3.8 HYDROLOGY AND WATER QUALITY

3.8.1 INTRODUCTION

This section describes the existing water quality and hydrology conditions in the Lake Tahoe Region, and the regulations that relate to the water resources. The potential water quality and hydrologic impacts that would result from implementation of the RTP/SCS alternatives are identified and assessed related to the implementation of the alternative transportation strategy packages. Mitigation measures are recommended for any significant or potentially significant impacts to important natural hydrologic processes or conditions, or to water quality.

Comment letters received on the Notice of Preparation that pertain to hydrology and water quality identified the following topics: relationship of the RTP to the Total Maximum Daily Load (TMDL) requirements for the Tahoe Region, potential pollution from waterborne transit on the Lake, and implications of the Lake’s designation as an Outstanding National Resource Water (ONRW). These topics are addressed in this section.

3.8.2 REGULATORY BACKGROUND

The following provides an overview of laws and regulations related to hydrology and water quality that are applicable to the RTP/SCS alternatives.

TAHOE REGIONAL PLANNING AGENCY

ENVIRONMENTAL THRESHOLD CARRYING CAPACITIES

Water quality standards adopted by the Tahoe Regional Planning Agency (TRPA) set a target to return the Lake to the transparency observed in the late 1960s. Six major indicator themes are currently used by TRPA to assess the water quality of Lake Tahoe and its tributaries. Table 3.8-1 lists each Threshold Category, indicator reporting category (indicator theme), and generalized characterization of status, trend, and confidence (TRPA 2012a).

Nearshore Water Quality

The nearshore area is the primary point of contact for most residents and visitors to the Lake. The quality of water in the nearshore area is tracked by measuring turbidity, which is an indication of the cloudiness of water expressed in Nephelometric Turbidity Units (NTU). Higher turbidity measurements indicate cloudier water. Higher turbidity measurements in the nearshore area of the Lake, defined by Taylor (2004: p. 29) as levels exceeding 0.25 NTU, appear to be influenced by surface runoff from developed areas. Of the 72 miles (115.9 kilometers (km)) of Lake shoreline, Taylor identified 0.9 miles (1.5 km) of shoreline with extremely elevated turbidity, 2.5 miles (4 km) of shoreline with moderately elevated turbidity, and 5.6 miles (9 km) of shoreline with slightly elevated turbidity (2004: p. iii).

TRPA is collaborating with the Lahontan Regional Water Quality Control Board (LRWQCB) and the Nevada Division of Environmental Protection (NDEP) to adjust nearshore turbidity monitoring locations and gather additional information to develop more appropriate indicators and standards to better correlate to Lake Tahoe’s nearshore water clarity and aesthetics (NDEP 2011).
<table>
<thead>
<tr>
<th>Threshold Category</th>
<th>Indicator Reporting Category (Indicator Theme)</th>
<th>Generalized Characterization of Status, Trend and Confidence</th>
</tr>
</thead>
</table>
| Water Quality      | Pelagic Lake Tahoe (open waters of Lake Tahoe) | Status: somewhat worse than target  
|                    |                                               | Trend: moderate decline  
|                    |                                               | Confidence: high |
| Water Quality      | Littoral Lake Tahoe (nearshore waters of Lake Tahoe) | Status: insufficient data to determine status, or no target established  
|                    |                                               | Trend: insufficient data to determine trend  
|                    |                                               | Confidence: low |
| Water Quality      | Tributaries                                    | Status: somewhat worse than target  
|                    |                                               | Trend: moderate improvement  
|                    |                                               | Confidence: moderate |
| Water Quality      | Surface Runoff (stormwater runoff to surface waters) | Status: insufficient data to determine status, or no target established  
|                    |                                               | Trend: insufficient data to determine trend  
|                    |                                               | Confidence: low |
| Water Quality      | Groundwater (stormwater runoff to soil)        | Status: insufficient data to determine status, or no target established  
|                    |                                               | Trend: insufficient data to determine trend  
|                    |                                               | Confidence: low |
| Water Quality      | Other Lakes (Fallen Leaf Lake)                 | Status: insufficient data to determine status, or no target established  
|                    |                                               | Trend: insufficient data to determine trend  
|                    |                                               | Confidence: low |

Source: TRPA 2012a

**Deep Water (Pelagic) Transparency and Clarity**

Long-term changes to the transparency and clarity of Lake Tahoe are influenced by the amount of particulate material in the water, which includes inorganic particles that scatter light (e.g., fine sediment suspended in the water column) and organic particles that absorb light (e.g., suspended algae).

Researchers from the Tahoe Environmental Research Center (TERC) have collected transparency measurements of Secchi depth since 1968. Exhibit 3.8-1 presents average annual measurements of Secchi depth from 1968 to 2010 (Data Provided by TRPA; Jan 2012), illustrating about a 26-foot decline in Tahoe’s transparency since 1968. In 2010 the average annual Secchi depth measured from the surface of the Lake was 64.4 feet, which is the second lowest recording (the lowest was an average annual measurement of 64.1 feet in 1997). TERC researchers note that the year to year measurements cannot be viewed in isolation, and that the long-term trend from the 43 years of data shows the rate of transparency decline to be slowing (TERC 2011: p. 6.2). Data for 2011 reported the average annual clarity level to be 68.9 feet, a 4.5-foot improvement over 2010. Winter clarity continued a decade-long pattern of improvement, while summer clarity continued to decline at the same rate that it has since the late 1960s, when monitoring began. Average annual clarity in the past decade has been better than in recent decades. In 1997-1998, annual clarity reached an all-time average low of 65.1 feet. In 2001-2011 the average clarity was 70.6 feet (TERC 2012).

**Deep Water Primary Productivity**

Primary productivity measures the rate at which algae grow. Measurements of primary productivity are expressed as grams of carbon per square meter (gC/m²). Exhibit 3.8-2 presents average annual measurements of primary productivity in the Lake, which have been measured by TERC continuously since 1968. Exhibit 3.8-2 shows the rate of primary productivity trending significantly upwards since 1968. The algal population in Lake Tahoe has shifted from dominance by large non-motile species of phytoplankton in the 1960s to smaller motile species of phytoplankton that have naturally higher rates of primary productivity (TRPA 2007a: p. 3-26).
Exhibit 3.8-1.  
Average Annual Secchi Depth (Data Provided by TRPA; Jan 2012)

Exhibit 3.8-2.  
Primary Productivity (Data Provided by TRPA; Jan 2012)
Other Threshold Standards
In addition to water quality thresholds and standards that specifically measure the water quality of Lake Tahoe and its tributaries, three additional threshold standards are used by TRPA to assess the quality of water in the Tahoe Region. These thresholds include standards that define surface runoff concentrations discharged to surface waters, surface runoff concentrations discharged to land surfaces for infiltration, and the quality of other lakes in the Tahoe Region. The 2011 Draft TRPA Threshold Evaluation Report found available data to be insufficient to evaluate the status and trends of these threshold standards over the past 5 years (TRPA 2012a). The 2006 Threshold Evaluation Report identified these three threshold standards to be in nonattainment but also cited a lack of sufficient data to make conclusive findings on status and trends (TRPA 2007b, 3-14 to 3-16).

REGIONAL PLAN
Regional Plan Update priorities and policies include accelerating water quality restoration by targeting environmental redevelopment and EIP opportunities, retaining the current regional growth system that prevents unchecked overdevelopment and encourages preservation of open space, and integrating with the Regional Transportation Plan to address congestion and support pedestrian and bike improvement projects that reduce vehicle dependency.

Goals and Policies
The TRPA Goals and Policies document is an overall approach to meeting the environmental threshold standards. Table 3.8-2 lists the current TRPA Regional Plan goals and policies relevant to hydrology and water quality in association with transportation facilities and projects.

Code of Ordinances
The March 2012 TRPA Code of Ordinances regulates Grading and Construction in Chapter 33, Driveway and Parking Standards in Chapter 34, 100-year Floodplains in Chapter 35 (Natural Hazard Standards chapter), and Site and Building Design Standards in Chapters 36 and 37 (TRPA 2012b).

Chapter 60 of the TRPA Code of Ordinances regulates Water Quality. It includes discharge limits for surface runoff and discharge to groundwater (Table 3.8-3), prohibition of certain types of watercraft, snow removal and disposal requirements and required installation and maintenance of BMPs (TRPA 2012b).

In accordance with Code Chapter 60 and TRPA’s BMP Handbook, temporary BMPs are required on construction sites and should be maintained throughout the construction period. Permanent BMPs are required for new and existing development and infrastructure. Infiltration facilities must be designed to accommodate a 20-year one hour storm, per the BMP Handbook. Drainage conveyances through a parcel must be designed for at least a 10-year, 24-hour storm. Conveyances through an SEZ must be designed for a minimum 50-year storm. SEZ is defined by TRPA as the major and minor streams, lakes, meadows and marshes, primary and secondary riparian vegetation and other areas of surface and ground water influence zones within the Lake Tahoe Region which provide natural treatment and conveyance of surface runoff, among many other aquatic and terrestrial habitat and wildlife values and functions (TRPA 2004:28). Floodplain management under Chapter 35 requires that TRPA review development in 100-year floodplains, as defined by the Federal Emergency Management Agency (FEMA) or where TRPA has reason to believe that a flood hazard may exist. The TRPA Code prohibits development, grading or filling of lands within 100-year floodplains with certain exceptions, including specific public outdoor recreation facilities, public health or safety facilities, access to buildable sites across a floodplain, and erosion control projects or water quality control facilities when it can be proven there are no viable alternatives and all potential impacts can be minimized (TRPA 2012b).
<table>
<thead>
<tr>
<th>Goal/Policy</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural Hazards Goal 1, Policy 2</td>
<td>Prohibit 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. Require 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.</td>
</tr>
<tr>
<td>Water Quality Goal 1, Policy 1</td>
<td>Discharge of municipal or industrial wastewater to Lake Tahoe, its tributaries, or the groundwaters of the Tahoe Region is prohibited, except for existing development operating under approved alternative plans for wastewater disposal, and catastrophic wildfire protection to prevent the imminent destruction of the [South Tahoe Public Utility District] STPUD Luther Pass pump station.</td>
</tr>
<tr>
<td>Water Quality Goal 1, Policy 2</td>
<td>All persons who own land and all public agencies which manage public lands in the Lake Tahoe Region shall put best management practices (BMPs) in place, maintain their BMPs; protect vegetation on their land from unnecessary damage; and restore the disturbed soils on their land.</td>
</tr>
<tr>
<td>Water Quality Goal 1, Policy 3</td>
<td>Application of BMPs to projects shall be required as a condition of approval for all projects.</td>
</tr>
<tr>
<td>Water Quality Goal 1, Policy 5</td>
<td>Units of local government, state transportation departments, and other implementing agencies shall restore 25 percent of the [stream environment zone] (SEZ) lands that have been disturbed, developed, or subdivided in accordance with the Capital Improvements Program (Part II).</td>
</tr>
<tr>
<td>Water Quality Goal 1, Policy 7</td>
<td>Off road vehicle use is prohibited in the Lake Tahoe Region except on specified roads, trails, or designated areas where the impacts can be mitigated.</td>
</tr>
<tr>
<td>Water Quality Goal 2, Policy 1</td>
<td>All persons engaging in public snow disposal operations in the Tahoe Region shall dispose of snow in accordance with site criteria and management standards in the Handbook of Best Management Practices.</td>
</tr>
<tr>
<td>Water Quality Goal 2, Policy 3</td>
<td>All institutional users of road salt in the Lake Tahoe Region shall keep records showing the time, rate, and location of salt application. Storage of road salt shall be in accordance with the Handbook of Best Management Practices.</td>
</tr>
<tr>
<td>Water Quality Goal 2, Policy 7</td>
<td>The BMPs will be amended to include special construction techniques, discharge standards, and development criteria applicable to projects in the shorezone.</td>
</tr>
<tr>
<td>Water Quality Goal 2, Policy 10</td>
<td>Reduce the impacts of motorized watercraft on water quality.</td>
</tr>
<tr>
<td>Soils Goal 1, Policy 6</td>
<td>Grading, filling, clearing of vegetation (which disturbs soil), or other disturbances of the soil are prohibited during inclement weather and for the resulting period of time when the site is covered with snow or is in a saturated, muddy, or unstable condition. Special regulations and construction techniques will apply to all construction activities occurring between October 15 and May 1.</td>
</tr>
<tr>
<td>Soils Goal 1, Policy 7</td>
<td>All existing natural functioning SEZs shall be retained as such and disturbed SEZs shall be restored whenever possible.</td>
</tr>
<tr>
<td>SEZ Goal 1, Policy 5</td>
<td>No new land coverage or other permanent land disturbance shall be permitted in Stream Environment Zones except for those uses as noted in A, B, C, D, and E below if they meet certain criteria for necessity and full mitigation of impacts as stated in more specific detail in the policy. A. Public outdoor recreation facilities B. Public service facilities C. Projects which require access across SEZs to otherwise buildable sites D. New development may be permitted in man-modified SEZs E. SEZ restoration and erosion control projects</td>
</tr>
<tr>
<td>SEZ Goal 1, Policy 6</td>
<td>Replacement of existing coverage in SEZs may be permitted where the project will reduce impacts on stream environment zones and will not impede restoration efforts.</td>
</tr>
<tr>
<td>Shorezone Goal 1, Policy 9</td>
<td>The agency shall regulate the placement of new piers, buoys, and other structures in the foreshore and nearshore to avoid degradation of fish habitats, creation of navigation hazards, interference with littoral drift, interference with the attainment of scenic threshold standards, and other relevant concerns.</td>
</tr>
</tbody>
</table>

