200,000 square feet of CFA. Potentially active faults in and close to the Tahoe Basin may subject new development and infrastructure projects associated with Alternative 3 to seismic hazards, including strong ground shaking. Through adherence to existing laws and regulations, developments associated with Alternative 3 would be required to undergo site-specific geotechnical analysis (TRPA Code Section 33.4), and, if applicable, employ design standards that consider seismically active areas and comply with current building codes and local jurisdiction seismic standards. Adherence to these laws and regulations would ensure impacts would be **less than significant**.

Alternative 4: Reduced Development, Incentivized Redevelopment

In addition to development rights and allocations remaining from the 1987 Regional Plan, Alternative 4 would include 4,000 new residential allocations, 200 new TAUs, and an additional 400,000 square feet of CFA. Potentially active faults in and close to the Tahoe Basin may subject new development and infrastructure projects associated with Alternative 4 to seismic hazards, including strong ground shaking. Through adherence to existing laws and regulations, developments associated with Alternative 4 would be required to undergo site-specific geotechnical analysis (TRPA Code Section 33.4), and, if applicable, employ design standards that

consider seismically active areas and comply with current building codes and local jurisdiction seismic standards. Adherence to these laws and regulations would ensure impacts would be **less than significant**.

ALTERNATIVE 5: SIMILAR RATE OF DEVELOPMENT AND REGULATORY STRUCTURE TO 1987 REGIONAL PLAN

In addition to development rights and allocations remaining from the 1987 Regional Plan, Alternative 5 would include 5,200 new residential allocations, 400 new TAUs, and an additional 600,000 square feet of CFA. Potentially active faults in and close to the Tahoe Basin may subject new development and infrastructure projects associated with Alternative 5 to seismic hazards, including strong ground shaking. Through adherence to existing laws and regulations, developments associated with Alternative 5 would be required to undergo site-specific geotechnical analysis (TRPA Code Section 33.4), and, if applicable, employ design standards that consider seismically active areas and comply with current building codes and local jurisdiction seismic standards. Adherence to these laws and regulations would ensure impacts would be **less than significant**.

MITIGATION MEASURES

No mitigation is required for any of the alternatives.

Impact 3.7-4 **Other Geologic Hazards.** Additional development over the planning period of the Regional Plan Update could potentially be constructed on soils or geologic formations susceptible to lateral spreading, subsidence, or collapse, thereby increasing the risk to people and facilities. Development projects implemented as part of the Regional Plan Update would be assessed on a project specific basis and would be required to conform to existing regional and local regulations and standards of design, grading, and construction practices to avoid or reduce hazards associated with other geologic hazards. Therefore, for all Regional Plan Update Alternatives (1, 2, 3, 4, and 5), there would be no substantial increased risk to people and facilities from other geologic hazards. This would be a **less-than-significant** impact for all Regional Plan Update alternatives.

Land surface subsidence can be induced by both natural and human phenomena. Natural phenomena include: subsidence resulting from tectonic deformations and seismically induced settlements; soil subsidence from consolidation, hydrocompaction, or rapid sedimentation; subsidence from oxidation or dewatering of organic rich soils; and subsidence related to subsurface cavities. Subsidence related to human activity includes subsurface fluid or sediment withdrawal. The potential for failure from subsidence and lateral spreading is highest in areas where there is a high groundwater table, where there are relatively soft and recent alluvial deposits (i.e., Holocene deposits approximately 11,000 years old), and where creek banks are relatively high. Settlement problems could also occur as a result of placing structures on man-made fill deposits. Expansive soils contain shrink-swell clays that are capable of absorbing water. As water is absorbed the clays increase in volume. This change in volume is capable of exerting enough force on buildings and other structures to damage foundations and walls. Damage can also occur as these soils dry out and contract. Lateral spreading typically occurs as a form of horizontal displacement of relatively flat-lying alluvial material and may often be associated with liquefaction. Soils most susceptible to liquefaction are loose, clean, saturated, uniformly-graded, fine-grained sands. Silty sands may also be susceptible to liquefaction.

