

## **3.4 Hydrology and Floodplains**

The following discussion summarizes the existing hydrologic and floodplain environment and regulatory environment as well as analyzes of direct and indirect environmental effects of the proposed action. Where feasible, mitigation measures are recommended to reduce the severity of identified effects. The information presented in this analysis is based on the *Kings Beach Watershed Improvement Project Final Hydrologic Conditions Report* (Entrix 2006b) located in Appendix G, the *Location Hydraulic Study* located in Appendix H, and the *Kings Beach Commercial Core Improvement Project Preliminary Delineation of Wetlands and Other Waters of the United States* located in Appendix I.

### **3.4.1 Affected Environment**

Lake Tahoe is renowned for its exceptional clarity and water quality. Urbanization and development in the Lake Tahoe watershed have altered hydrologic patterns, resulting in increased impervious surface, which can have a negative effect on water quality. Extensive regulatory effort has been expended to identify hydrology concerns and develop effective management programs.

#### **3.4.1.1 Flooding**

The action area includes portions of the shore zone of Lake Tahoe and Griff Creek. The 100-year floodplain is associated with these water bodies. The Federal Emergency Management Agency (FEMA) issues Flood Insurance Rate Maps (FIRMs) to determine the likelihood of a flood to occur. Floodplain information was obtained from the Placer County (FIRM) Panel Number 0100 of Map Number 060239 (effective June 8, 1998). The proposed action is within the 100-year floodplain in Placer County, although base flood elevations have not been determined in this area. Figure 3.4-1 depicts the 100-year floodplain with respect to the proposed action area. As shown, the floodplain includes the Griff Creek channel and also a secondary outflow of this channel located on Deer Street, which ultimately drains to the lake. A floodplain also occurs along the shore zone of Lake Tahoe.

SR 28 was constructed in 1938. Drainage features were installed based on design criteria appropriate for that era. Since that time, some roadway and drainage modifications have been constructed, but for the most part, drainage facilities closely adhere to those that were part of the original construction as far as size and capacity are concerned. The watershed has experienced urbanization in the form of impervious material, which collects and concentrates stormwater runoff. Existing SR 28 facilities are inadequate to handle these increased flows.

Several locations along the length of SR 28 have experienced flooding and overtopping in recent years. Many of these occurrences are the result of localized, short-duration, yet very high intensity weather systems that are prevalent to the Lake Tahoe Basin. These intense storms typically result in clogged drainage systems resulting from the transport of floating debris and solid precipitation (snow and/or hail). Drainage systems are then overwhelmed, resulting in roadway flooding and, in some cases, overtopping.

#### **3.4.1.2 Stream Environment Zones**

Local surface water features are defined by TRPA as SEZs, which include “natural marsh and meadowlands, watercourses and drainageways, and floodplains which provide surface water conveyance from upland areas into Lake Tahoe and its tributaries” (Tahoe Regional Planning Agency 2004). Riparian vegetation is often associated with SEZs and provides habitat for many wildlife species. SEZs also promote higher water quality by slowing overland water flow to the lake and allowing percolation of water. These functions help limit sediment and nutrient transport to the lake.

TRPA, through land use classifications, has identified SEZs in the action area. SEZs are mapped along the shoreline, Griff Creek, and an unmapped drainage in the action area. Figure 3.4-2 illustrates the SEZ boundaries verified by TRPA in June 2004 that occur in the action area.