Source: TRPA 1986, Updated 2006.
Table 3.8-3. TRPA Discharge Limits for Surface Runoff and Discharge to Groundwater

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Maximum Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Surface Runoff</strong></td>
<td></td>
</tr>
<tr>
<td>Dissolved Inorganic Nitrogen as N</td>
<td>0.5 mg/l</td>
</tr>
<tr>
<td>Dissolved Phosphorus as P</td>
<td>0.1 mg/l</td>
</tr>
<tr>
<td>Dissolved Iron as Fe</td>
<td>0.5 mg/l</td>
</tr>
<tr>
<td>Grease and Oil</td>
<td>2.0 mg/l</td>
</tr>
<tr>
<td>Suspended Sediment</td>
<td>250 mg/l</td>
</tr>
<tr>
<td><strong>Discharge to Groundwater</strong></td>
<td></td>
</tr>
<tr>
<td>Total Nitrogen as N</td>
<td>5 mg/l</td>
</tr>
<tr>
<td>Total Phosphate as P</td>
<td>1 mg/l</td>
</tr>
<tr>
<td>Iron as FE</td>
<td>4 mg/l</td>
</tr>
<tr>
<td>Turbidity</td>
<td>200 NTU</td>
</tr>
<tr>
<td>Grease and Oil</td>
<td>40 mg/l</td>
</tr>
</tbody>
</table>


Plan Area Statements

TRPA’s Plan Area Statements (PAS) outline land use classifications, special policies and planning considerations, permissible uses and maximum allowances for the Lake Tahoe Region. Water quality protection features allowed in Plan areas are described in the list of Resources Management Allowed Uses in the PAS, such as erosion control and runoff control. The Tahoe Region roadway network encompasses numerous PAS with different land uses and management requirements.

FEDERAL

**FEDERAL WATER POLLUTION CONTROL ACT OF 1977 (33 USC 1251 ET SEQ.)**

Section 404

The Federal Water Pollution Control Act, commonly referred to as the Clean Water Act (CWA), provides for the restoration and maintenance of the physical, chemical, and biological integrity of the nation’s waters. Section 404 of the act prohibits the discharge of fill material into waters of the United States, including wetlands, except as permitted under separate regulations by U.S. Army Corps of Engineers (USACE) and U.S. Environmental Protection Agency (EPA). To discharge dredged or fill material into waters of the United States, including wetlands, Section 404 requires projects to receive authorization from the Secretary of the Army, acting through the USACE. Waters of the U.S. are generally defined as “…waters which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide; territorial seas and tributaries to such waters.”

Section 401

Under CWA Section 401, applicants for a federal license or permit to conduct activities that may result in the discharge of a pollutant into waters of the United States must obtain certification for the discharge. The certification must be obtained from the state in which the discharge would originate or, if appropriate, from the interstate water pollution control agency with jurisdiction over the affected waters at the point where the discharge would originate. Therefore, all projects that have a federal component and may affect state water quality (including projects that require federal agency approval, such as issuance of a Section 404 permit) must also comply with CWA Section 401. Water quality certification requires evaluation of potential impacts in light of
water quality standards and CWA Section 404 criteria governing discharge of dredged and fill materials into waters of the United States. The federal government delegates water pollution control authority under CWA Section 401 to the states (and in California, ultimately to the Regional Water Quality Control Boards).

Section 402
Section 402 of the CWA establishes the National Pollutant Discharge Elimination System (NPDES) permit program to regulate discharges of pollutants into waters of the United States. An NPDES permit sets specific discharge limits for point sources discharging pollutants into waters of the United States and establishes monitoring and reporting requirements, as well as special conditions. The federal government delegates water pollution control authority under Section 402 of the CWA to the states, which oversee compliance. Phase I regulations under Section 402(p) require medium and large Municipal Separate Storm Sewer Systems (MS4s) serving populations greater than 100,000, industrial sites and construction sites greater than five acres to obtain stormwater permits. Although the areas around Lake Tahoe serve less than 100,000, on the California side of the Tahoe Region the Phase I program regulations apply because of a special provision of the law and the fact the Lake is designated an ONRW by the EPA (see below). Phase II came on line in 1999 requiring permits for stormwater discharges from Small MS4s (less than 100,000 served) and construction sites disturbing between one and five acres (LRWQCB 2011d).

Section 303
Section 303(d) of the CWA requires states to identify impaired waters and establish the TMDL of pollutants for those waters. Lake Tahoe is currently on the 303(d) list for deep water transparency (Lake clarity), because it has not achieved the standard of 29.7 meters (97.4 feet) average annual Secchi depth since the early 1970s. Since then, deep water transparency has been greatly diminished to a 2011 measurement of 68.9 feet, a 4.5-foot improvement over 2010, when average clarity levels were the second-worst on record (TERC 2012). With a goal to restore Lake Tahoe’s historic deep water transparency, the Lake Tahoe TMDL was adopted by the LRWQCB and NDEP and approved by the EPA in August 2011. The two state agencies are collaborating with the Region’s counties, state departments of transportation, the City of South Lake Tahoe, and TRPA to ensure that programs and policies are aimed at and supportive of reducing the amount of fine sediment and nutrients entering the Lake (EPA 2011). The Lake Tahoe TMDL identifies fine sediment particles causing light scatter, and nitrogen and phosphorus contributing to phytoplankton growth as the pollutants primarily responsible for impairing the transparency of the Lake (LRWQCB, NDEP 2010). TMDL analysis showed runoff from urban land uses as the primary source of fine sediment loading to the Lake and, therefore, the TMDL plan emphasizes actions by the jurisdictions (i.e., cities, counties, and state departments of transportation) to reduce fine sediment sources from entering urban stormwater runoff and to treat urban runoff before it reaches the Lake.

Tahoe Regional Planning Agency Water Quality Management Plan (208 Plan)

TRPA developed a Water Quality Management Plan for the Lake Tahoe Region under Section 208 of the federal CWA (TRPA 1998). The 208 Plan includes descriptions of the geologic, hydrologic, geomorphic, soils, SEZ, and water quality setting. The Plan analyzes regional water quality problems and describes programs and activities to address these problems. The plan contains the Handbook of Best Management Practices (BMP Handbook), an SEZ Protection and Restoration Program, and a Capital Improvements Program (since replaced by the Environmental Improvement Program) for Erosion and Runoff Control (TRPA 1998).

TRPA recently completed a final draft update of the BMP Handbook, incorporating information from the Lake Tahoe TMDL reports related to protecting Lake clarity by reducing the key pollutants of concern: fine sediment, phosphorus, and nitrogen (TRPA 2011). The BMP Handbook is a tool for agencies and project implementers to use in meeting the standards for reducing pollutants of concern as identified in the Lake Tahoe TMDL. The BMP Handbook is not necessarily all inclusive or site specific, but it does provide targeted guidance on site analysis dependent upon project scale, temporary and permanent BMP planning, and design. It also includes a BMP toolkit and long-term maintenance strategies for stormwater quality control measures. The BMP Handbook will
continue to be periodically reviewed and updated in the future given the nature of evolving Lake and stormwater quality research and new technology and tools targeted for stormwater quality control and treatment (TRPA 2011).

**FEDERAL ANTIDEGRADATION POLICY**

The Federal Antidegradation Policy was enacted to provide protection to high-quality water resources of national importance. It directs states to develop and adopt statewide antidegradation policies that include protecting existing instream water uses and maintaining a level of water quality necessary to protect those existing uses and the water quality of high-quality waters. In EPA’s Clean Water Act regulations regarding water quality standards (40 CFR Chapter 1, Section 131.12[a][3]), the criteria for requiring an antidegradation standard includes: “where high quality waters constitute an outstanding National resource, such as waters of National and State parks and wildlife refuges and waters of exceptional recreational or ecological significance, that water quality shall be maintained and protected.” The EPA has designated Lake Tahoe an ONRW. ONRWs are provided the highest level of protection under EPA’s Antidegradation Policy, stipulating that states may allow some limited activities that result in temporary and short-term changes to water quality, but such changes should not adversely affect existing uses or degrade the essential character or special uses for which the water was designated an ONRW. The EPA interprets this provision to prohibit new or increased discharges to ONRWs that would degrade water quality.

**REGULATED FLOODPLAIN**

Floodplain Management Executive Order (EO) 11988 (May 24, 1977) directs all federal agencies to evaluate potential effects of any actions it may take in the floodplain and to avoid all adverse impacts associated with modifications to floodplains. It also directs federal agencies to avoid encroachment into the 100-year floodplain, whenever there is a practicable alternative and to restore and preserve the natural and beneficial values served by the floodplains (EPA 1977).

FEMA oversees floodplain management and runs the National Flood Insurance Program (NFIP) adopted under the National Flood Insurance Act of 1968. FEMA prepares Flood Insurance Rate Maps (FIRM) that delineate the regulatory floodplain to assist local governments, such as the Basin counties and City of South Lake Tahoe, with land use and floodplain management decisions to meet the requirements of the NFIP. In general, the NFIP mandates that development is not to proceed within the 100-year regulatory floodplain, if the development is expected to increase flood elevation by one foot or more. Very limited development is allowed in designated 100-year floodways (i.e., flood flow channels and areas with sufficient directional flow velocity of 100-year floodwaters).

**STATE**

**CALIFORNIA**

The California State Water Resources Control Board (SWRCB) is composed of nine regional water quality control boards responsible for preserving the state’s water quality. In coordination with the EPA, USACE, and SWRCB, the nine regional water quality control boards administer most of the federal CWA regulations, issue and enforce waste discharge permits, and monitor water quality. The Tahoe Region is within the LRWQCB. It issues Water Quality Certifications, pursuant to Section 401 of the CWA, and regulates stormwater discharges from municipal operations, industrial facilities, and construction projects under the NPDES program. The NPDES Stormwater Permit provides a means for the LRWQCB to hold California municipal jurisdictions and California Department of Transportation (Caltrans) accountable for achieving water quality improvements required by the Lake Tahoe TMDL.
The Porter-Cologne Water Quality Act transferred authority from the EPA to the State Water Resource Control Board to regulate and control stormwater pollutant discharges by requiring the state to establish water quality objectives and standards to protect water quality for beneficial uses. This law requires any operation or project that discharges waste or is proposing to discharge waste which could affect the quality of the state’s water to file a “report of waste discharge” with the appropriate regional water quality control board. Designated beneficial uses and water quality objectives for the surface and groundwater bodies in the California side of the Tahoe Region are identified in the Water Quality Control Plan for the Lahontan Region (LRWQCB 1995, as amended). LRWQCB regulates and works with the California-side jurisdictions in the Tahoe Region under the Phase I NPDES program to improve stormwater management practices (LRWQCB 2011a). The current NPDES permit (Order No. R6T-2011-0101, NPDES No. CAG616001) expands upon the previous stormwater management program requirements by adding pollutant load reduction and associated monitoring requirements to align with the Lake Tahoe TMDL (LRWQCB 2010).

The Lake Tahoe TMDL reports urban upland areas as having the most significant fine sediment load reduction opportunities needed to meet the transparency standard and emphasizes actions to reduce fine sediment particle and nutrient loading from urban stormwater runoff (LRWQCB 2011b). LRWQCB specifies waste load allocations as percent reductions from a baseline pollutant load taken from water year 2003/2004 (i.e. October 1, 2003 to September 30, 2004) and tracks compliance with load reductions through the NPDES permits. The City of South Lake Tahoe, Placer and El Dorado Counties, and Caltrans must use baseline load estimate calculations that represent infrastructure, land development, operation and maintenance activities that existed during that time (LRWQCB 2011b) and reduce those loads in the urban zones by certain percentages as shown in Table 3.8-4. A Lake Clarity Crediting Program was developed as part of the TMDL to provide technical guidance to various local jurisdictions on estimating baseline load estimates and tracking compliance with TMDL pollutant load reduction requirements. It is estimated to take 65 years to achieve the required load reductions and reach the Lake transparency target (LRWQCB 2011a).

Operating under the current NPDES Stormwater Permit and Lake Tahoe TMDL, each California jurisdiction (i.e., El Dorado and Placer Counties, City of South Lake Tahoe, and Caltrans) must develop and implement a comprehensive Pollutant Load Reduction Plan (PLRP) for review and approval by LRWQCB that illustrates how their methods of operation and maintenance, and plans for capital improvements and retrofit projects, ordinance enforcement, and related actions will achieve pollutant load reduction requirements (LRWQCB 2011a). The permit also replaces the previous concentration-based effluent limits for fine sediment particles, total nitrogen and total phosphorus listed in the 1995 Water Quality Control Plan with the particle- and mass-based Lake Tahoe TMDL effluent limits as shown in Table 3.8-5. For oil and grease, the permit more strictly prohibits waters from containing any oils, greases or other materials that result in a visible film or coating. Iron, no longer a constituent of concern in urban runoff sources, was removed from the effluent limitations.

