15.0 HYDROLOGY, WATER RIGHTS, SURFACE WATER QUALITY AND GROUNDWATER

This chapter describes the existing conditions of the Homewood Mountain Resort (HMR) Ski Area Master Plan Area (Project area) and discloses the potential impacts of the HMR Ski Area Master Plan Project (Project) on hydrologic conditions, water rights and supply, surface water quality and groundwater in the Madden Creek, Ellis Creek and Quail Lake Creek watersheds and intervening areas that drain the Project area.

15.1 ENVIRONMENTAL SETTING

15.1.1 Lake Tahoe Basin

The Lake Tahoe Basin comprises a bowl-shaped watershed, characterized by steep, north/south trending mountain ranges to the east and west, with Lake Tahoe occupying nearly 40 percent of the watershed. Within the basin, 63 individual watersheds contribute their flow to Lake Tahoe. The climate consists of long, relatively mild winters with short, dry summers. Most of the area's precipitation comes in the form of snow, with occasional thunderstorms during the summer months. Precipitation that falls from June through September accounts for less than 20 percent of the annual total. The western portions of the basin receive between 35 and 90 inches of precipitation per year (in/yr), while the eastern portions receive between 20 and 40 in/yr (USGS 2002). The higher amounts of precipitation typically occur in the upper elevations.

Natural drainage systems surrounding Lake Tahoe convey surface and subsurface runoff from rain and melting snow that slowly erodes the land. Sediment, dissolved minerals, organic litter, and nutrients are transported through the drainage courses and stream environment zones (SEZ) to the lake. Delta marshes of tributary streams filter these sediments and nutrients whereby they are used for plant growth. Organic materials are decomposed in the oxygen-rich lake and stream waters and nutrients are used by aquatic biota. Water quality in Lake Tahoe and its tributaries can be adversely affected by runoff from surrounding lands. Suspended sediment can cause turbidity and result in sedimentation and suspended and dissolved nutrients can stimulate algal growth, depleting the lake of oxygen in the natural process of eutrophication (i.e., increasing biologic material and depletion of oxygen over time). Today significant portions of the Lake Tahoe Basin are urbanized. Many factors such as land disturbance, habitat destruction, air pollution, soil erosion, and roads can interact to degrade water quality (Murphy and Knopp 2000).

Robert Coats recently published *Climate change in the Tahoe Basin: regional trends, impacts and drivers* (2010), a study that quantified decadal-scale time trends in air temperature, precipitation phase and intensity, spring snowmelt timing, and lake temperature in the Lake Tahoe Basin. The results indicate strong upward trends in air temperature, a shift from snow to rain precipitation regime, a shift in snowmelt timing to earlier dates, increased rainfall intensity, increased interannual variability and continued increases in temperature of Lake Tahoe. The study concludes that continued warming in the Lake Tahoe Basin has important implications for efforts to manage biodiversity and maintain clarity of the lake. Climate change impacts are addressed in Chapter 19, Climate Change.

15.1.2 Homewood Mountain Resort

The Project area is located on the western slope of the Lake Tahoe Basin in Placer County in the town of Homewood, California. HMR is approximately 19 miles north of South Lake Tahoe and five miles south of Tahoe City along Highway 89 and lies within portions of Sections 1, 2, 10, 11, and 12 of Township 14 North and Range 16 East of the Mt. Diablo Meridian. Elevations of the Project area range from approximately 6,235 feet to 7,880 feet above mean sea level (msl).

Kleinfelder (2009) evaluated monthly average precipitation records for the Project area based on WETS data from the Tahoe City Station with normal range of precipitation defined as the 30% chance that precipitation will be either greater than or less than the average values. From 1971 to 2000, the average annual precipitation range was from 25.08 to 37.92 inches. Precipitation studies that evaluated a period of record ending in 2006 determined average precipitation for the Project area at 33.5 inches/year for the lower elevations and 37.5 inches/year for the upper elevations (Lumos and Associates 2006).

15.1.3 Homewood Mountain Resort Technical Studies and Monitoring Efforts

Project construction will occur within the Madden Creek, Homewood Creek (also called Ellis Creek) and Quail Lake Creek watersheds that drain the Project area, along with Intervening Zone 7000, which contains the North Base area and a portion of the South Base area. Figure 15-1 illustrates the watersheds and the Project area boundaries as delineated by the Tahoe Regional Planning Agency (TRPA) and defined for the Lake Tahoe Total Maximum Daily Load (TMDL) (Lahontan and NDEP 2010). HMR has worked with regulatory agencies, scientists and contracted consultants to study and report the existing conditions within the Project area and project vicinity. The following sections detail the analyses conducted to measure existing conditions within the Project area for hydrology and flooding, surface water quality, channel condition, cumulative watershed effects, and restoration. The results and conclusions of these technical studies are summarized and reported by watershed (i.e. Madden Creek, Homewood Creek, Quail Lake Creek, and Intervening Areas) in the sections that follow.

Hydrology and Flooding

In cooperation with the California Department of Transportation (Caltrans), the United States Geological Survey (USGS) estimates the flood frequencies of streams that enter Lake Tahoe. Information about potential flooding of these streams is used by Caltrans in the design and construction of roads and highways in the California portion of the basin. The stream-monitoring network in the Lake Tahoe Basin is part of the Lake Tahoe Interagency Monitoring Program (LTIMP), which combines the monitoring and research efforts of various Federal, State, and regional agencies, including both USGS and Caltrans. Table 15-1 presents estimated 50-year and 100-year peak discharge for Quail Lake Creek and Madden Creek. This data was not reported for Homewood Creek. The largest flood peaks for these drainages were recorded in 1973 and did not exceed the 50-year peak flood discharge based on the two years of data collected.