**Figure 3.4-2**  
**Kings Beach Commercial Core Improvement Project**  
**Stream Environment Zone Boundary**

### **3.4.1.3 U.S. Army Corps of Engineers Jurisdictional Resources**

Delineations of wetlands and other waters of the United States were conducted in the action area by Harding ESE, Inc. (2001), Mactec Engineering and Consulting, Inc. (2003, 2006c), and Jones & Stokes (2006) to determine the location and extent of USACE jurisdictional resources. The delineations were performed in accordance with Section 404 of the CWA and the *Corps of Engineers Wetland Delineation Manual* (U.S. Army Corps of Engineers 1987). Although the delineation conducted by Harding ESE (2001) was verified by the USACE, subsequent delineations were conducted as a result of modifications to the original action area. The delineations conducted by Mactec Engineering and Consulting, Inc. (2003, 2006c) were not verified, in part due to inopportune weather conditions (i.e., snow cover), which prevented quantifying eight intermittent drainages in the action area. Jones & Stokes conducted a delineation of the entire action area in September 2006 and identified a total of 0.719 acre of waters of the United States, including wetlands; this delineation was verified on February 26, 2007 (regulatory document 200600998) (Appendix I). The 0.719 acre of USACE jurisdictional resources comprises 0.329 acre of jurisdictional wetlands (i.e., depressional wetlands) and 0.390 acre of other waters of the United States (i.e., Griff Creek and Lake Tahoe).

All wetlands and waters of the United States are protected under Section 404 of the CWA under the jurisdiction of the USACE. Discharges into these resources are also protected under Section 401 of the CWA.

### **3.4.2 Regulatory Setting/Tahoe Regional Planning Authority Thresholds**

#### **3.4.2.1 Floodplains**

EO 11988 for Floodplain Management directs federal agencies to refrain from conducting, supporting, or allowing an action in a floodplain unless it is the only practicable alternative. The FHWA requirements for compliance are outlined in *23 CFR 650 Subpart A*. An encroachment into a floodplain is defined as “an action within the limits of the 100-year floodplain,” with the 100-year floodplain being defined as “the area

subject to flooding by the flood or tide having a one percent chance of being exceeded in any given year.” The National Flood Insurance Program produces maps that identify 100-year flood areas based on local hydrology, topography, precipitation, flood protection measures, and other scientific data. FEMA administers this program.

In order to comply, the following areas must be analyzed:

- the practicability of alternatives to any longitudinal encroachments,
- risks of the action,
- impacts on natural and beneficial floodplain values,
- support of incompatible floodplain development, and
- measures to minimize floodplain impacts and to preserve/restore any beneficial floodplain values impacted by the proposed action.

#### **3.4.2.2 Stream Environment Zones**

The TRPA Code of Ordinances (*Section IX, Chapter 74*) provides protection for Stream Environment Zones (Tahoe Regional Planning Agency 2004a) and states in paragraph 74.2 Protection of Stream Environment Zones:

No project or activity shall be undertaken in an SEZ (land capability 1b) which converts SEZ vegetation to a non-native or artificial state, or which negatively impacts SEZ vegetation through action including, but not limited to, reducing biomass, removing vegetation or altering vegetation composition.

A land capability verification of the CCIP was performed by TRPA in 2004 and determined that two land capability classifications exist in the CCIP area: 1b and 5. Classification 1b is described as, “Most sensitive and restrictive lands with least tolerance for disturbance by development with allowable impervious cover varying from 1 to 5 percent.” Classification 5 is described as exhibiting “Moderate sensitivity, with allowable impervious cover at 25 percent.” Classification 1b in the action area includes both beach and SEZ.

### **3.4.2.3 U.S. Army Corps of Engineers Jurisdictional Resources**

Jurisdictional resources include wetlands and waters of the United States. According to the USACE and the EPA, jurisdictional wetlands are defined as:

those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstance do support, a prevalence of vegetation typically adapted for life in saturated soil conditions (*33 CFR 328.2*).

In addition the USACE and the EPA define all other waters of the United States as:

all non-tidal waters that are currently, or were used in the past, or may be susceptible to use in interstate commerce; all interstate waters including wetlands; all other waters such as intrastate lakes, rivers, streams (including intermittent streams), mud flats, sand flats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, the use, degradation or destruction of which could affect interstate commerce; and all impoundments of waters otherwise defined as waters of the United States under this definition (*33 CFR 328.3*).

### **3.4.3 Environmental Consequences (Including Permanent, Temporary, Direct, Indirect)**

#### ***Impact HYD-1. Substantial Alteration in the Quantity of Surface Runoff***

##### ***Alternative 1***

The no-build alternative will not alter the quantity of surface water.