Until a regional stormwater monitoring program can be funded and implemented to substantiate basin-wide progress and appraise the Lake Clarity Crediting Program, more focused water quality monitoring and reporting is required under the NPDES permit for each jurisdiction to provide data to demonstrate compliance with the load reduction requirements and support future adaptive management processes. Monitoring requirements include gathering data following methods described in the Lake Clarify Crediting Program to assess whether modeled water quality improvements are being realized and monitoring the effectiveness of implemented water quality improvement practices to inform and improve facility design, operation and maintenance procedures. More specifically, jurisdictions must conduct assessments of roadway and runoff treatment facility conditions following established methods under the Lake Clarity Crediting Program (LRWQCB 2011a).
Table 3.8-4.  TMDL Load Allocations for Urban Upland*

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Baseline Load</th>
<th>% of Basin-Wide Load</th>
<th>Standard Attainment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>5 yrs</td>
<td>10 yrs</td>
</tr>
<tr>
<td>Fine Sediment</td>
<td>3.5E+20</td>
<td>72%</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>10%</td>
<td>21%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10%</td>
<td>21%</td>
</tr>
<tr>
<td>Total Nitrogen</td>
<td>63</td>
<td>18%</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>8%</td>
<td>14%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10%</td>
<td>21%</td>
</tr>
<tr>
<td>Total Phosphorus</td>
<td>18</td>
<td>47%</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>7%</td>
<td>14%</td>
</tr>
</tbody>
</table>

* Urban upland load reduction requirements constitute waste load allocations for the City of South Lake Tahoe, El Dorado County, Placer County, and the California Department of Transportation. Source: LRWQCB 2011b Tables 5.18-2 through 5.18

Table 3.8-5.  Stormwater Effluent Limitations

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Units</th>
<th>Maximum Daily Effluent Limitations for Discharge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Nitrogen (as N)</td>
<td>Mg/L</td>
<td>0.5</td>
</tr>
<tr>
<td>Total Phosphorus (as P)</td>
<td>Mg/L</td>
<td>0.1</td>
</tr>
<tr>
<td>Total Iron</td>
<td>Mg/L</td>
<td>0.5</td>
</tr>
<tr>
<td>Turbidity</td>
<td>NTU</td>
<td>20*</td>
</tr>
<tr>
<td>Grease and Oil</td>
<td>Mg/L</td>
<td>2</td>
</tr>
</tbody>
</table>

*Note: For Active Treatment Systems use 10 NTU as daily average and 20 NTU for any single sample. Source: LRWQCB 2011c
A modified NPDES General Construction Stormwater Permit (Order No. R6T-2011-0019, NPDES No. CAG616002) was reissued by LRWQCB for the Lake Tahoe Hydrologic Unit in April 2011 based on a recently updated state General Permit (Order No. 2009-009-DWQ) that establishes a risk-based approach with increased monitoring and oversight for construction activities resulting in greater than one acre of disturbance. The new Tahoe Construction Stormwater permit requires potential dischargers to file permit registration documents, including a Notice of Intent (NOI) and a Storm Water Pollution Prevention Plan (SWPPP) that includes proposed Best Management Practices (BMP) and a site specific Construction Site Monitoring and Reporting Plan (CSMRP) developed by a certified Qualified SWPPP Developer (QSD). Stormwater generated from a construction site is sampled to determine if it exceeds the effluent limits shown in Table 3.8-5 (LRWQCB 2011c).

Under the NPDES post-construction stormwater requirements, the City of South Lake Tahoe, Basin counties, and state highway departments must design projects according to their respective stormwater NPDES permit and low impact development (LID) techniques. Onsite infiltration of stormwater must be integrated into all new and redevelopment projects. Stormwater facilities are to be designed and constructed to infiltrate runoff generated under a 20-year, one-hour storm event at a minimum, which is approximately one inch of runoff during a one-hour period. If site conditions do not allow for the required infiltration, the project proponent must either (1) propose and provide information on treatment facilities to meet the Tahoe 208 Plan effluent limits or (2) demonstrate that the public or municipal stormwater facilities are sufficient to provide adequate treatment of the project runoff to meet the sediment and nutrient load reduction requirements. Parking lots and other land uses that may contribute hydrocarbon pollutants are also required to implement pre-treatment devices to remove hydrocarbons prior to infiltration or discharge (LRWQCB 2011c).

The Lahontan Water Quality Control Plan includes prohibitions to protect 100-year floodplains, LRWQCB may grant exemptions to the 100-year floodplain discharge prohibition when it can be shown that either (1) there is no reasonable alternative that avoids or reduces the extent of encroachment in the floodplain for projects that require access to buildable sites and the impacts are minimized, or (2) the project is for erosion control, habitat, or SEZ restoration necessary for environmental protection and there is no reasonable alternative that avoids floodplain encroachment.

The Lahontan Water Quality Control Plan also requires that all public utilities, transportation facilities and other necessary public uses in the 100-year floodplain must be constructed and maintained so as to prevent damage from flooding and to not cause flooding.

Caltrans operates under a statewide MS4 permit (Order 99-06-DWQ, NPDES CAS000003) that was adopted prior to the newly enacted California General Permit (Order 2009-0009-DWQ) and Tahoe Municipal and Construction Stormwater Permits (Order No. R6T-2011-0101, NPDES No. CAG616001 and Order No. R6T-2011-0019, NPDES No. CAG616002). Caltrans is currently adapting its practices to be compliant with both the state and Tahoe permits while it works towards submitting a modified MS4 permit application compatible with the new stormwater requirements for California State Water Resources Control Board’s review and approval. Caltrans’ current MS4 permit incorporated the provisions of the Lahontan Water Quality Control Plan, including the stormwater discharge effluent limitations and infiltration and treatment facilities designed for the 20-year, one-hour storm for all projects and facilities within the Lake Tahoe Hydrologic Unit.

California Antidegradation Policy, Resolution No. 68 16 is incorporated into all Regional Water Quality Control Plans to protect high-quality waters as directed by the Federal Antidegradation Policy mentioned above. The state policy differs in that it extends protections to high-quality groundwater sources in addition to surface waters. Under this policy Lake Tahoe has been identified as one of only two ONRWs in California.
NEVADA

The NDEP Bureau of Water Quality Planning (BWQP) is responsible for several water quality protection functions, including: collecting and analyzing water data, developing standards for surface waters, publishing reports, providing water quality education, and implementing programs to address surface water quality. BWQP is divided into four branches: water quality standards, monitoring, nonpoint source pollution management, and the Lake Tahoe management program. The branches are responsible for the following duties and responsibilities:

- The water quality standards branch is responsible for developing and reviewing water quality standards; determining TMDLs loads and waste load allocations from point sources; and determining load allocations from non-point sources.
- The monitoring branch is responsible for administering the state’s water quality monitoring program. This branch maintains and updates water quality data for the national water quality data base (Water Quality Exchange Network - WQX) and is responsible for preparation of Nevada's Water Quality Assessment Report which is required under Section 305(b) of the CWA.
- The Nonpoint Source (NPS) Pollution Management Program is lead for controlling nonpoint sources of pollution in Nevada. NPS pollution results from a variety of dispersed land uses and human activities where discharges are not associated with specific outfall or end-of-pipe points.
- The Lake Tahoe Watershed Program is the NDEP program that collaborated with California’s LRWQCB to develop the TMDL for Lake Tahoe (see below for more information).

Similar to the California requirements under the LRWQCB, the NDEP stipulates that a Stormwater General Permit (NVR 100000) must be obtained, a SWPPP developed that demonstrates adequate BMP selection and installation for any construction project that is to disturb one or more acres. Prior to issuance of the permit, the owner/operator must submit a Notice of Intent (NOI) to NDEP online and mail in a filing fee. Under the permit when discharges are to Section 303(d) Impaired Water Bodies with an established TMDL, such as in the case of the Lake Tahoe Region, the project must comply with all applicable TMDL requirements (NDEP 2007).

LOCAL

EL DORADO COUNTY

El Dorado County has certain stipulations for construction grading, erosion control, and floodplain protections. El Dorado County ordinances and guidance relative to grading and erosion control include Chapter 15.14, County Grading, Erosion and Sediment Control Ordinance and the Tahoe Basin Special Conditions Section of the County Grading Design Manual (California State Parks, et al 2010). Chapter 17.25 Flood Damage Prevention Ordinance governs the alteration of natural floodplains, stream channels and natural protective barriers including filling, dredging and other development which may increase flood damage or divert floodwaters increasing flood hazards in other areas. The County’s community development director or authorized representative oversees the development permit applications within the floodplain.

El Dorado County has implemented a Stormwater Management Plan (SWMP) in compliance with the NPDES Order No. R6T-2005-0026 for the parts of the county within the Lake Tahoe Hydrologic Unit that lays out a five year strategy for reducing discharge of pollutants from the municipal stormwater collection, conveyance and treatment facilities. The SWMP proposes a range of control measures, BMPs and performance standards (Nichols 2007).
PLACER COUNTY

Placer County developed a SWMP in compliance with the NPDES and LRWQB Phase I Municipal Permit that summarizes goals and activities related to stormwater management in the Tahoe Region. The SWMP includes a Municipal Facilities Retrofit Program to improve erosion control and stormwater treatment facilities in the Lake Tahoe Region; a Construction Component to educate, monitor, and enforce stormwater quality protection measures; and a Road and Facility Inspection Component to reduce stormwater pollution from public stormwater collection and conveyance facilities. Actions under the latter include inspection of public road and drainage facilities and construction and post-construction BMPs for Placer County projects. Placer County coordinates much of the stormwater planning and improvement efforts in the Tahoe Region with neighboring El Dorado County and the City of Lake Tahoe.

Changes were made to the County’s grading ordinance to require grading permits for all construction in the Tahoe Region where three or more cubic yards of earthwork is to occur and BMPs for erosion prevention, slope stabilization, phased grading, revegetation, native vegetation preservation, SEZ protection and source control and retention are to be implemented (Placer County 2007).

WASHOE COUNTY

Under its Flood Hazard Ordinance, Washoe County requires any proposed development or construction in a flood hazard area to apply for a grading or special use permit and provide information on base flood elevations and flood protection measures (Washoe County 2007).

Under the County’s Storm Drainage Manual, all new development with drainage facilities shall maintain predevelopment conditions for major and minor storm events and culverts and bridges shall provide a minimum 100-year capacity with no overflow for major and minor arterial highways and a 100-year capacity for collector and local streets (Washoe County 2009).

DOUGLAS COUNTY

Douglas County provides floodplain management and drainage design requirements and guidance through Douglas County Code Titles 20.50 and 20.100 respectively, and the Storm Drainage section of its Design Criteria and Improvements Standards (DCIS) Manual (Division 6) (Douglas County 2012; 2008). An increase in the peak rate of flow from development is not allowed under the DCIS with emphasis given to the use of detention facilities sized to minimize runoff to pre-developed levels and retention/infiltration facilities only in certain cases, which include projects in the Tahoe Basin and approved by TRPA (Douglas County 2012, Douglas County 2008).

CITY OF SOUTH LAKE TAHOE

The City of South Lake Tahoe serves as the floodplain administrator for those areas within city limits. An application for a development permit must include a site plan, proposed structures, and base flood elevations for review and approval by the floodplain administrator is required before any construction can be approved within an area of special flood hazard as required under Chapter 34 of the City Code (CSLT 2011).

As a provision of the NPDES permit the City of South Lake Tahoe in partnership with Placer County and El Dorado County developed a SWMP that describes the process and procedures the City will take to move towards greater compliance with the TRPA and LRWQCB’s water quality requirements. The City of South Lake Tahoe developed a 2008 Drainage Master Plan that identifies specific drainage improvement and stormwater quality facilities. Section 8-6 of the City Code describes requirements for the preparation and submittal of grading plans.
and standards to ensure the proposed construction does not damage adjoining properties or streets due to increases in flow or flooding.

3.8.3 AFFECTED ENVIRONMENT

BASIN HYDROLOGY

The Lake Tahoe Basin was formed approximately two to three million years ago by geologic faulting and volcanic activity. Geologic faults running in a north-south direction allowed the formation of a valley between the uplifting Sierra Nevada Range and the Carson Range. The northeastern portion of the valley was blocked and dammed by volcanic activity to create the 506 square mile basin that lies along the California-Nevada border. Precipitation and runoff eventually filled a portion of the basin to create Lake Tahoe, which has a water surface area covering nearly two-fifths of the total basin area (123,000 acres).

Lake Tahoe is fed by 63 tributary streams and 52 intervening zones that drain directly to the Lake (see Exhibit 3.8-3). The largest tributary to the Lake is the Upper Truckee River in the south portion of the Basin, which accounts for 25 percent of the Lake’s annual inflow. The Truckee River at the northwest end of the Basin is the Lake’s only outlet, flowing to Pyramid Lake, a terminal lake in Nevada. A dam constructed at Tahoe City in the early 1900s regulates water flow to the Truckee River from the natural rim (6223 feet above sea level) to the maximum legal Lake level of 6229.1 feet. The Lake is 12 miles wide and 22 miles long with 72 miles of shoreline.