Figure 15-1. Project Area Watersheds

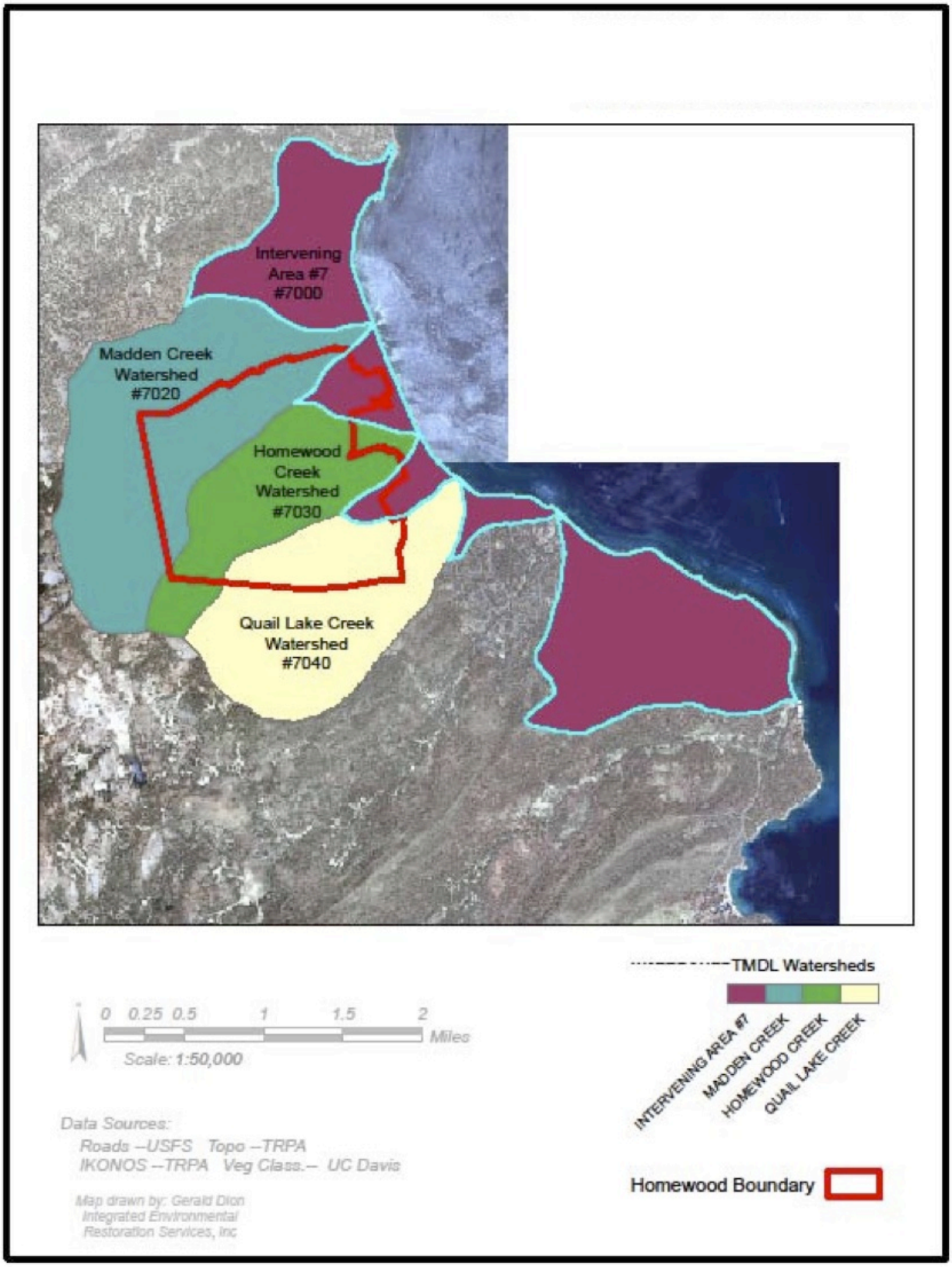


Table 15-1

Modeled and Historic Flood Data for USGS Monitoring Sites in Homewood, CA.

Monitoring Site	Period of Record	Drainage Area (mi^2)	50-year peak discharge [a] (cfs*)	100-year peak discharge [b] (cfs*)	Largest recorded flood peak (Date/Magnitude – cfs*)
10336650 Quail Lake at Homewood, CA.	1972-1974	1.48	150	207	May 14, 1973 / 24
10336655 Madden Creek near Homewood, CA.	1972-1973	1.67	146	195	May 17, 1973 / 43
10336658 Madden Creek at Homewood, CA.	1972-1973	2.04	178	204	May 17, 1973 / 86

Source: USGS http://pubs.usgs.gov/fs/fs03502/table01.html and USGS 2002

Note: * cubic feet per second or cfs

a. The 50-year peak discharge is theoretical and statistically has a 2-percent chance of happening in any given year.

b. The 100-year peak discharge is theoretical and statistically has a 1-percent chance of happening in any given year.