##### ***Alternatives 2, 3, and 4***

The proposed Alternatives 2, 3, and 4 involve a variation of improvements to the current SR 28 along with many drainage improvements. These improvements result in increased amount of impervious surfaces that will concentrate stormwater runoff. These impervious surfaces include additional paved surfaces due to the construction of new bike paths, sidewalks, and off-site parking areas. Buildout of any of the alternatives would increase the amount of impervious surface area by adding cement and asphalt over previously bare ground, which could potentially lead to a change in drainage patterns and

would result in more surface runoff during winter storms compared to existing conditions.

Stormwater flows based on various precipitation events were estimated in the *Kings Beach Watershed Improvement Project Final Hydrologic Conditions Report* in which the HEC-HMS model was used to estimate flows for the 25-year, 1-hour storm event and the 25-year, 72-hour storm event. Stormwater flows were estimated for Griff Creek along with all drainage outlets for the CCIP. The 25-year, 1-hour storm event flow for the Griff Creek Outlet was 53.8 cfs, while the 25-year, 72-hour flow was 1,199.6 cfs (Entrix 2006b). The 100-year, 24-hour event was also estimated as 1,000 cfs (Entrix 2006b). This discrepancy relates to the rainfall intensity for the different storms in relation to the infiltration rates. In the shorter duration storm, the initial precipitation goes to the soil moisture deficit, and subsequent precipitation goes to the constant infiltration and to runoff. With the longer duration storm, a greater amount of rainfall is available or runoff after removing the initial and constant infiltration amounts. For design flows on all other drainage outlets, refer to the *Kings Beach Watershed Improvement Project Final Hydrologic Conditions Report* (Entrix 2006b) located in Appendix G.

*Chapter 2, Alternatives*, and Figure 2-3 indicate drainage, collection, conveyance, and treatment improvements that will be implemented as part of the Kings Beach Watershed Improvement Project (WIP) to improve water quality in the Kings Beach region and CCIP. These design features will help to collect, convey, and treat water runoff from the on-street parking sites implemented as part of the CCIP and as well as runoff flowing into the CCIP from areas upstream of the CCIP. Moreover, as indicated in *Chapter 2*, the proposed CCIP drainage, collection, conveyance, and treatment facilities that tie into and interface with the WIP improvements would be designed and built to handle these flows at all culverts, crossings, and drainage facilities affected by the proposed action. In addition, all off-street parking lots would be designed with water collection and infiltration features to contain runoff on-site for a 20-year, 1-hour storm flow. These water collection and infiltration features will be incorporated into the off-site parking lots and are designed to mitigate runoff associated with the additional hard coverage from the

parking lots. Because water would be contained entirely on-site, the off-site lots would not worsen water quality in the region. Consequently, while implementation of the CCIP would increase the quantity of surface runoff due to increased impervious surfaces (i.e., additional paved surfaces due to the construction of new bike paths, sidewalks, and off-site parking areas), the improvements as part of the proposed action will sufficiently handle these increased flows. In addition, improvements associated with the proposed WIP will further increase water treatment capacity.

***Impact HYD-2. Placement of Structures that Would Impede or Redirect Flood-Flows within a 100-Year Floodplain***

***Alternative 1***

Implementation of the no-build alternative would not involve placement of structures that would impede or redirect any flows within the 100-year floodplain.

***Alternatives 2, 3, and 4***

A preliminary 100-year, 24-hour storm event memorandum was completed by Entrix (2006c) in which the HEC-RAS model was used to estimate the 100-year, 24-hour event for Griff Creek. Currently, Griff Creek has three 4-foot-by-6-foot arch corrugated metal pipe (CMP) culverts and two 30-inch CMPs. The model concluded that the current 100-year event will result in overtopping of SR 28 at Griff Creek with this current design. FIRMs obtained from Placer County for Griff Creek also indicate the 100-year flow would break out of the channel and flow across SR 28. Road realignment or placements of sidewalks (that are elevated higher than existing conditions) may alter the pattern of the overflow (and increase the size of the 100-year floodplain). (Entrix 2006c.)