Regional topography is characterized by steep mountain slopes at higher elevations, transitioning to more moderately sloped terrain near the lakeshore. A notable precipitation gradient exists from the western boundary of the Tahoe Basin along the crest of the Sierra Nevada Range to the eastern boundary at the crest of the Carson Range. The west shore of Lake Tahoe averages about 35 inches per year of precipitation, while the east shore averages about 20 inches per year. Most precipitation in the basin falls between October and May as snow at higher elevations and as a mixture of snow and rain at Lake level. The peak in stream runoff caused by snowmelt in the higher elevations typically occurs in May or June. The snow pack near the lakeshore predominantly melts prior to the peak in snowmelt and runoff from the higher elevations.

Land cover within the basin is primarily forest, with areas of granitic outcrops and meadows. Less than four percent of the land cover in the Basin has been converted to impervious surfaces associated with development (i.e., hard cover; soft cover has not yet been quantified). Of this total amount of impervious surfaces, approximately 75 percent is found within three kilometers of the lakeshore (Minor and Cablk 2004: p. 58). Development is mostly concentrated near the Lake shore, with the densest urbanized land uses occurring in the City of South Lake Tahoe in the south, Tahoe City in the northwest, Kings Beach in the north and Incline Village in the northeast.

FLOODING

Extreme peak flows associated with damaging floods in the Tahoe Region are typically associated with winter rain on snow events where warmer weather rainstorms fall on antecedent snowpack conditions increasing runoff substantially. Moderate flood events can occur during spring snowmelt or rain on snow events.

With a controlled outlet on the Truckee River at the dam just east of the State Route 89/Fanny Bridge crossing in Tahoe City, flooding of the Lake itself is avoided by controlled releases and precautionary drawdowns. Projections of maximum water surface elevation in the Lake are made in early spring based on snow water content and expected physical and climate conditions affecting that season’s runoff. Calculated scheduled releases are made to ensure the water surface elevation is not allowed to exceed 6,229.1 feet Lake Tahoe datum (USBR 2008). Occasionally when the Lake is at its high water stage of 6229.1 feet it can align with and exaggerate river flood stages near their outlet into the Lake when a high Lake level occurs in unison with large rain on snow or summer rainstorm events (i.e., backwater effect in a tributary reach entering the Lake).
FEMA FIRMs, with various effective dates for the five counties encircling the Tahoe Region, delineate roadway segments crossing into FEMA designated Special Flood Hazard Areas, which are areas expected to be inundated by a one percent annual chance flood (i.e. 100-year flood). These areas are typically associated with a creek or river crossing. The FIRM effective September 26, 2008 covering El Dorado County and the southwestern portion of the Region show short sections of US 50 and State Route (SR) 89 in Special Flood Hazard Areas where the highways cross tributaries to the Lake including the Upper Truckee River, Trout Creek, and Bijou Creek crossings. Small sections of county and City of South Lake Tahoe roadways also fall within the Special Flood Hazard Areas; for example, Pioneer Trail enters the 100-year floodplain where it crosses Cold Creek, Heavenly Creek, and Bijou Creek. A large portion of the City of South Lake Tahoe airport is also in the 100-year floodplain as defined by FEMA (FEMA 2012). In the northwest and Placer County SR 89 enters Special Flood Hazard Areas only at specific river crossings including Ward Creek, Blackwood Creek, and the Truckee River at the Fanny Bridge crossing in Tahoe City. In Kings Beach, Vista and Griff Creek crossings at SR 28 show 100-year flood hazard according to the FIRM effective June 8, 1998 (FEMA 1998). To the northeast in Washoe County, short sections of SR 28 cross the 100-year floodplain at First Creek, Second Creek, and Mill Creek crossings per the FIRM effective January 20, 2010 (FEMA 2010). In Douglas County to the southeast, US 50 crosses the 100-year floodplain at some low-lying meadow areas near the Lake, and at Lincoln, McFaul, and Edgewood Creek crossings. A section of Lake Parkway and a large portion of Edgewood Creek Golf Course are also in the 100-year floodplain according to January 20, 2010 maps (FEMA 2010).

TRPA mapped most of the 100-year flood hazard areas just described with the addition of 500-year floodplain areas (See Exhibit 3.8-4). The maps provide a general depiction of the Basin’s floodplains adequate for environmental impact analysis, while the FIRMs noted previously describe the specific regulatory flood hazard areas. To the extent that minor variations in mapped floodplains may occur between the two sources, the FIRMs should take precedent.

**LAKE TAHOE TOTAL MAXIMUM DAILY LOAD**

The Lake Tahoe TMDL was developed collaboratively by the LRWQCB and the NDEP, and adopted by EPA for both states in 2011. As an impaired water body for transparency, Lake Tahoe is required to have a TMDL to determine the key pollutants and contributing sources to the impairment. The three pollutants identified as the primary basis for Lake Tahoe’s impaired status include fine sediment, nitrogen, and phosphorus. The TMDL also identified the maximum amount of each of these three pollutants Lake Tahoe can receive and remain in attainment of water quality goals. A completed TMDL provides the framework for a comprehensive water quality restoration plan to address identified pollutant sources (LRWQCB and NDEP 2010: p. 1-1).

The Lake Tahoe TMDL was a large, collaborative, multi-agency effort. It was supported by a body of scientific research that identified the load, or mass, of pollutants responsible for Lake Tahoe’s transparency decline; quantified the sources of pollutants to the Lake; and established load reduction milestones that can be used to develop policies and load reduction plans to progress towards attainment of water quality goals. The following summarizes key modeling tools and monitoring efforts that supported the development of the Lake Tahoe TMDL.

**TMDL STORMWATER MONITORING PROGRAM**

During water years 2003 and 2004, work under the TMDL Stormwater Monitoring Program collected stormwater quality data to characterize the quality of runoff from urban land uses in the Tahoe Region. Nineteen stormwater monitoring stations located throughout the Tahoe Region were used to measure the quality of runoff from urban land uses. The Stormwater Monitoring Program effort produced the most comprehensive stormwater quality data set in the Tahoe Region that can be used to characterize and assess urban stormwater runoff quality.
Exhibit 3.8.4. 100-Year and 500-Year Floodplains in the Tahoe Basin

Source: TRPA 2012a

Legend
- TRPA Boundary
- 100-year Flood Zone
- 500-year Flood Zone
Lake Tahoe Interagency Monitoring Program (LTIMP)

The Lake Tahoe Interagency Monitoring Program (LTIMP) is a cooperative program formed in 1979 to primarily monitor flow, nutrient concentrations, and sediment concentrations from a selection of streams that discharge to Lake Tahoe. Streams with substantial flow and water quality data collected through the LTIMP program include: Trout Creek, Upper Truckee River, General Creek, Blackwood Creek, Ward Creek, Third Creek, Incline Creek, Glenbrook Creek, Logan House Creek and Edgewood Creek.

Watershed Model

The Lake Tahoe Watershed Model (Watershed Model) was developed using the EPA’s Loading Simulation Program in C++ (LSPC) software platform. LSPC is an EPA approved model developed to facilitate large scale, data intensive watershed modeling applications. The Watershed Model uses long-term continuous records of Tahoe Region meteorological data and numerous modeling algorithms to simulate hydrology and water quality over twenty land-use types in 184 subwatersheds to collectively estimate runoff and pollutant loads that are discharged to Lake Tahoe.

Watershed Model inputs of average runoff quality generated by urban land uses in the Tahoe Region was derived from the data collected by the TMDL Stormwater Monitoring Program. Runoff and pollutant loading estimates produced by the Watershed Model were calibrated using 11 years (1994-2004) of hydrology and water quality data from 10 LTIMP streams. The calibrated Watershed Model is the primary TMDL tool used to estimate 1) runoff and pollutant loading from all subwatersheds of the Tahoe Basin, and 2) expected pollutant loads that might result from potential land use changes formulated to represent basin-wide pollutant reduction strategies.

Lake Clarity Model

The Lake Clarity Model was developed to estimate Lake Tahoe’s response to pollutant loading and to quantify pollutant load reductions necessary to achieve water quality goals, such as TRPA’s transparency standard. The Lake Clarity Model was designed to estimate Secchi depth in Lake Tahoe and Secchi depth responses to changes in various environmental inputs. The Lake Clarity Model is a complex modeling platform that includes interacting sub-models for hydrodynamics, plankton ecology, water quality, particle dynamics, and Lake optical properties. The model uses a number of variables, including algal concentration, suspended inorganic sediment concentration, particle size distribution, and colored dissolved organic matter to predict Secchi depth.

Pollutant Sources

Lake Tahoe is classified by limnologists as an oligotrophic lake, which means the Lake has clear water, high levels of dissolved oxygen, and very low concentrations of nutrients that can support algal growth (TERC 2011: p. 6.15). The exceptional transparency of the Lake results from naturally low inputs of nutrients and sediment from the surrounding watershed. As previously mentioned, Lake Tahoe is designated an ONRW under the CWA, and is also designated a “water of extraordinary ecological or aesthetic value” by the NDEP (TERC 2011: p. 6.2).

The Lake Tahoe TMDL research included an analysis of pollutant sources to identify the magnitude of pollutant loads to Lake Tahoe from source categories defined as: surface runoff from developed lands (urban upland); atmospheric deposition; forested runoff; stream channel erosion; groundwater; and shoreline erosion.

Exhibit 3.8-5 displays the relative distribution of average annual pollutant loading to Lake Tahoe for each pollutant of concern among the source categories (LRWQCB and NDEP 2010: pp. 7-2 and 7-3). As shown in Exhibit 3.8-5, the TMDL identifies surface runoff from developed lands as the most significant source of pollutant loading for fine sediment particles (the primary pollutant of concern) and phosphorus. Surface runoff from
developed lands is estimated to deliver over 70 percent of the average annual fine sediment particle load and approximately 40 percent of the average annual phosphorus load to the Lake. For nitrogen, atmospheric deposition is identified as the most significant source of loading to the Lake, contributing 55 percent of the average annual load.

![Pie charts showing pollutant sources](image)

**Exhibit 3.8-5 Existing Pollutant Sources**

**LOAD REDUCTION MILESTONES AND IMPLEMENTATION**

The Lake Tahoe TMDL indicates that to achieve TRPA’s transparency standard, total Region-wide loads of fine sediment particles, phosphorus, and nitrogen need to be reduced by 65 percent, 35 percent, and 10 percent, respectively. Load reductions expressed as a percentage are relative to baseline pollutant loads calculated for the year 2004.

Through the Lake Tahoe TMDL, the LRWQCB and NDEP have established five year load reduction milestones to help assess progress towards meeting the overall load reduction goals. The TMDL sets a 15-year interim goal, termed the Clarity Challenge, to reduce basin-wide loading of fine sediment particles, phosphorus, and nitrogen by 32 percent, 17 percent, and 4 percent, respectively. Attainment of the Clarity Challenge goal is estimated to return the Lake to an average annual transparency of about 80 feet (LRWQCB and NDEP 2010: p. 8-7).

Given that the majority of pollutant loads for fine sediment particles and phosphorus are delivered to the Lake from developed lands, the LRWQCB and NDEP have prioritized this source category as the greatest opportunity.
for pollutant control. The Lake Tahoe TMDL identifies various practices and treatment options as Implementation Actions to achieve the TMDL that include, but are not limited to, removal of impervious coverage, installation and maintenance of BMPs, advanced deicing strategies (to reduce or eliminate abrasive application), and controlling retail fertilizer sales within the Region (NDEP 2011).

Pollutant load allocations and load reduction targets will be specified for each jurisdiction in the Tahoe Region through NPDES permits for El Dorado County, Placer County, the City of South Lake Tahoe, and the California and Nevada Departments of Transportation. For local jurisdictions in Nevada (Washoe County and Douglas County), the NDEP is developing a Memorandum of Agreement (MOA) that will set load reduction goals and guide the implementation of projects and actions to achieve TMDL milestones. Through either an NPDES permit or an MOA, each jurisdiction is expected to develop load reduction plans that prioritize water quality projects and actions to reduce loading from developed lands to meet the TMDL milestones shown in Table 3.8-6.

<table>
<thead>
<tr>
<th>Pollutant of Concern</th>
<th>2016 Target</th>
<th>2021 Target</th>
<th>Interim Clarity Challenge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fine Sediment Particles</td>
<td>10%</td>
<td>21%</td>
<td>32%</td>
</tr>
<tr>
<td>Total Phosphorus</td>
<td>7%</td>
<td>14%</td>
<td>17%</td>
</tr>
<tr>
<td>Total Nitrogen</td>
<td>8%</td>
<td>14%</td>
<td>4%</td>
</tr>
</tbody>
</table>

1 Load reductions expressed as a percentage are relative to baseline pollutant loads calculated for the year 2004. Source: LRWQCB and NDEP 2010

3.8.4 ENVIRONMENTAL CONSEQUENCES AND RECOMMENDED MITIGATION MEASURES

METHODS AND ASSUMPTIONS

The following analysis considers how implementation of the proposed RTP/SCS transportation strategy packages, under each alternative, would affect the significance criteria listed below. Cumulative impacts are discussed in Chapter 4 and consider the transportation strategies in combination with SCS.