Surface Water Quality Sampling

Surface water quality sampling began at HMR in February 1989. More consistent monitoring commenced in 1995 upon issuance of the Updated Waste Discharge Requirements (WDR) under Board Order 6-95-86 by the California Regional Water Quality Control Board – Lahontan Region (Lahontan). Surface water quality monitoring must comply with the Amended WDR under Board Order 6-95-86A2, which was signed March 13, 2002. The details of the WDRs are presented in the Regulatory Setting section and surface water quality monitoring data are referenced to Appendix Y.

The WDRs established sampling stations at the following locations:

- Station M-1 – Madden Creek, immediately downstream of the outfall from Lake Louise;
- Station M-2 – Madden Creek, immediately downstream of the point where the creek exits the property;
- Station E-1 – Ellis (Homewood) Creek, immediately downstream of the point where the creek enters the property;

- Station E-2 – Ellis (Homewood) Creek, immediately downstream of the point where the creek exits the property;
- Station P-1 – North Parking Lot, at the outlet drain pipe; and
- Station P-2 – South Parking Lot, at the drop inlet on the south side of the parking lot.

Figure 15-2 illustrates the station locations, and the results from surface water quality compliance monitoring for Lahontan WDRs are discussed below. Appendix Y contains the data for each monitoring station for the periods of record for water years 1989 through 2009 and annual averages computed by Lahontan staff.

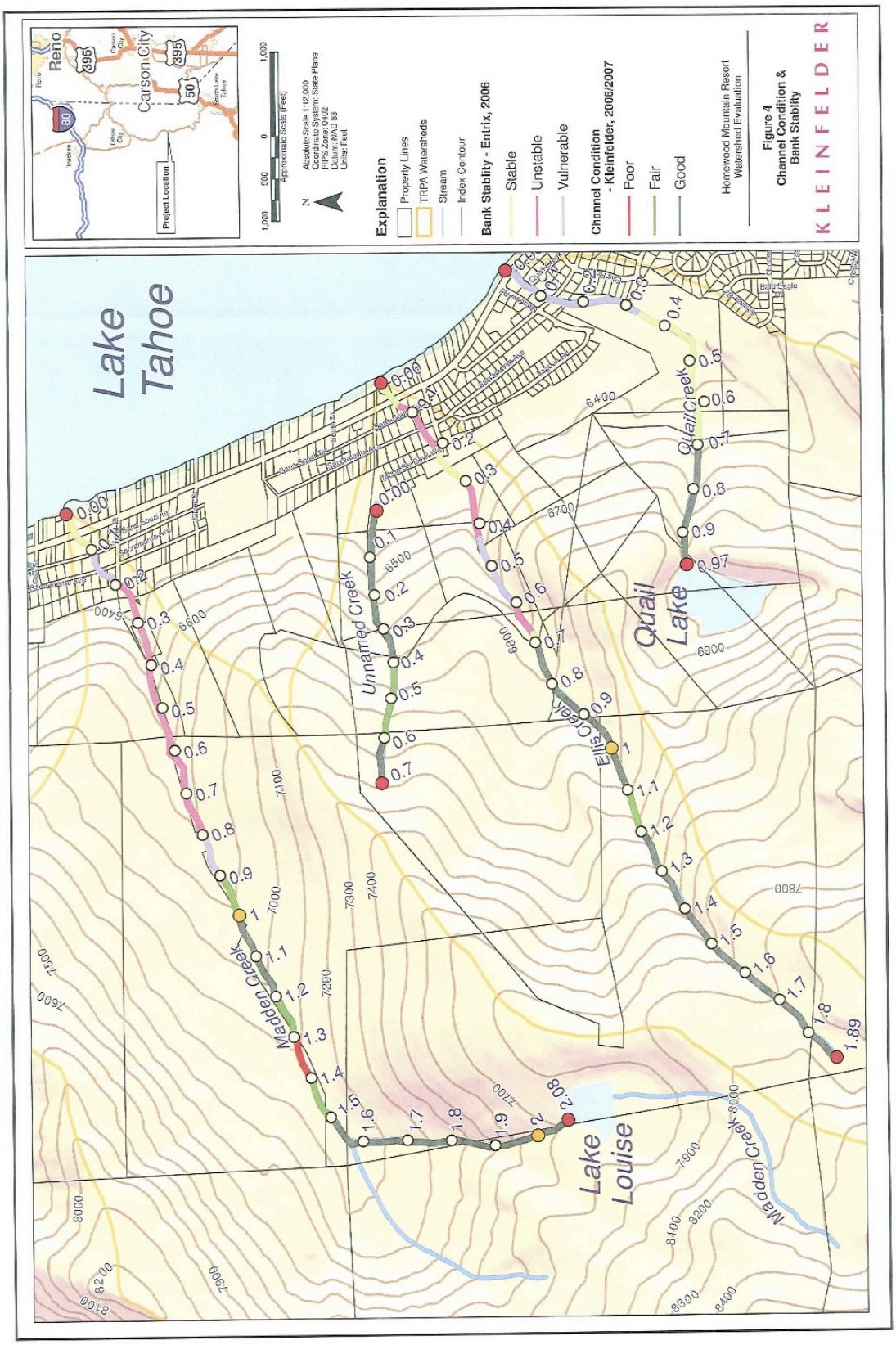
Beneficial uses for the Project area streams include: municipal and domestic supply, groundwater recharge, water contact recreation, noncontact water recreation, commercial and sportfishing, cold freshwater habitat, wildlife habitat, spawning, reproduction and development, and suspended sediment objective for Lake Tahoe. Compliance for the period of record is discussed below according to watershed. Figures 7, 8 and 9 in Appendix W, the HMR Cumulative Watershed Effects Analysis (IERS 2010), illustrate this dataset for Total Suspended Solids, Total Nitrogen and Total Phosphorus. As outlined in the WDRs, analysis of receiving water samples is addressed through calculation of annual average means while analysis of discharge to surface water samples is discussed according to single grab sample.