ALTERNATIVE 1: NO PROJECT

Although new development potential associated with Alternative 1 would be very low, any such development could be subject to risk of impacts from unstable soils and slope failure. Redevelopment or new development

would likely require grading or earthwork, which would increase the propensity for soils to become unstable, thereby increasing the risk to people and structures. However, all proposed projects would be assessed on a project-by-project basis and would be required to conform to existing regional and local regulations to minimize excessive grading and soil instability. As discussed above in Section 3.7.1, Regulatory Background, and under Impact 3.8-1 in Section 3.8, Hydrology and Water Quality, construction projects in the Tahoe Region must meet multiple requirements and regulations of the TRPA, LRWQCB (California), NDEP (Nevada), and federal and local (city and county) agencies. Through adherence to existing laws and regulations, developments associated with Alternative 1 would be required to undergo site-specific geotechnical analysis (TRPA Code Section 33.4), and, if applicable, employ all standard design, grading, and construction practices to avoid or reduce other geologic hazards, including those associated with unstable soils and slope failure. Corrective measures such as structural reinforcement and using engineered fill to replace unstable soils would be applied to the design of individual future projects. All site designs would be reviewed and approved by the appropriate agencies. Adherence to these laws and regulations would ensure impacts would be **less than significant**.

Alternative 2: Low Development, Increased Regulation

In addition to development rights and allocations remaining from the 1987 Regional Plan, Alternative 2 would include 2,600 new residential allocations and an additional 200,000 square feet of CFA. As with Alternative 1, development and infrastructure projects associated with Alternative 2 may be constructed on areas of unstable soils or geologic units, thereby increasing the risk to people and structures. Through adherence to existing laws and regulations, new development, redevelopment, and infrastructure projects would be required to undergo site-specific environmental review and, as appropriate, geotechnical analysis (TRPA Code Section 33.4) to determine the design, grading, and construction practices required to avoid or reduce other geologic hazards, including those associated with unstable soils and slope failure. Furthermore, site designs would be reviewed and approved by permitting agencies, as appropriate. Adherence to existing laws and regulations would ensure impacts would be **less than significant**.

Alternative 3: Low Development, Highly Incentivized Redevelopment

In addition to development rights and allocations remaining from the 1987 Regional Plan, Alternative 3 would include 2,600 new residential allocations, 600 new residential bonus units, and an additional 200,000 square feet of CFA. As with Alternative 1, development and infrastructure projects associated with Alternative 3 may be constructed on areas of unstable soils or geologic units, thereby increasing the risk to people and structures. Through adherence to existing laws and regulations, new development, redevelopment, and infrastructure projects would be required to undergo site-specific environmental review and, as appropriate, geotechnical analysis (TRPA Code Section 33.4) to determine the design, grading, and construction practices required to avoid or reduce other geologic hazards, including those associated with unstable soils and slope failure. Furthermore, site designs would be reviewed and approved by permitting agencies, as appropriate. Adherence to existing laws and regulations would ensure impacts would be **less than significant**.

Alternative 4: Reduced Development, Incentivized Redevelopment

In addition to development rights and allocations remaining from the 1987 Regional Plan, Alternative 4 would include 4,000 new residential allocations, 200 new TAUs, and an additional 400,000 square feet of CFA. As with Alternative 1, development and infrastructure projects associated with Alternative 4 may be constructed on areas of unstable soils or geologic units, thereby increasing the risk to people and structures. Through adherence to existing laws and regulations, new development, redevelopment, and infrastructure projects would be required to undergo site-specific environmental review and, as appropriate, geotechnical analysis (TRPA Code Section 33.4) to determine the design, grading, and construction practices required to avoid or reduce other geologic hazards, including those associated with unstable soils and slope failure. Furthermore, site designs

would be reviewed and approved by permitting agencies, as appropriate. Adherence to existing laws and regulations would ensure impacts would be **less than significant**.

ALTERNATIVE 5: SIMILAR RATE OF DEVELOPMENT AND REGULATORY STRUCTURE TO 1987 REGIONAL PLAN

In addition to development rights and allocations remaining from the 1987 Regional Plan, Alternative 5 would include 5,200 new residential allocations, 400 new TAUs, and an additional 600,000 square feet of CFA. As with Alternative 1, development and infrastructure projects associated with Alternative 5 may be constructed on areas of unstable soils or geologic units, thereby increasing the risk to people and structures. Through adherence to existing laws and regulations, new development, redevelopment, and infrastructure projects would be required to undergo site-specific environmental review and, as appropriate, geotechnical analysis (TRPA Code Section 33.4) to determine the design, grading, and construction practices required to avoid or reduce other geologic hazards, including those associated with unstable soils and slope failure. Furthermore, site designs would be reviewed and approved by permitting agencies, as appropriate. Adherence to existing laws and regulations would ensure impacts would be **less than significant**.

MITIGATION MEASURES

No mitigation is required for any of the alternatives.

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