SIGNIFICANCE CRITERIA

Implementation of the RTP/SCS would result in a significant adverse effect on hydrology or water quality if it would:

- violate any federal, state, regional or TRPA water quality standards or waste discharge requirements or otherwise substantially degrade surface or groundwater quality
- be inconsistent with or impede the implementation of the approved Lake Tahoe TMDL in California or Nevada or result in any permanent or long-term degradation of Lake Tahoe transparency
- significantly increase the rate or amount of stormwater runoff within the Tahoe Region which would exceed the capacity of existing or planned stormwater drainage, infiltration, and treatment systems or facilities resulting in increased sources of pollutants reaching the Lake or detrimental flooding to property or infrastructure
- substantially alter existing drainage patterns in a manner that may result in detrimental flooding to property or infrastructure or substantial erosion or siltation that may be carried to the Lake
- cause changes in currents, adversely affect the natural littoral processes, or substantially alter the course or direction of water movements in any water body,
allow new development to proceed within a 100-year flood hazard area as mapped by FEMA or alter the course or flow of 100-year flood waters

- alter the direction or rate of flow of groundwater, or
- substantially reduce the amount or quality of water otherwise available for public water supplies.

**IMPACT ANALYSIS AND MITIGATION MEASURES**

- **Impact 3.8-1** Water quality issues related to construction. All five alternatives would result in construction of new transportation projects. Soil disturbance associated with construction activities could cause accelerated soil erosion and sedimentation or the release of other pollutants to nearby water bodies. Potential short-term impacts from construction activities in the Tahoe Region are avoided or minimized through stringent existing state, federal, local, and TRPA regulations, which require the implementation and maintenance of temporary BMPs to protect water quality during construction. Any new transportation projects implemented with associated stormwater systems under the five alternatives would also be required to comply with their respective jurisdiction NPDES permit and integrate low-impact development techniques and onsite filtration of stormwater. Projects with the potential to release hydrocarbons would also be required to implement pre-treatment measures for their removal prior to infiltration. Because construction of all projects included in the RTP/SCS alternatives would be required to conform to stringent applicable state, federal, local, and TRPA regulations pertaining to protection of water quality from construction, this impact would be less than significant for all alternatives.

All of the RTP alternatives would involve construction of transportation facilities and associated amenities. Construction projects create the potential for short-term accelerated soil erosion and sedimentation and/or release of pollutants to nearby water bodies and groundwater from activities that may include vegetation removal, trenching, grading, excavation, and soil and material stockpiling. Furthermore, construction projects include onsite construction staging and refueling of equipment and vehicles, as well as construction-related vehicle trips. Fuels and other construction related chemicals could be accidentally spilled or leaked into nearby drainages.

Construction projects in the Tahoe Region must meet multiple stringent requirements and regulations of the TRPA, LRWQCB (California), NDEP (Nevada), federal, and local (city and county) agencies. For example, all construction projects in the California side of the Tahoe Region with greater than one acre of disturbance are now required to prepare a SWPPP that includes a site specific Construction Site Monitoring and Reporting Plan pursuant to the 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. Enactment of the updated NPDES Tahoe Stormwater Permit in California requires even more stringent water quality protection measures for construction projects greater than one acre in size, including increased construction site assessment for targeted BMPs and more frequent stormwater monitoring, sampling and reporting.

Project SWPPPs would 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, and would be required to ensure that runoff quality meets or surpasses TRPA water quality objectives and the federal and state antidegradation policies, remain within the TRPA and LRWQCB discharge limits to surface 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 RTP alternatives include TMDL-achievement strategies and site-specific projects designed to improve erosion control and water quality via advanced stormwater infrastructure, retention and biofilter installations and other water quality protection elements within the context of planned transportation facilities.

**ALTERNATIVE 1: NO PROJECT**

Alternative 1 includes implementation of Transportation Strategy Package A, which would include roadway improvements, community revitalization projects, construction of bicycle and pedestrian trails, and the Lake Tahoe Waterborne Transit Project. Transportation Strategy Package A includes relatively few other transit service upgrades. Land uses and development densities under Alternative 1 would continue to be implemented in the manner prescribed by the 1987 Regional Plan.

The magnitude of the risk of construction related water quality impacts would be correlated to the number of potential transportation projects and amount of landscape disturbance. Alternative 1 (and Alternative 5) would involve the least number of new transportation projects among the alternatives. Any project and associated construction under Alternative 1 would be required to conform to stringent applicable state, federal, local, and TRPA regulations, many of which are more stringent in terms of water quality protection measures for construction related potential discharges than at the time of the last RTP update. Additionally, operation of any storm drain conveyance systems associated with roadway improvements would fall under federal, state and TRPA requirements requiring increased storage, infiltration, and treatment measures to reduce runoff volumes and protect water quality. As discussed in Section 3.1, Approach to the Environmental Analysis, these existing regulations specify mandatory and relatively prescriptive actions about how to fulfill the regulatory requirements as part of the project definition, leaving little discretion in their implementation. Alternative 1’s potential for water quality impacts would be less than Alternatives 2, 3, and 4, and comparable to Alternative 5. Because transportation project construction would be required to comply with stringent runoff control and treatment standards, construction-related water quality impacts of Alternative 1 would be **less than significant**.

**ALTERNATIVE 2: LOW DEVELOPMENT, INCREASED REGULATION**

Alternative 2 would implement Transportation Strategy Package B, which includes similar types of projects as Transportation Strategy Package A, but with a substantially greater number of bicycle and pedestrian improvements and inter-regional bus services; however, without the Lake Tahoe Waterborne Transit Project and City of South Lake Tahoe Aviation Capital Project.

The magnitude of the risk of construction water quality impacts would be related to the number of potential transportation projects and amount of landscape disturbance. Alternative 2, with Strategy Package B, would provide for implementation of the most extensive list of transportation improvement projects among the alternatives, including those identified but not yet underway, resulting in increased construction activities over the long term. Alternative 2’s potential for water quality impacts would be greater than other alternatives, because it contains the largest number of landscape altering transportation construction projects. All projects and associated construction activities included in the RTP/SCS under Alternative 2 would be required to conform to stringent applicable state, federal, local, and TRPA regulations pertaining to protection of water quality from construction and municipal stormwater system-related discharges. As discussed in Section 3.1, these existing regulations specify mandatory and relatively prescriptive actions about how to fulfill the regulatory requirements as part of the project definition, leaving little discretion in their implementation. Therefore, construction-related water quality impacts of Alternative 2 would be **less than significant**.
**ALTERNATIVE 3: LOW DEVELOPMENT, HIGHLY INCENTIVIZED REDEVELOPMENT**

Alternative 3 would implement Transportation Strategy Package C, which includes the financially constrained list of projects for the RTP, including new bicycle and pedestrian facilities, corridor revitalization projects, transit service and capital enhancements, and the Lake Tahoe Waterborne Transit Project, but not as many new pedestrian/bicycle facilities as included in Alternative 2.

The magnitude of the risk of construction water quality impacts would be related to the number of potential transportation projects and amount of landscape disturbance. Alternative 2 (and Alternative 3) with Transportation Strategy Package C has an intermediate number of transportation construction projects, when compared to Alternatives 1 and 5 (the least number of projects) and Alternative 2 (the most transportation projects). As with other alternatives, projects included in the RTP/SCS under Alternative 3, and associated temporary earth disturbance during construction and post construction would be required to abide by a stringent set of applicable state, federal, local, and TRPA regulations to protect surface and groundwater sources within the Tahoe Region. These existing regulations specify mandatory and relatively prescriptive actions about how to fulfill the regulatory requirements as part of the project definition, leaving little discretion in their implementation. Therefore, construction-related water quality impacts of Alternative 3 would be less than significant.

**ALTERNATIVE 4: REDUCED DEVELOPMENT, INCENTIVIZED REDEVELOPMENT**

As with Alternative 3, Alternative 4 would implement Transportation Strategy Package C. Because Alternative 4 would have the same transportation projects as Alternative 3, its resultant construction disturbance would be similar in scale as well. This alternative would also implement new water quality and transportation programs to improve the Region’s natural environment. Projects under Alternative 4 would be required to adhere to the stringent multi-layered state, federal, local, and TRPA regulations pertaining to protection of water quality from construction related discharges and continued releases from separate stormwater systems. Therefore, as discussed above under Alternative 3, construction-related water quality impacts of Alternative 4 would be less than significant.

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

As with Alternative 1, Alternative 5 would include the group of projects listed under Transportation Strategy Package A. Alternative 5 would include the same transportation construction activities to Alternative 1 and, therefore, would result in construction projects that are the same in scope, scale, and timeline to Alternative 1. As discussed above, implementation of projects under Alternative 5 would be required to conform to stringent applicable state, federal, local, and TRPA regulations for the protection of water quality from construction related and post construction stormwater discharges. Therefore, as discussed above under Alternative 1, construction-related water quality impacts of Alternative 5 would be less than significant.

**MITIGATION MEASURES**

*No mitigation is required for any of the alternatives.*
Stormwater runoff, drainage capacity, infiltration related to pollutants reaching the Lake. All five RTP/SCS alternatives would include development of many stormwater treatment and erosion/sediment control projects that would result in net decreases in sediment and nutrient transport to the Lake. Although some transportation projects (such as bicycle paths and realigned highways) would create new impervious surfaces and attendant runoff (including on erodible slopes and SEZ), drainage would be controlled and runoff would be treated, so that the capacity of receiving stormwater systems or natural drainages would not be exceeded and sediment transport to the Lake would not be increased. Any new transportation projects would be required to comply with the stringent stormwater and sediment control measures in the Lahontan Water Quality Control Plan, the Lake Tahoe TMDL Program, and existing NPDES permits. These controls would include permanent BMPs, low-impact development techniques, and onsite stormwater infiltration to accommodate at least a 20-year, one-hour storm, which would prevent an increase in volume or peak flows leaving the project sites. Over time, BMP maintenance is critical to proper functionality. Lack of maintenance could result in the transport of sediment and other pollutants to nearby water bodies; however, existing TRPA policy requires a maintenance program for BMPs. Because all five RTP/SCS alternatives would include new stormwater treatment and erosion control projects and transportation projects would be required to control, treat, and infiltrate runoff produced from any increases in impervious area, the net impact on long-term stormwater runoff and potential for pollutants to reach the Lake would be beneficial for Alternatives 1, 2, 3, 4, and 5.

All of the RTP alternatives would involve construction of stormwater-control facilities, including drainage controls, detention basins, infiltration features, and other water quality and erosion control infrastructure. These projects would help the Region’s jurisdictions achieve the runoff-related TMDL requirements and TRPA water quality threshold standards, because they would control and treat existing runoff from the Region’s highways and roadways. The projects would be located along both California and Nevada state highways (US 50, SR 89, and SR 28). In addition, stormwater-control facilities would be implemented along local roadways in the City of South Lake Tahoe, El Dorado County, Placer County, Incline Village, and Douglas County.

Some of the transportation projects in the strategy packages, such as new bicycle paths or highway realignments that are a part of corridor revitalization projects, would create new impervious areas, including on lower capability and erodible slopes. A GIS analysis of potential new coverage from planned transportation projects was conducted using conceptual locations and assumed dimensions for the facilities. Because the projects are generally not yet designed, the estimates of additional coverage should be viewed as approximate and preliminary. Detailed project design would be likely to reduce the area of new coverage, recognizing that more specific alignments and locational decisions would-be oriented to avoiding and minimizing coverage. Based on the GIS analysis, the potential new coverage could be located on between approximately 6 and 12 acres of SEZ, depending on the alternative.

Table 3.8-7 presents the results of the GIS analysis of potential new coverage from two categories of transportation projects, bike paths and realigned highways, based on where they would intersect soils representing land capability districts (LCD) 1A, 1B (SEZ), 1C, and 2 (the lowest capability soils). The data provides insight on the relative degree of added coverage for each RTP/SCS alternative in these LCD areas, which relates to the level of risk of increased runoff and erosion. However, the transportation projects would comply with stringent requirements for stormwater and erosion control contained in the Lahontan Water Quality Control Plan, the Lake Tahoe TMDL Program, and existing NPDES permits, so increases in adverse runoff and erosion impacts would be avoided, where feasible, and otherwise minimized.
Construction of stormwater-control projects would control and treat runoff from both existing highways and roadways and from new or increased impervious surfaces resulting from transportation projects in the RTP strategy packages. The projects would beneficially modify the timing of peak flows (i.e., detain and attenuate the peak flows) and reduce runoff volumes (i.e., by including infiltration features). For infrastructure projects that involve stormwater runoff, regulatory requirements in the Tahoe Region mandate infiltration of 20-year, one-hour storm events and the design and implementation of permanent BMPs and LID techniques including pervious pavement, vegetated swales, and detention basins. Installation of drainage features with the transportation projects that meet these requirements would control and detain stormwater, treat sediment loads, and infiltrate a considerable portion of total runoff volume. As a result, new transportation infrastructure improvements associated with all of the RTP/SCS alternatives would be designed to not increase runoff entering receiving waters or sediment transport to the Lake. Participation in the Lake Tahoe TMDL program by all the Tahoe Region jurisdictions through development and implementation of a comprehensive Pollutant Load Reduction Plan (PLRP) for acceptance by the LRWQCB or NDEP would also provide controls and reductions of stormwater runoff, further minimizing the potential for erosion or flooding risks.

**ALTERNATIVE 1: NO PROJECT**

Alternative 1 includes implementation of Transportation Strategy Package A, which would include roadway improvements, community revitalization projects, construction of bicycle and pedestrian trails, and the Lake Tahoe Waterborne Transit Project. Transportation Strategy Package A includes relatively few other transit service upgrades. Land uses and development densities under Alternative 1 would continue to be implemented in the manner prescribed by the 1987 Regional Plan.