HMR complies with the base requirements outlined in Lahontan's current WDRs, which are summarized in the Regulatory Settings section below. Current WDRs have the purpose of determining compliance with pollutant concentration levels but not for determining annual loading. Because annual loading calculations are difficult to report based on the sampling regime of the surface water quality monitoring program, average annual loading has been estimated based on the methods of the Load Simulation Program in C++ (LSPC) model (http:www.epa.gov/Athens/wwqtsc/html/lspc.html) for the North Base, South Base, and Mid-Mountain areas and along Tahoe Ski Bowl Way (i.e., the developed base areas). The results are reported below in Subsection 15.1.6. This approach evaluates benchmark sediment values to better characterize the Project area with treatment/loading assumptions tested and BMP and stormwater treatment system performance evaluated.

Channel Condition Assessments

Placer County contracted Entrix, Inc. and Lumos and Associates to conduct an assessment of the Homewood, California watersheds for the purposes of identifying erosion control problems and opportunities for watershed and water quality improvements (Entrix, 2006 and Lumos and Associates, 2006). This assessment included an evaluation of the lower portions of Madden Creek, Homewood Creek, and Quail Lake Creek completed as part of the Homewood Erosion Control Project, which is identified by the TRPA as Environmental Improvement Program (EIP) Project No. 725. The lower portions of the streams exit the Project area and soon discharge to Lake Tahoe.

Figure 15-2. Channel Reach Delineations and Conditions



Kleinfelder completed the *Stream Channel and Baseline Surface Water Assessment for Homewood Mountain Resort* in 2007 (Kleinfelder 2007), an assessment that incorporated the Entrix, Inc. and Lumos and Associates assessments and expanded the study area to the upper limits and headwaters of the HMR watersheds with data collected in October and November 2006. The assessment provides baseline conditions for the following metrics:

- Steam Channel Classification is based on California Forest Practice Rules, Rosgen Level II and Montgomery-Buffington Stream Classification and Stream Condition Inventory methodologies. The delineated channel reaches are illustrated in Figure 15-2 and classification details are referenced to the Kleinfelder (2007) report. The overall condition assessments describe channel conditions as good, fair and poor for the upper reaches or stable, vulnerable and unstable for the lower reaches. The definitions that are used in the watershed summaries below are:
    - Good – Banks exhibit erosion only on outcurves, at obstructions and infrequently in other areas; OR
    - Stable – No instability factors and greater than 75 percent cover (cover includes vegetation, large rock, downed wood, or erosion resistant soil types with clay or conglomerate); and
    - Fair – Channels are eroded intermittently in locations not explained by stable fluvial processes; OR
    - Vulnerable – Greater than 75 percent cover, but at least one instability indicator (instability indicators include mass movement, slumping, fracturing, undercut banks or significant lengths of bank erosion); and
    - Poor – Extensive and continuous erosion on one or both banks; OR
    - Unstable – Less than 75 percent cover and at least one instability indicator.
- Baseline Surface Water Quality based on grab samples collected in October 2006, March 2007, May 2007 and September 2007 at the Lahontan Monitoring and Reporting Program No. 95-86A1 monitoring stations and at an additional 10 monitoring stations.
- Historic Surface Water Quality Trends based on grab samples collected since 1989.

Restoration

Starting in 2006, HMR teamed with Integrated Environmental Restoration Services (IERS) to complete sediment source control and restoration projects and monitoring. The value of removing unpaved roads in the upper watershed is defined in the *Lake Tahoe TMDL Pollutant Reduction Opportunity Report* (Praul and Sokulsky 2008). Unpaved roads at HMR are generally characterized by highly compacted soil conditions, low to no surface cover, and elevated runoff and sediment loading rates (IERS 2008).

In 2006 and 2007, six restoration projects, ranging in size from 3,500 square feet to 48,300 square feet, were completed for approximately 2.4 acres of restoration (Note that portions of these projects could be verified by TRPA as land coverage removal for banking or permanent retirement as detailed in Chapter 14, Geology, Soils and Seismicity). In years 2008 and 2009,

eight restoration projects were completed, ranging in size from 1,920 square feet to 38,788 square feet, for approximately 3.1 acres of land restoration. The project locations are illustrated on Figure 14-4 in Chapter 14, Geology, Soils and Seismicity, where these sediment source control projects are discussed in context with existing land coverage removal and reductions. Although land coverage has been removed and restored, the coverage is considered existing TRPA land coverage until the Project Applicant submits banking applications with TRPA, verification is completed and approval is granted.