Implementation of Alternatives 2, 3, and 4 would involve placement of structures in the 100-year floodplain. The *Location Hydraulic Study* prepared for the proposed action indicates these structures will not be in the direct path of flow and would not impede or redirect flow with implementation of the proposed action (Appendix H). The proposed action will not include any change in the roadway footprint at the Griff Creek crossing and will not change the configuration of the current culverts. The crossing is a multi-

barrel culvert, and no changes will be made to this configuration. The highway grade (elevation and profile) will be maintained at this crossing with no change in the post-project condition. Therefore, the culvert hydraulics and overtopping will not change and flood damage risk will remain the same as under existing conditions. Applicable Placer County Design Criteria and Improvement Standards for floodplain construction will also be incorporated by design into the project plans and specifications in compliance with permit requirements. Although no substantial change to the course or flow of 100-year floodwaters is expected, if unanticipated projects occur that result in a substantial change, appropriate applications will be filed with USACE with plans for mitigation through appropriate storm water conveyance, control, and treatment facilities.

***Impact HYD-3. Exposure of People, Structures, or Facilities to Significant Risk from Flooding, Including Flooding as a Result of the Failure of a Levee or Dam***

***Alternative 1***

Implementation of the no-build alternative would not expose people to flooding from levee or dam failure due to the relative proximity of a levee or dam within the area. However, the no-build alternative could expose people or structures to significant risk from flooding, as the existing culverts under SR 28 at Griff Creek are currently undersized and experience flooding and overtopping of SR 28.

***Alternatives 2, 3, and 4***

Implementation of Alternatives 2, 3, and 4 would not expose people, structures, or facilities to significant risk from flooding. In addition, Alternatives 2, 3, and 4 involve various improvements to current drainage facilities decreasing the chances of localized flooding in the area.

**Impact HYD-4. Creation of or Contribution to Runoff that Would Exceed the Capacity of an Existing or Planned Stormwater Management System**

**Alternative 1**

Current existing drainage facilities are outdated and frequently involve small amounts of flooding and overtopping of the roadways. Implementation of the no-build alternative would result in the continuation of this flooding and overtopping.

**Alternatives 2, 3, and 4**

Implementation of Alternatives 2, 3, and 4 will increase impervious surfaces (i.e., additional paved surfaces due to the construction of new bike paths, sidewalks, and off-site parking areas) resulting in an increase in stormwater runoff. Buildout of any of the alternatives would increase the amount of impervious surface area by adding cement and asphalt over previously bare ground, which could potentially lead to a change in drainage patterns and would result in more surface runoff during winter storms compared to existing conditions. Stormwater flows based on various precipitation events were estimated in the Kings Beach Watershed Improvement Project *Final Hydrologic Conditions Report* (Entrix 2006b).

*Chapter 2, Alternatives*, and Figure 2-3 indicate drainage, collection, conveyance, and treatment improvements will be implemented as part of the WIP to improve water quality in the Kings Beach region and CCIP. These design features will help to collect, convey, and treat water runoff from the on-street parking sites implemented as part of the CCIP and as well as runoff flowing into the CCIP from areas upstream of the CCIP. Moreover, as indicated in *Chapter 2*, the proposed CCIP drainage, collection, conveyance, and treatment facilities that tie into and interface with the WIP improvements would be designed and built to handle these flows at all culverts, crossings, and drainage facilities affected by the proposed action. In addition, all off-street parking lots would be designed with water collection and infiltration features to contain runoff on-site for a 20-year, 1-hour storm flow. These water collection and infiltration features will be incorporated into the off-site parking lots and are designed to mitigate runoff associated with the additional hard coverage from the parking lots. Because water would be contained entirely on-site,

the off-site lots would not worsen water quality in the region. Consequently, while implementation of the CCIP would increase the quantity of surface runoff due to increased impervious surfaces (i.e., additional paved surfaces due to the construction of new bike paths, sidewalks, and off-site parking areas), the improvements as part of the proposed action will sufficiently handle these increased flows. In addition, improvements associated with the proposed WIP will further increase water treatment capacity.

#### **3.4.4 Mitigation, Avoidance, Minimization, and Compensation Measures**

No specific measures related to hydrology are proposed for the action.

#### **3.4.5 Compliance with Tahoe Regional Planning Agency Code**

No substantial change to the course or flow of 100-year floodwaters is expected.