Based on a GIS analysis of conceptual project locations and dimensions, realigned highways related to corridor revitalization projects and bicycle paths in Alternative 1 are estimated to add approximately 6.2 acres of cover to SEZ area (LCD 1B) and 9.5 acres of cover to other lower capability soils (1A, 1C, and 2). For infrastructure projects that involve stormwater runoff, stringent regulatory requirements in the Tahoe Region mandate infiltration of 20-year, one-hour storm events and the design and implementation of permanent BMPs and LID techniques including pervious pavement, vegetated swales, and detention basins. As a result, new transportation infrastructure improvements associated with Alternative 1 would be designed to avoid increasing runoff entering receiving waters or sediment transport to the Lake.

Stormwater-control projects contained in Transportation Strategy Package A include Caltrans water quality improvement projects for US 50 and SR 89 and Nevada Department of Transportation (NDOT) water quality projects for US 50 and SR 28, as well as several roadway retrofit projects in Nevada. In addition, local stormwater-control projects are planned for short-term implementation in the City of South Lake Tahoe, El Dorado County, Placer County, and Douglas County, along with a phased program in Incline Village. Transportation Strategy Package A omits the local government, long-term stormwater-control projects,
contained in Alternative 2, because of the package’s near-term orientation. Any proposed transportation projects under Alternative 1 would be required to conform to applicable stringent, state, federal, local, and TRPA regulations for post-construction stormwater controls. Additionally, operation of any storm drain conveyance systems associated with roadway improvements would fall under federal, state and TRPA requirements requiring increased storage, infiltration, and treatment measures to reduce runoff volumes and prevent downstream erosion or flooding. As discussed in Section 3.1, Approach to the Environmental Analysis, these existing regulations specify mandatory and relatively prescriptive actions about how to fulfill the regulatory requirements as part of the project definition, leaving little discretion in their implementation. This water quality impact would be beneficial for Alternative 1, but to a lesser degree than Alternatives 2, 3, and 4.

**ALTERNATIVE 2: LOW DEVELOPMENT, INCREASED REGULATION**

Alternative 2 would implement Transportation Strategy Package B, which includes similar types of projects as Transportation Strategy Package A, but with a substantially greater number of bicycle and pedestrian improvements and inter-regional bus services and without the Lake Tahoe Waterborne Transit Project and City of South Lake Tahoe Aviation Capital Project. The larger number of bicycle and pedestrian projects in Alternative 2 would involve the addition of more impervious area than Alternative 1, including greater potential to impact erodible slopes and SEZ. Although transportation projects on erodible soils and SEZ create a risk of adverse increases in stormwater runoff and erosion impacts, the existing stringent project design and runoff control requirements would minimize impacts to SEZs and other sensitive areas.

Based on a GIS analysis of conceptual project locations and dimensions, realigned highways related to corridor revitalization projects and bicycle paths in Alternative 2 are estimated to add approximately 11.8 acres of cover to SEZ area (LCD 1B) and 48.8 acres of cover to other lower capability soils (1A, 1C, and 2). This acreage of additional cover is larger than the amount expected for Alternative 1. Nonetheless, for infrastructure projects that involve stormwater runoff, stringent regulatory requirements in the Tahoe Region mandate infiltration of 20-year, one-hour storm events and the design and implementation of permanent BMPs and LID techniques including pervious pavement, vegetated swales, and detention basins. As a result, new transportation infrastructure improvements associated with Alternative 2 would be designed to minimize runoff entering receiving waters or sediment transport to the Lake.

Compared to Alternative 1, this alternative includes the same Caltrans and NDOT state roadway projects and short-term local projects, but also provides additional, long-term local drainage and erosion control projects in the City of South Lake Tahoe and El Dorado, Placer, Douglas and Washoe counties. The inclusion of long-term stormwater-control projects in Alternative 2 would increase its opportunity for generating water quality benefits, compared to Alternative 1 (and Alternative 5). Because all projects and associated construction activities included in the RTP/SCS under Alternative 2 would be required to conform with all applicable state, federal, local, and TRPA regulations pertaining to post-construction stormwater controls and reductions of municipal stormwater system flows and because Alternative 2 contains a full suite of state, short-term local, and long-term local stormwater-control projects, the overall water quality impact would be beneficial. Alternative 2, with Transportation Strategy Package B, would create a greater water quality benefit than Alternatives 1 and 5, and similar benefit to Alternatives 3 and 4.

**ALTERNATIVE 3: LOW DEVELOPMENT, HIGHLY INCENTIVIZED REDEVELOPMENT**

Alternative 3 would implement Transportation Strategy Package C, which includes the financially constrained list of projects for the RTP, including new bicycle and pedestrian facilities, corridor revitalization projects, transit service and capital enhancements, and the Lake Tahoe Waterborne Transit Project.

Transportation Strategy Package C has more bicycle and pedestrian projects than Alternative 1, but fewer than Alternative 2. Alternative 3 would provide for more transportation projects focused on pedestrian and transit-
related improvements than in Alternative 1. The amount of additional coverage estimated for Alternative 3 would be the same as Alternative 2 for SEZ (11.8 acres) and less than Alternative 2 for other lower capability soils (44.4 acres, compared to Alternative 2’s 48.8 acres). As with other alternatives, the projects included in the RTP/SCS under Alternative 3 would be required to abide by stringent applicable state, federal, local, and TRPA regulations and requirements for post-construction infiltration and treatment to minimize runoff flows and volumes and prevent erosion and flooding episodes downstream of its projects.

Alternative 3 includes Caltrans and NDOT state roadway stormwater projects, as well as local short-term stormwater-control projects, as with Alternatives 4. Recognizing the control of stormwater incorporated into new transportation projects and the additional stormwater and erosion improvements included in the strategy package, the net water quality impact would be beneficial to a similar degree as Alternatives 4, to a lesser degree than Alternative 2, and to a greater degree than Alternatives 1 and 5.

**ALTERNATIVE 4: REDUCED DEVELOPMENT, INCENTIVIZED REDEVELOPMENT**

As with Alternative 3, Alternative 4 would implement Transportation Strategy Package C. Because Alternative 4 would include the same transportation projects as Alternative 3, the resulting alteration in impervious area would be the same as Alternative 3. This alternative would also implement new water quality improvement projects to further enhance the Region’s runoff control and sediment treatment, as with Alternative 3. Transportation improvement projects under Alternative 4 would be required to adhere to the stringent, multi-layered state, federal, local, and TRPA regulations pertaining to post-construction stormwater discharges and reductions in separate stormwater system releases. This water quality impact would be beneficial to a similar degree as Alternative 3, to a lesser degree than Alternative 2, and to a greater degree than Alternatives 1 and 5.

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

Alternative 5 would implement Transportation Strategy Package A, which would be the same as Alternative 1, and result in transportation construction projects and stormwater-control projects similar in scope, scale and timeline to Alternative 1. As with all the RTP alternatives, Alternative 5 would have to conform to stringent, applicable state, federal, local, and TRPA regulations for post construction stormwater discharge reduction. This water quality impact would be beneficial to a similar degree as Alternatives 1, and lesser degree than Alternatives 2, 3, and 4.

**MITIGATION MEASURES**

*No mitigation is required for any of the alternatives.*

| Impact | Lake Tahoe TMDL attainment and Lake clarity. All RTP/SCS alternatives would assist with attaining the Lake Tahoe TMDL program goals, because Transportation Strategy Packages A, B, and C include stormwater-control projects specifically designed to address TMDL requirements and help reach or maintain the threshold standard for water quality and Lake clarity. The benefits of reduced pollutant loads from stormwater-control projects would be substantial. All alternatives would result in a beneficial impact in helping support TMDL program attainment and Lake clarity. |
play an important role in helping to attain and maintain the lake clarity and water quality threshold standards for the Region.

RTP/SCS objectives that help support TRPA, LRWQB, and NDEP water quality regulations include the following:

- Fulfill the requirements of the Tahoe Regional Planning Compact (Public Law 96-551)
- Attain and maintain the Environmental Threshold Carrying Capacities, and federal, state, and local transportation standards
- Support reductions in vehicle emissions and stormwater runoff to meet federal, state, and local air quality standards and help meet the requirements of Tahoe’s TMDL program
- By including stormwater-control projects, i.e., a series of stormwater and erosion control facilities, in the RTP transportation strategies, implementation of the RTP/SCS would help improve the quality of runoff reaching the Lake, reduce fine sediment and nutrient loads discharging to the Lake, and support the attainment of Lake clarity threshold indicators. Many of the proposed stormwater and erosion control projects would be installed in areas where existing roadways do not have such facilities, and some existing erosion control facilities would be retrofit for improved effectiveness. These actions would help attain the Lake Tahoe TMDL and, therefore, would provide Lake clarity benefits.

**ALTERNATIVE 1: NO PROJECT**

Alternative 1 includes implementation of Transportation Strategy Package A, which would include water quality improvement projects, along with roadway improvements, community revitalization projects, construction of bicycle and pedestrian trails, and the Lake Tahoe Waterborne Transit Project. Transportation Strategy Package A includes relatively few other transit service upgrades.

Implementation of the stormwater-control projects included under Alternative 1 would result in the construction of stormwater quality improvements to help reach or maintain the threshold standard for water quality and Lake clarity. Stormwater-control projects contained in Transportation Strategy Package A include Caltrans water quality improvement projects for US 50 and SR 89 and NDOT water quality improvement projects for US 50 and SR 28, as well as a general Nevada retrofit program. In addition, local stormwater-control projects are planned for short-term implementation in the City of South Lake Tahoe, El Dorado County, Placer County, and Douglas County, along with a phased program in Incline Village. Alternative 1 omits the local government, long-term stormwater-control projects, contained in other strategy packages, because of the package’s near-term orientation. Even without the long-term local projects, Alternative 1 would improve the quality of stormwater reaching the Lake, reduce discharges of fine sediments and nutrients to the Lake, and support attainment of the Lake Tahoe TMDL and the Lake clarity Threshold Standards. Alternative 1 would have a beneficial impact, as with Alternative 5, but less than Alternatives 2, 3, and 4.

**ALTERNATIVE 2: LOW DEVELOPMENT, INCREASED REGULATION**

Alternative 2 would implement Transportation Strategy Package B, which includes similar types of projects as Transportation Strategy Package A, but with a greater number of long-term, water quality improvement projects and a larger number of bicycle and pedestrian improvements and inter-regional bus services, but without the Lake Tahoe Waterborne Transit Project and City of South Lake Tahoe Aviation Capital Project. Compared to Alternative 1, this alternative includes the same state highway stormwater-control projects and short-term local projects, but also provides additional, long-term local government drainage and erosion control projects in El Dorado, Placer, and Douglas counties. The inclusion of long-term stormwater-control projects in Alternative 2 would increase its opportunity for supporting attainment of the Lake Tahoe TMDL, compared to Alternative 1 (and Alternative 5, which also includes Transportation Strategy Package A). Because Alternative 2 contains a full suite of state, short-term local, and long-term local stormwater-control projects the impact of Alternative 2 on
the Lake Tahoe TMDL Program and Lake clarity is **beneficial**. Alternative 2, with Transportation Strategy Package B, would create the greatest TMDL benefit of all the alternatives.

**ALTERNATIVE 3: LOW DEVELOPMENT, HIGHLY INCENTIVIZED REDEVELOPMENT**

Alternative 3 would implement Transportation Strategy Package C, which includes the financially constrained list of projects for the RTP, including water quality improvement projects, new bicycle and pedestrian facilities, corridor revitalization projects, transit service and capital enhancements, and the Lake Tahoe Waterborne Transit Project, but not as many new pedestrian/bicycle facilities as included in Alternative 2. Alternative 3 would include state highway stormwater-control projects and local short-term stormwater-control projects, but would not include local long-term stormwater-control projects, as with Alternative 4. As discussed above under Alternative 1, implementation of the stormwater control projects included under Alternative 3 would result in the development of water quality improvements to help reach or maintain the threshold standard for water quality and Lake clarity. Alternative 3 would be **beneficial**, as with Alternative 4, to a lesser degree than Alternative 2, and to a greater degree than Alternatives 1 and 5.

**ALTERNATIVE 4: REDUCED DEVELOPMENT, INCENTIVIZED REDEVELOPMENT**

Alternative 4, with Transportation Strategy Package C, would implement the same new water quality projects to further improve the Region’s runoff control and sediment treatment, as with Alternative 3. This would include the full suite of state highway stormwater-control projects and local short-term stormwater-control projects, as with Alternatives 3, which would contribute beneficially to attainment of the Lake Tahoe TMDL and to achievement of Lake clarity Threshold Standards. Contributions toward achievement of the Lake TMDL and clarity Threshold Standard would be a **beneficial impact**, similar in degree to Alternatives 3, to a lesser degree than Alternative 2, and a greater benefit than Alternatives 1 and 5.