The goals of the road restoration projects and monitoring are to:

- Increase watershed function through soil and plant community restoration;
- Reduce erosion potential through increasing infiltration, reducing soil compaction, increasing mulch cover and plant cover, and creating proper nutrient cycling to sustain the plant cover in the long-term;
- Monitor each treatment area to determine the level of effectiveness of the range of treatments and determine the most cost effective restoration techniques; and
- Use this information to develop a long-term treatment strategy for the Project area.

The restoration projects are discussed below according to watershed location. The road restoration includes Tier 1, Tier 2, and Tier 3 treatments that are directly tied to the pollutant load reduction opportunities described in the *Lake Tahoe TMDL Pollutant Reduction Opportunity Report* and are described below:

Tier 1: Lowest Treatment Intensity; treatments include surface mulch of varying types and depths.

Tier 2: Medium Treatment Intensity; treatments include light soil decompaction (ripping or targeted loosening), organic fertilizer, native seed and mulch. This treatment is implemented to test the cost-effectiveness of a very low-intensity soil decompaction process, which is currently thought to be less expensive than deeper tilling and/or recontouring (Tier 3). Tier 2 treatments were implemented with and without wood chips as a soil amendment to assess the effects of woody soil amendments on sediment source control.

Tier 3: High Treatment Intensity; treatments include deep soil loosening/tilling (minimum 12 inches) and recontouring as appropriate, incorporation of a high concentration of woody soil amendments, organic fertilizer, native seed and mulch. Tier 3 (also referred to as "full treatment") describes a level of treatment that includes all the elements necessary to develop site conditions that will, in time, mimic and sustain "native" or "undisturbed" conditions.

Variations of treatment were implemented based on site-specific needs. A wide range of monitoring techniques, including rainfall and runoff simulations, soil density, soil moisture, and surface and vegetative cover and composition, were conducted.

Cumulative Watershed Effects (CWE) Model

CWE Overview

IERS completed the HMR Cumulative Watershed Effects (CWE) analysis for the Project area watersheds following the approach outlined in the TRPA's Ski Area Master Plan Guidelines (TRPA 1990) with guidance from TRPA Staff. Appendix 5 of the Ski Area Master Plan Guidelines outlines the requirements for preparation of a CWE analysis. The HMR CWE analysis assists in the planning and understanding of the cumulative impacts of redevelopment within the Project area, especially as they relate to sediment movement and water quality within the Project area as combined with sediment movement and water quality in the total watershed.

A CWE analysis is a qualitative evaluation of the overall health of a watershed and the sensitivity of the watershed to disturbances such as land use development and redevelopment. The analysis includes a qualitative evaluation of a watershed that is supported by quantitative measurable parameters. The purpose of the HMR CWE analysis is to estimate the relative impacts caused by facilities or activities related to past and proposed development and to determine appropriate mitigation if necessary. Appendix W contains the *Homewood Ski Area Master Plan Cumulative Watershed Effects Analysis* technical document that was prepared by IERS (IERS 2010).

Thresholds of Concern (TOC)

The HMR CWE analysis evaluates the relative impacts of the Proposed Project (Alternative 1) and Alternatives 3, 4, 5 and 6 as compared to existing conditions (No Project or Alternative 2) and Thresholds of Concern (TOCs). TOCs are conceptual thresholds that describe a point beyond which a relatively irreversible trend of increasing degradation to 'beneficial uses' occurs. The TOC concept is roughly analogous to the TRPA Environmental Thresholds and the ecological concept of carrying capacity. For purposes of the HMR CWE analysis a TOC is defined as *"the point at which the watershed would undergo irreversible degradation supported by a positive environmental feedback loop"*(IERS 2010).

Two types of TOCs for the Project area watersheds are defined:

1. Project Area TOCs determine the point of impact significance for development and redevelopment actions taken within the Project area (i.e. those portions of Madden, Homewood and Quail Lake Creek and Intervening Zone 7000 watersheds within the Project area boundary). The Project Area TOCs help gauge 1) whether existing conditions within the Project area already exceed the Project Area TOCs, and 2) whether the actions within the Project area boundary from implementation of the Proposed Project (Alternative 1) or Alternatives 3, 4, 5 or 6 would cause exceedance of Project Area TOCs. Exceedance of a Project Area TOC constitutes a significant impact requiring mitigation under TRPA codified regulation.

2. Total Watershed TOCs determine the point of impact significance for future development and redevelopment actions that could be taken outside the Project area considered cumulatively with those actions taken, as defined by the Project, within the HMR Project area (i.e. the portions of the Madden, Homewood and Quail Lake Creek and Intervening Zone 7000 watersheds located upstream and downstream of the Project area ADDED to those portions of Madden, Homewood and Quail Lake Creek and Intervening Zone 7000 watersheds within the Project area boundary). The Total Watershed TOCs gauge the incremental contribution of the Project to cumulatively considerable impacts when

combined with future reasonable and foreseeable projects outside the Project area portions of the watersheds. Exceedance of a Total Watershed TOC could constitute a potentially cumulatively significant effect as defined by CEQA and TRPA.

The TOCs were developed using two main components. The first component is quantitative and provides modeled annualized sediment yields that could theoretically result from build-out of base allowable land coverage permissible under current TRPA Bailey land use coefficients. The second component is qualitative and consults several levels of stream condition assessments, surface water quality from a period of record dating back to 1989, and other watershed indicators (i.e., 2007 HMR Watershed Atlas, professional knowledge of the Project area hydrology, field evidence) to support or discount the quantitative TOC for the four watersheds of study.

HMR CWE Analysis

The HMR CWE analysis employs a process and model that reflect those utilized in the development of the Lake Tahoe Total Maximum Daily Load (TMDL) and described in the *Lake Tahoe TMDL Technical Study* (Lahontan and NDEP 2007). The Lake Tahoe TMDL process employed the Loading Simulation Program in C++ model (LSPC), a nationally recognized watershed model developed by the United States Environmental Protection Agency (USEPA) (http://www.epa.gov/ATHENS/wwqtsc/html/lspc.html). At its core, the LSPC model considers watershed hydrologic processes as they depend on climate, topography, and land-use to determine the runoff and sedimentation rates from each defined land-use category within a watershed. The sedimentation rates are summed to estimate the watershed sediment yields reported in metric Tonnes per year (T/yr).

The HMR CWE analysis utilizes the LSPC model land use inputs, topography and climate conditions and sediment rates from urban areas, as defined for the Lake Tahoe TMDL together with model computed runoff rates and Project area field-measured pervious area erosion rates to determine sediment yields from each land use as described by existing conditions (i.e., No Project or Alternative 2). By varying land uses within each of the four watersheds to reflect changes proposed by the Project, it is possible to estimate the relative impacts to annual sediment yields that could occur from the Proposed Project (Alternative 1) and Alternatives 3, 4, 5 and 6.

The following steps that resulted in a GIS dataset of some 20,000 polygons were taken to setup the HMR CWE analysis for the existing conditions and simulate each of the project alternative land-use conditions to estimate sediment yield (T/yr).

1. The 1-meter land use raster dataset are converted into a feature (polygon) dataset using the standard ESRI “raster to poly” toolset.

2. The average slope for each land use is calculated based on 10-meter grid dataset. This dataset is simplified to a 100-meter grid and intersected with the baseline land-use dataset. The slope for each land use is determined as an area-weighted average.

3. The soil parent material (volcanic or granitic origin) is used to determine sediment rates per unit of runoff from pervious areas. This key parameter for each watershed is derived from the 2007 NRCS soil survey GIS data layer.

4. The unpaved (dirt) roaded area, used in the original TMDL modeling effort, under-estimated the actual dirt roaded areas found in the Homewood area. As

such the dirt road land use category area is increased by approximately 958,311 square feet or 22 acres to reflect field-measured land use and land coverage conditions while adjoining vegetated land use category areas were reduced by an equivalent amount. This correction results in a more realistic representation of existing conditions.

5. For the Proposed Project (Alternative 1) and Alternatives 3, 4, 5 and 6, the land uses are adjusted (added or subtracted) for each watershed to reflect proposed changes in land use under each alternative. The total watershed areas are held constant.

6. Following the Lake Tahoe TMDL Pollutant Reduction Opportunities Report, reductions in sediment yield are established based on the pollutant load reduction measures proposed under each project alternative.

7. The resulting sediment yields from each set of land use conditions are summarized and graphically displayed.

Section 3 of Appendix W further details the HMR CWE analysis methodology.

Compliance with Project Area and Total Watershed TOCs

The modeled existing sediment yields from the Madden Creek, Quail Lake Creek and Homewood Creek watersheds and Intervening Zone 7000 are used as the baseline to describe existing conditions. Existing conditions (No Project, Alternative 2) are discussed below for each watershed.

As stated above, the HMR CWE analysis then simulates changes to the existing land uses (and thus sedimentation rates) and modifies TMDL pollutant load reduction measures to reflect the future conditions under the Proposed Project (Alternative 1) and Alternatives 3, 4, 5 and 6. The Proposed Project (Alternative 1) and Alternatives 3, 4, 5 and 6 are discussed under Impact HYDRO-1 in the Environmental Impacts and Recommended Mitigation section.

Table 15-2 presents existing Project Area sediment yield for each watershed for comparison against the Project Area TOC for that watershed and the Total Watershed sediment yield, which combines the Project area sediment yield with the sediment yield for the portions of the watershed located upstream and downstream of the Project area, for comparison against the Total Watershed TOC for that watershed..

Table 15-2

Annualized Sediment Yield Estimates –Existing Conditions vs. Project Area and Total Watershed TOCs

	Baseline Sediment Yield for Project Area (T/yr)	TOC for Project Area (T/yr)	Baseline Sediment Yield for Total Watershed (T/yr)	TOC for Total Watershed (T/yr)*
Intervening Zone 7000	62	55	361	355
Madden Creek	459	435	1036	1085
Homewood Creek	828	865	906	955
Quail Lake Creek	152	147	409	462
Totals	**1501**	**1502**	**2712**	**2857**

Source: IERS 2010

Notes: * TOC for Total Watershed equates the Project Area TOC plus the Outside of Project Area TOC. The Outside of Project Area TOCs are as follows in T/yr: Intervening Zone 7000 – 300; Madden Creek – 650; Homewood Creek – 90; Quail Lake Creek – 315

The modeled results demonstrate that the Homewood Creek watershed has a sediment yield that is below its Project Area TOC and Total Watershed TOC. Quail Lake Creek and Madden Creek watersheds are estimated to have sediment yields that exceed their Project Area TOC, while the sediment yields for the whole watersheds are below the Total Watershed TOC. Intervening Zone 7000 is estimated to have a sediment yield that exceeds its Project Area TOC and the Total Watershed TOC.