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

Alternative 5, with Transportation Strategy Package A, would implement the same new water quality improvement projects as Alternative 1 to further improve the Region’s runoff control and sediment treatment. This would include the state highway stormwater-control projects and local short-term stormwater-control projects, but not long-term local projects. Implementation of Alternative 5 would contribute beneficially to attainment of the Lake Tahoe TMDL and to achievement of Lake clarity Threshold Standards. Contributions toward achievement of the Lake TMDL and Lake clarity Threshold Standards would be a **beneficial impact**, similar in degree to Alternative 1, but less of a benefit than Alternatives 2, 3, and 4.

**MITIGATION MEASURES**

*No mitigation is required for any of the alternatives.*
Passenger ferry operation associated with the Lake Tahoe Waterborne Transit Project would include several new ferry vessels traveling between the North Shore and South Shore. This public transit project is unique among the RTP transportation projects, because of its operation on the Lake; therefore, a separate environmental impact conclusion has been included related to the potential for operational water quality effects.

As a result of the Federal Transit Administration (FTA) “North-South Transit Connections Alternatives Analysis” conducted by FTA and the Tahoe Transportation District (TTD) to date, the concept of the project and potential alternatives are known, but the specific project operational details are yet to be determined. For instance, the specific terminal locations, vessel routes, operating plan, selection of vessels, and maintenance approach would be determined during the environmental review of project alternatives during project-level review. The concept of the project would involve operation of a daily schedule of ferry service between North Shore and South Shore, likely using three or four watercraft. The ferry service would transport people and bicycles, but not automobiles, and would cross the Lake several times per day. Potential terminal locations include, but may not be limited to, Tahoe City, Kings Beach, and Ski Run/South Lake Tahoe. A maintenance facility is also needed for the project and it may include a new maintenance pier in the shorezone and maintenance building in the shoreland.

Potential water quality issues related to new ferry service include runoff from shoreland ferry facilities (i.e., terminals and maintenance facilities), direct vessel discharges, and risk of accidental spills (e.g., fuel, maintenance facility operational spills). Because the vessels would not carry motor vehicles, threats to water quality because of stormwater runoff from ferry vessel decks would be minimal (unlike ferry vessels that carry motor vehicles). By shifting travel from private motor vehicles to the ferry for long north/south intraregional trips, the project could reduce vehicle miles of travel, which would be beneficial to Lake water quality to the extent that aerial deposition of motor vehicle-related NOx was decreased. The ferry vessel operation would result in air emissions, including NOx. Because ferry schedules and operational frequency have not been defined, yet, it is not feasible to precisely quantify potential vessel emissions. Regardless, because of the substantial regional reduction of vehicle NOx emissions expected over time for all alternatives, it is very reasonable to expect that this regional NOx reduction would more than offset air emissions from a small fleet of passenger ferries operating on regular transit schedules; therefore, the net change in potential for aerial deposition of nitrogen to the Lake would be beneficial.

Operation of passenger ferries and fueling activities presents the risk of direct discharges to the Lake, including petroleum products, such as benzene, toluene, and Polycyclic Aromatic Hydrocarbons (PAHs). In addition, pier construction and dredging activities, if needed, associated with the Lake Tahoe Waterborne Transit Project could result in discharge of sediments into Lake Tahoe. Dredging could also increase turbidity, causing distribution of nutrients throughout the Lake, thereby increasing primary phytoplankton productivity and decreasing water clarity. Federal regulations for vessel discharge controls have their authority in the Clean Water Act (33 USC
1251 et seq.) and they are administered by the EPA and enforced by the U. S. Coast Guard. A Vessel General Permit (VGP) was approved on February 4, 2009 under the NPDES regulations for non-recreational, non-military vessels used for transportation that are 79 feet long or greater. Vessel regulations protecting water quality are stringent and include not only effluent limits, but also prescribed vessel spill and discharge prevention equipment and watercraft design features and monitoring and inspection requirements. Also, runoff control and treatment at ferry facilities would be required, consistent with applicable NPDES permits, Lake Tahoe 208 Plan, and BMP requirements. As part of normal operational planning, the ferry service would be required to develop and implement a spill prevention and response plan. Consequently, the stringent regulatory controls applied to the Lake Tahoe Waterborne Transit Project would maintain the risk of pollutant discharge and related water quality impacts to Lake Tahoe at less-than-significant levels.

The addition of cross-lake ferry service would involve daily operation of vessels on the Lake, which would raise the potential for shoreline disturbance from vessel wakes. If shore sediments were disturbed by regular vessel wake waves, impacts to shoreline erosion and resuspension of sediment could occur. Shoreline erosion and sediment disturbance would be influenced by wave energy. The extent of wave energy at shorelines from vessel wakes depends on a variety of factors, including the vessel design, operating speed, natural wave and wind conditions, other vessel wakes, distance to shorelines, and water depth. The potential for erosion impacts at a shoreline would also be influenced by wave height, wave frequency, and shoreline conditions (Jonason 1993; Glamore 2008). The potential for shoreline disturbing waves diminishes considerably with distance from the shore, so nearshore wake generation would be the primary concern. TRPA has established a no-wake zone with a 5 mph speed limit around the Lake Tahoe shorezone to minimize the noise impacts of motorized watercraft. Section 84.17.1. (No Wake Zone) of the TRPA Code of Ordinances states that, “the creation of a wake or speeds in excess of 5 MPH by motorized watercraft within 600 feet of the waterline of Lake Tahoe shall be prohibited.” Another benefit of the speed limit would be substantial reduction of nearshore vessel wakes, which would maintain a less-than-significant risk of shoreline erosion and attendant water quality effects.

**ALTERNATIVE 1: NO PROJECT**

Alternative 1 includes implementation of Transportation Strategy Package A, which would include roadway improvements, community revitalization projects, construction of bicycle and pedestrian trails, and the Lake Tahoe Waterborne Transit Project. Transportation Strategy Package A includes relatively few other transit service upgrades. Land uses and development densities under Alternative 1 would continue to be implemented in the manner prescribed by the 1987 Regional Plan. The Lake Tahoe Waterborne Transit Project is part of Transportation Strategy Package A, so the risks of water quality impacts related to ferry operations would exist for this alternative, including runoff from shoreland ferry facilities, vessel discharges, and risk of accidental spills. Because ferry operations must comply with Lake Tahoe BMP requirements, no-wake zone speed limits, federal vessel discharge regulations, and a spill prevention and response plan, the risk of pollutant discharge, shoreline disturbance from vessel wakes, and attendant water quality impacts would be less than significant. Therefore, the potential for water quality effects from ferry operation would be a **less-than-significant impact** for Alternative 1.

**ALTERNATIVE 2: LOW DEVELOPMENT, INCREASED REGULATION**

Alternative 2 would implement Transportation Strategy Package B, which excludes the Lake Tahoe Waterborne Transit Project. Because the Lake Tahoe Waterborne Transit Project would not be constructed, there would be no impact related to water quality effects of ferry operation under Alternative 2.

**ALTERNATIVE 3: LOW DEVELOPMENT, HIGHLY INCENTIVIZED REDEVELOPMENT**

Alternative 3 would implement Transportation Strategy Package C, which includes the financially constrained list of projects for the RTP, including the Lake Tahoe Waterborne
Transit Project is part of Transportation Strategy Package C, and the potential for water quality impacts under Alternative 3 would be the same as Alternative 1. Therefore, the potential for water quality effects from ferry operation would be a less-than-significant impact for Alternative 3.

**ALTERNATIVE 4: REDUCED DEVELOPMENT, INCENTIVIZED REDEVELOPMENT**

Alternative 4 contains the group of projects listed under Transportation Strategy Package C, which includes the Lake Tahoe Waterborne Transit Project. As a result, the potential for water quality impacts of Alternative 4 would be the same as Alternative 1. Therefore, the potential for water quality effects from ferry operation would be a less-than-significant impact for Alternative 4.

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

Alternative 5 contains the group of projects listed under Transportation Strategy Package A, which includes the Lake Tahoe Waterborne Transit Project. As a result, the potential for water quality impacts of Alternative 5 would be the same as Alternative 1. Therefore, the potential for water quality effects from ferry operation would be a less-than-significant impact for Alternative 5.

**MITIGATION MEASURES**

No mitigation is required for any of the alternatives.

| Impact | Changes in currents, related to changes in the natural littoral processes, or the course or direction of water movements in Lake Tahoe. RTP alternatives 1, 3, 4, and 5 that include the Lake Tahoe Waterborne Transit Project under Transportation Strategies A and C could potentially impact natural littoral processes that may exacerbate shoreline erosion through the expansion of existing piers or installation of new piers, docks or in-shoreline facilities to support expanded ferry operations. Because projects under Alternatives 1, 3, 4, and 5 would be required to comply with TRPA’s policies and regulations for new construction and maintenance activities within the Lake Tahoe shoreline to avoid interference with littoral currents and natural shoreline processes, this would be a less-than-significant impact for Alternatives 1, 3, 4, and 5. Alternative 2 would have no impact on shoreline processes. |

Passenger ferry facilities associated with the Lake Tahoe Waterborne Transit Project would include several structures in the shorezone, which could include new piers. This public transit project is unique among the RTP transportation projects, because of its need for facilities in the shorezone; therefore, a separate environmental impact conclusion has been included related to the potential for effects on natural shorezone processes.

As a result of the FTA “North-South Transit Connection Alternatives Analysis” process conducted by FTA and TTD to date, the concept of the project and potential alternatives are known, but the specific project facility details are yet to be determined. For instance, the specific terminal locations, vessel routes, use of existing piers versus construction of new piers, and location and character of maintenance facilities would be determined during the environmental review of project alternatives during project-level review. The concept of the project would require terminal locations for passenger loading and unloading, location(s) to moor ferry vessels overnight, and a facility for fueling and maintenance. Potential terminal locations include, but may not be limited to, Tahoe City, Kings Beach, and South Lake Tahoe. A maintenance facility is also needed for the project and it may include a new maintenance pier in the shorezone and maintenance building in the shoreland.
**ALTERNATIVE 1: NO PROJECT**

Alternative 1 includes the Lake Tahoe Waterborne Transit Project, which would require structures in the shorezone. To the extent feasible, the project would take advantage of existing marinas and existing piers for its shorezone facilities. However, new shorezone structures and facilities supporting ferry transit service on the Lake could be required. The detailed designs of the ferry facilities have not yet been prepared, so the siting, size, and character of the facilities are not yet known. However, to provide the functions necessary to support a cross-lake ferry with multiple vessels, such as ferry terminals, mooring locations, and vessel maintenance, it is reasonable to expect that structures in the shorezone and/or shoreland would be needed. Terminal-area shoreland development may also be required, such as a passenger terminal building and/or parking facilities. In addition, a ferry maintenance facility would be required, which typically would include a maintenance pier with ferry slips, on-pier power and water supply, waste pump-out equipment, and a fueling facility, along with a maintenance building for storage of materials needed for the vessels.

Projects constructed under Alternative 1 would be required to comply with stringent environmental protections, including TRPA’s Shorezone Goal, Policy 9 that regulates the placement of new piers, buoys and other structures in the foreshore and nearshore of Lake Tahoe to avoid interference with littoral currents and prevent any erosional hazards associated with altering the natural processes of currents in the Lake. Construction of the Lake Tahoe Waterborne Transit Project would be required to adhere to TRPA’s shorezone ordinances regarding development within and adjacent to the waters of the Lake Tahoe Region, including Lake Tahoe itself. Currently, TRPA is operating under the “Partial Shorezone Permitting Program” adopted by the governing board in June 2011 until its more comprehensive Shorezone policy is either restored through an appeal process or a revised complete policy is put in place. The current permitting program requires that any proposed project demonstrate that there would be no increase in littoral drift impacts or increase in erosion or to fully mitigate those impacts using methods consistent with the TRPA BMP Handbook. For these reasons, Alternative 1 would have a less-than-significant impact on littoral currents.

**ALTERNATIVE 2: LOW DEVELOPMENT, INCREASED REGULATION**

Alternative 2 would implement Transportation Strategy Package B, which excludes the Lake Tahoe Waterborne Transit Project and City of South Lake Tahoe Aviation Capital Project. Because Alternative 2 would not include the Lake Tahoe Waterborne Transit Project, Alternative 2 would not include new shorezone structures. There would be no impact related to littoral currents in Lake Tahoe for Alternative 2.

**ALTERNATIVE 3: LOW DEVELOPMENT, HIGHLY INCENTIVIZED REDEVELOPMENT**

Alternative 3 would implement Transportation Strategy Package C, which includes the Lake Tahoe Waterborne Transit Project. The potential for littoral current impacts of Alternative 3 would be the same as Alternative 1. Therefore, the potential for littoral current effects from ferry facilities would be a less-than-significant impact for Alternative 3.

**ALTERNATIVE 4: REDUCED DEVELOPMENT, INCENTIVIZED REDEVELOPMENT**

Alternative 4 contains the group of projects listed under Transportation Strategy Package C, which includes the Lake Tahoe Waterborne Transit Project. As a result, the potential for littoral current impacts of Alternative 4 would be the same as Alternative 1. Therefore, the potential for littoral current effects from ferry facilities would be a less-than-significant impact for Alternative 4.
ALTERNATIVE 5: SIMILAR RATE OF DEVELOPMENT AND REGULATORY STRUCTURE TO THE 1987 REGIONAL PLAN

Alternative 5 contains the group of projects listed under Transportation Strategy Package A, which includes the Lake Tahoe Waterborne Transit Project. As a result, the potential for littoral current impacts of Alternative 5 would be the same as Alternative 1. Therefore, the potential for littoral current effects from ferry facilities would be a less-than-significant impact for Alternative 5.