15.1.4 Homewood Mountain Resort Watershed

The Project area affects portions of the Madden Creek, Homewood Creek and Quail Lake Creek watersheds. The North Base area is contained within Intervening Zone 7000. The South Base area is located primarily within Homewood Creek watershed with a small portion of the South Base area in Intervening Zone 7000. The following sections present the watershed characteristics for the Project area watersheds.

Madden Creek

Hydrology and Flooding. The Madden Creek watershed contains the perennial Madden Creek and Lake Louise and establishes the northern and western boundaries of the Project area. A weir structure spills water from Lake Louise into Madden Creek and the headwaters are located in a broader valley area. Madden Creek Watershed (also labeled H9 or TMDL watershed 7020) has an area of approximately 2.5 square miles or over 1,300 acres. The headwaters begin at Ellis Peak at an elevation of about 8,700 feet msl, flow over three miles and discharge into McKinney Bay of Lake Tahoe. Lake Louise is the only lake in this watershed and is located at approximately 7,700 feet msl. United States Department of Agriculture (USDA) Forest Service

Lake Tahoe Basin Management Unit (LTBMU) land is located adjacent to the north side of the drainage. The Project area covers the majority of the lower portion of the watershed and 27 percent, or 351 acres, of the total watershed.

The average slope of the watershed is 48 percent with a general aspect of southeast and northwest. The parent material underlying the watershed is primarily volcanic and about 10 percent glacial deposits (IERS 2010).

Madden Creek comprised the northern boundary of the Project area. A 100-year flood plain is mapped along the lower portions of Madden Creek at the confluence with Lake Tahoe. No portion of the Project area is within a FEMA designated floodplain within this watershed.

Surface Water Quality. Madden Creek is sampled above the Project area at station M-1 and below the Project area at M-2, as required for Lahontan WDRs. The period of record spans from water year 1992 through 2009. Average annual means for receiving water samples at M-1 ranged from 0.03 to 1.2 milligrams per liter (mg/L) for Total Nitrogen and 0.007 to 0.034 mg/L for Total Phosphorus. Annual means for Total Suspended Sediment concentrations ranged from 5.3 mg/L to less than 1.0 mg/L. Turbidity measurements do not exceed 3.4 are below the nephelometric Average annual means for receiving water samples at M-2 ranged from 0.02 to 0.97 mg/L for Total Nitrogen and 0.01 to 0.16 mg/L for Total Phosphorus. Annual means for Total Suspended Sediment concentrations ranged from 1.8 to 14.9 mg/L. Turbidity was typically measured below 2 ntu.

Figures 7, 8 and 9 in Appendix W, the HMR CWE Analysis (IERS 2010), illustrate the Madden Creek dataset for Total Suspended Solids, Total Nitrogen and Total Phosphorus. The data set does not indicate negatively trending degradation and the dataset does not indicate consistent pollutant values between downstream and upstream monitoring locations (IERS 2010).

Channel Condition. Most of the sediment delivered to Madden Creek is derived from mass wasting of very steep, unstable channel banks (Kleinfelder 2007). In the lower portion of Madden Creek, channel gradients are moderately high, at approximately four percent between Lake Tahoe and just above Highway 89. The majority of Madden Creek is typified by extremely high gradients ranging from 10 percent to over 20 percent upstream to Lake Louise. There is a portion of the stream, between R1.4 and R1.8 (see Figure 15-2) where multiple drainages confluence into the main channel and where the river valley widens and flattens out. The slopes are less than 10 percent in this reach and the stream has greater sinuosity and larger expanse of riparian vegetation.

For the lower portions of Madden Creek, these percentages shift with approximately 60 percent of the lower portion of Madden Creek (RM 0.0 – RM 1.0) rated Unstable, 20 percent rated Vulnerable and 20 percent rated Stable. The poor conditions observed included steep unvegetated banks with unstable soils. In the upper reach of Madden Creek, between Lake Louise and RM 1.5, the channel is in very Good condition with minor bank erosion in very limited areas. This section is located upgradient of the various confluences.

The condition ratings for the entire channel are summarized as: Good/Stable 42 percent; Fair/Vulnerable 21 percent; and Unstable/Poor 37 percent.

Madden Creek was inventoried by LTBMU in August 1994 for fish habitat. Based on the LTBMU information, it appears that most of Madden Creek may provide better potential habitat for adult trout than the other streams in the Project area due to the greater proportion of pools and

their greater depth. The lower portion of Madden Creek, outside of the Project area, does not provide good fish habitat due to alterations of the streambed for flood control.

Restoration. No restoration projects are reported for Madden Creek watershed.

Cumulative Watershed Effects. The Project area comprises 27 percent of the Madden Creek watershed. As presented in Table 15-2, the Total Watershed TOC for the Madden Creek watershed is calculated at 1085 T/yr for total sediment. The baseline (existing conditions) sediment yield for the total Madden Creek watershed is 1036 T/yr, which is 5 percent less than the Total Watershed TOC.

The Project area TOC for the Madden Creek watershed is calculated at 435 T/Yr. The baseline (existing conditions) sediment yield from the Project area is 459 T/Yr, which exceeds the Project area TOC by 24 T/yr or 5 percent.