MITIGATION MEASURES

No mitigation is required for any of the alternatives.

| Impact 3.8-6 | Development and the 100-year flood hazard area. Flood risk is relatively low as a percent area basis within the Tahoe Region, because of the mountainous terrain and minimal occurrence of flood hazard as a whole; however, all RTP alternatives would potentially build roadway, trails, and multi-use bridges and walkways across rivers, creeks, and 100-year floodplains. Any project that would encroach upon, or cross a 100-year flood hazard area would be required to adhere to several federal, state, regional and TRPA requirements for protection of public safety, property and environment from any impacts that may occur due to construction or obstruction within a 100-year flood hazard area. Therefore, this potential impact would be less than significant for all alternatives.

Given the mountainous terrain in the Region, there is a relatively low density of 100-year flood hazard areas within the Tahoe Region, and the current roadway network only occasionally interfaces with 100-year floodplains, most typically at river and creek crossings. The highest concentration of flood hazard area is in the southern portion of the Tahoe Region where there is the larger low lying valley area of the Upper Truckee River system that begins to widen around Meyers and extends to the lakeshore. SR 89 and US 50 cross the 100-year floodplain near the South Lake Tahoe golf course in El Dorado County and US 50 again at South Lake Tahoe Boulevard in the City of South Lake Tahoe near the shore where the floodplain opens up into the Upper Truckee Marsh and encompasses the Tahoe Keys Development. Positioned along the valley floor, a large portion of the City of South Lake Tahoe Airport resides within the 100-year floodplain as well. SR 89 enters the 100-year floodplain where it crosses Blackwood and Ward creeks along the west shore and the Truckee River at Fanny Bridge. SR 28 crosses over 100-year floodplains at Vista and Griff Creek crossings and US 50 again at Lincoln, McFaul and Edgewood Creek.

Based on GIS analysis of the conceptual location of corridor revitalization projects and bike and pedestrian trails, all RTP/SCS alternatives would require crossing of approximately 12 to 30 acres of 100-year flood zones and less than one to 3.5 acres of 500-year flood zones, depending on the alternative (Table 3.8-8). The majority of the area of floodplain occupied by these projects is from the bike and pedestrian trails. This data is an illustration of the relative degree to which these transportation facilities intersect with floodplains, based only on conceptual alignments. Detailed design has not yet been conducted and would be expected to reduce the acreages involved, because of requirements to avoid and minimize encroachment into floodplains.

Table 3.8-8 Flood Hazard Zone Occupied by Corridor Revitalization Projects and Bike and Pedestrian Trails

<table>
<thead>
<tr>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>100-Year Flood Zone</td>
<td>12.1</td>
<td>29.8</td>
<td>30.8</td>
<td>30.8</td>
<td>12.1</td>
</tr>
<tr>
<td>500-Year Flood Zone</td>
<td>0.2</td>
<td>3.2</td>
<td>3.5</td>
<td>3.5</td>
<td>0.2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>12.4</strong></td>
<td><strong>33.0</strong></td>
<td><strong>34.3</strong></td>
<td><strong>34.3</strong></td>
<td><strong>12.4</strong></td>
</tr>
</tbody>
</table>

Source: GIS analysis conducted by Ascent Environmental, Inc. 2012
Any projects in the RTP would be required to comply with FEMA regulations, which mandate that no development is to proceed within the 100-year regulatory floodplain if it could increase the flood elevation by one foot or more and no development is allowed within 100-year floodways. If federal funds are used to construct projects, which would occur for several of the major transportation improvements, the projects must also comply with the federal Executive Order 11988, which requires that floodplain encroachment may only occur if there is no alternative to avoid the floodplain and all feasible mitigation for floodplain impacts is included in the project.

Any enhancements or modifications to California state highways would be required to follow Caltrans guidelines which include the performance of a hydraulic study and submittal of a Hydraulics Study Report for any project intercepting a waterway or encroaching upon a floodplain to assess the potential impacts to natural processes and beneficial uses as part of the environmental review. Bridges are to be designed to pass the two percent probability flood (i.e. the 50-year flood) or the flood-of-record, whichever is greater to not cause damaging backwater or excessive flow velocities. They are also required to add a minimum freeboard of two feet (Caltrans 2005). Any RTP projects on the California side of the Tahoe Region would also be required to abide by regulations of the LRWQCB.

RTP projects proposed along a Nevada state roadway with waterway crossings would be required to also conduct a thorough hydraulic analysis for any proposed bridge designs and implement flood design standards defined by NDOT. Capacity to handle a 50-year flood event is typically used for bridges on roadways classified as interstate or principal arterial highways; however, NDOT may require the 100-year event as the design flood to accommodate. On FEMA-delineated floodways, no backwater may be introduced by the bridge structure. Where practical, a minimum clearance of two feet should be provided between the design water surface elevation and the low chord of the bridge to allow for passage of debris (NDOT 2008).

Development in the 100-year floodplain is prohibited unless exceptions are granted due to the need to access buildable sites that have no alternative, or to install critical water quality or SEZ improvements. All facilities would be required to be designed, built, and maintained so as to not cause any flooding or damage from flooding.

Any bridge, culvert crossing, or roadway to be constructed in 100-year floodplains would also need to comply with the TRPA Natural Hazards Goal 1, Policy 2 that requires all transportation facilities located in the 100-year floodplain to be constructed and maintained to prevent flooding and/or any damage from flooding.

Individual projects under the RTP that would propose crossings, roadway segments, or facilities in the 100-year floodplain would be required to alter designs or implement measures to avoid any potential impacts.

**ALTERNATIVE 1: NO PROJECT**

Alternative 1 includes implementation of Transportation Strategy Package A, which would include roadway improvements, community revitalization projects, construction of bicycle and pedestrian trails, and the Lake Tahoe Waterborne Transit Project. Transportation Strategy Package A includes relatively few other transit service upgrades. Land uses and development densities under Alternative 1 would continue to be implemented in the manner prescribed by the 1987 Regional Plan.

As discussed above, projects constructed under Alternative 1 that propose any facility or structure within the 100-year floodplain would be required to comply with the multi-layered federal, state, regional and TRPA regulations to protect public safety, property and the environment from proposed construction in the 100-year floodplain. As discussed in Section 3.1, Approach to the Environmental Analysis, these existing regulations specify mandatory and relatively prescriptive actions about how to fulfill the regulatory requirements as part of
the project definition, leaving little discretion in their implementation. Therefore, floodplain impacts of Alternative 1 would be less than significant.

**ALTERNATIVE 2: LOW DEVELOPMENT, INCREASED REGULATION**

Alternative 2 would implement Transportation Strategy Package B, which includes similar types of projects as Transportation Strategy Package A, but with a substantially greater number of bicycle and pedestrian improvements and inter-regional bus services and without the Lake Tahoe Waterborne Transit Project and City of South Lake Tahoe Aviation Capital Project. As with Alternative 1, projects that propose any facility or structure within the 100-year floodplain would be required to comply with the multi-layered federal, state, regional and TRPA regulations to protect public safety, property and the environment from proposed construction in the 100-year floodplain. These existing regulations specify mandatory and relatively prescriptive actions about how to fulfill the regulatory requirements as part of the project definition, leaving little discretion in their implementation. Therefore, floodplain impacts of Alternative 2 would be less than significant.

**ALTERNATIVE 3: LOW DEVELOPMENT, HIGHLY INCENTIVIZED REDEVELOPMENT**

Alternative 3 includes the group of projects listed under Transportation Strategy Package C. Transportation Strategy Package C represents the financially constrained projects list, as described above.

As with Alternative 1, projects that propose any facility or structure within the 100-year floodplain would be required to comply with the multi-layered federal, state, regional and TRPA regulations to protect public safety, property and the environment from proposed construction in the 100-year floodplain. These existing regulations specify mandatory and relatively prescriptive actions about how to fulfill the regulatory requirements as part of the project definition, leaving little discretion in their implementation. Therefore, floodplain impacts of Alternative 3 would be less than significant.

**ALTERNATIVE 4: REDUCED DEVELOPMENT, INCENTIVIZED REDEVELOPMENT**

Alternative 4 includes the group of projects listed under Transportation Strategy Package C, as with Alternative 3. Therefore, for the reasons explained above under Alternative 3, floodplain impacts of Alternative 4 would be less than significant.

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

Alternative 5 includes the group of projects listed under Transportation Strategy Package A, which is the same package of strategies listed under Alternative 1. Therefore, for the reasons explained above under Alternative 1, the floodplain impacts of Alternative 5 would be less than significant.

**MITIGATION MEASURES**

No mitigation is required for any of the alternatives.
**Impact 3.8-7**

**Direction and rate of flow of groundwater.** Projects included under all the alternatives would involve construction that has the potential to intercept and/or redirect groundwater flows from excavations and below ground surface installations of piers, abutments, parking structures, bike trails, transit facilities or other structures or drainage improvements. Any project under all alternatives that would propose below ground installations that could potentially disrupt groundwater movement is required to follow the TRPA grading standards that require such projects to fully mitigate those impacts prior to approval to protect groundwater resources. Therefore, the potential to interfere with groundwater flow would be less than significant for Alternatives 1, 2, 3, 4, and 5.

Groundwater interception or interference is prohibited under TRPA’s Code of Ordinance’s Grading Standard 33.3.6 and includes cases where excavation for bridge abutments, parking structures or drainage improvements may alter the direction or rate of groundwater flow, capture or intercept groundwater flow or raise or lower the groundwater table. Exceptions to this are only permitted on a case by case basis for situations described in the standard and where there are no viable alternatives and measures are taken to avoid adverse impacts. Whenever excavations will be greater than five feet in depth and have the potential to interrupt or redirect groundwater movement, a soils hydrologic report must be prepared to demonstrate that no interference would occur or that measures are incorporated to maintain groundwater flows to avoid adverse impacts to SEZ vegetation and to prevent any groundwater from leaving the project area as subsurface flow.

**ALTERNATIVE 1: NO PROJECT**

Alternative 1 includes the group of projects listed under Transportation Strategy Package A, as described above. The State Route 89/Fanny Bridge Community Revitalization Project could result in construction of a new bridge across the Truckee River. All projects proposed under Alternative 1 would be required to follow TRPA’s grading ordinances for prior investigation and reporting of any potential redirection or interruption of groundwater flow for review and approval, thereby mitigating for any resulting groundwater impacts. Therefore, the potential for projects included in Alternative 1 to interfere with groundwater flow would be a less-than-significant impact.

**ALTERNATIVE 2: LOW DEVELOPMENT, INCREASED REGULATION**

Alternative 2 would implement Transportation Strategy Package B, which includes similar types of projects as Transportation Strategy Package A, but with a substantially greater number of bicycle and pedestrian improvements and inter-regional bus services and without the Lake Tahoe Waterborne Transit Project and City of South Lake Tahoe Aviation Capital Project. As with Alternative 1, Alternative 2 would include the State Route 89/Fanny Bridge Community Revitalization Project, which could result in construction of a new bridge across the Truckee River. Additionally, construction of some RTP projects would result in removal or disturbance of sensitive habitats, including SEZs and potential jurisdictional wetlands.

As described above, all projects proposed under Alternative 2 would be required to follow TRPA’s grading ordinances for prior investigation and reporting of any potential redirection or interruption of groundwater flow for review and approval, thereby mitigating for any resulting groundwater impacts. Therefore, Alternative 2’s potential to interfere with groundwater flow would be a less-than-significant impact.

**ALTERNATIVE 3: LOW DEVELOPMENT, HIGHLY INCENTIVIZED REDEVELOPMENT**

Alternative 3 would implement Transportation Strategy Package C, which includes the financially constrained list of projects for the RTP, including new bicycle and pedestrian facilities, corridor revitalization projects, transit service and capital enhancements, and the Lake Tahoe Waterborne Transit Project, but not as many new pedestrian/bicycle facilities as included in Alternative 2.
As described above, all projects proposed under Alternative 3 would be required to follow TRPA’s grading ordinances for prior investigation and reporting of any potential redirection or interruption of groundwater flow for review and approval, thereby mitigating for any resulting groundwater impacts. Therefore, Alternative 3’s potential to interfere with groundwater flow would be a less-than-significant impact.

**ALTERNATIVE 4: REDUCED DEVELOPMENT, INCENTIVIZED REDEVELOPMENT**

As with Alternative 3, all projects proposed under Alternative 4 would be required to follow TRPA’s grading ordinances for prior investigation and reporting of any potential redirection or interruption of groundwater flow for review and approval, thereby mitigating for any resulting groundwater impacts. Therefore, Alternative 4’s potential to interfere with groundwater flow would be a less-than-significant impact.

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

Alternative 5 includes the group of projects listed under Transportation Strategy Package A, which is the same package of strategies listed under Alternative 1. As with Alternative 1, all projects proposed under Alternative 5 would be required to follow TRPA’s grading ordinances for prior investigation and reporting of any potential redirection or interruption of groundwater flow for review and approval, thereby mitigating for any resulting groundwater impacts. Therefore, Alternative 5’s potential to interfere with groundwater flow would be a less-than-significant impact.

**MITIGATION MEASURES**

No mitigation is required for any of the alternatives.