Homewood (Ellis) Creek and South Base Area

Hydrology and Flooding. The watershed is titled Homewood Creek on the TRPA watershed map for priority drainages (http://www.trpa.org/documents/docdwnlds/Prioritywtrshd.pdf), Homewood Canyon Creek on the Jorgensen et al. watershed map (1978) and is sometimes referred to as Ellis Creek in past documents, including the Lahontan WDRs. The watershed contains: an unnamed ephemeral creek that flows through the Project area north of the terminus of Tahoe Ski Bowl Way; the perennial Homewood Creek; and several tributaries to Homewood Creek. Homewood Creek flows through the South Base area.

Homewood Creek watershed (also titled H40 or TMDL watershed 7030) has an area of approximately 1.3 square miles or 645 acres, the majority of which, 81 percent or 524 acres, is located within the Project area. The headwaters begin at Knee Ridge, flow over two miles through the Project area and then residential areas to discharge into McKinney Bay of Lake Tahoe.

The average slope of the watershed is 47 percent and the general aspect is southeast and northwest. The parent material underlying the watershed is primarily volcanic and less than 10 percent glacial deposits. The land uses in the watershed include roads, vegetated ski trails and a small amount of development in the South Base area and private residences (IERS 2009).

Portions of the South Base area are within a 100-year flood hazard area as defined and mapped by FEMA on panel 06061C0225F dated June 8, 2007. A Federal Emergency Management Agency (FEMA) flood hazard Zone A is delineated along Homewood Creek in the South Base area and estimated at 1.47 acres or 64,124 square feet of the Project area. Currently there is a parking lot and several structures located within the flood hazard zone. A-Zones are found on all Flood Hazard Boundary Maps (FHBM), Flood Insurance Rate Maps (FIRM), and Flood Boundary and Floodway Maps (FBFM). An A-Zone is an area that would be flooded by the Base Flood (known as a 100-year flood elevation or one-percent chance flood) and is the same as a Special Flood Hazard Area (SFHA) or a 100-year floodplain.

There is an unnamed drainage within the Homewood Creek watershed that receives runoff from an intervening area (identified as Intervening Zone D in the Kleinfelder Baseline Report - 2007). This area is located between Homewood Creek and Madden Creek and includes an unnamed intermittent drainage channel. The unnamed stream does not provide perennial or seasonal fish habitat but is capable of transporting sediment to Lake Tahoe and potentially Homewood Creek

(Kleinfelder 2007). Based on geomorphic features and observations by HMR staff, the channel conducts high volumes of water during large storm events and captures and conveys snowmelt during the spring.

Surface Water Quality. Homewood Creek is sampled above the Project area at station E-1 and below the Project area at E-2, as required for Lahontan WDRs. The period of record spans from water year 1989 through 2009.

Average annual means for receiving water samples at E-1 ranged from 0.03 to 0.23 mg/L for Total Nitrogen and 0.008 to 0.083 mg/L for Total Phosphorus. Annual means for Total Suspended Sediment concentrations ranged from 8.3 to less than 1 mg/L. Turbidity was typically measured below 2 ntu. Average annual means for receiving water samples at E-2 ranged from 0.04 to 0.5 mg/L for Total Nitrogen and 0.01 to 0.048 mg/L for Total Phosphorus. Annual means for Total Suspended Sediment concentrations ranged from 25 to 2.1 mg/L. Turbidity was typically measured below 2 ntu with a maximum measurement of 6.5 ntu in 1995.

Figures 3, 4 and 5 in Appendix W, the HMR Cumulative Watershed Effects Analysis (IERS 2010), illustrate the Homewood Creek dataset for annual monthly means for Total Suspended Solids, Total Nitrogen and Total Phosphorus. The data set does not indicate negatively trending degradation and the dataset does not indicate consistent pollutant values between downstream and upstream monitoring locations (IERS 2010).

Channel Condition. Channel gradients for Homewood Creek are approximately four percent in the lowest reach between Lake Tahoe and Ski Bowl Way and then range from 12 percent to 27 percent upstream to the headwaters where the gradient flattens to less than one percent.

The overall condition ratings for the entire channel are summarized as: Good/Stable 70 percent; Fair/Vulnerable 18 percent; and Unstable/Poor 12 percent. Approximately 48 percent of the stream channel located in the South Base area to Lake Tahoe (RM 0.0 – RM 0.7 as depicted on Figure 15-2) was rated as Unstable. Bank instability between RM 0.3 and RM 0.7 appears to be from mass wasting sites along a steep gradient. In the 0.2 mile of the channel confluence with Lake Tahoe, undercutting was observed. Erosion and undercut banks are observed near RM 1.15. Otherwise, the upper reaches (RM 0.7 – RM 1.89) have good channel conditions with substantial vegetation cover and no significant erosional features.

Homewood Creek was inventoried by LTBMU in August 1994 for fish habitat. Homewood Creek provides limited habitat for adult trout life stages, but there is substantial suitable spawning habitat. High gradients between RM 0.3 and RM 0.7 and RM 1.1 and RM 1.4 could act as natural barriers for migration in low flow years.

Kleinfelder assessed the portion of the unnamed channel in the Homewood Creek watershed that is located within the Project area. The unnamed channel has 72 percent of banks in Good/Stable condition with the exception of banks between RM 0.4 and RM 0.6, where banks have little or no vegetation along steep slopes and are rated as Fair/Vulnerable (28 percent). In this section, banks have erosional features such as slope failure, undercut banks, loose soil and exposed tree roots that are most likely contributable to road crossings.

Restoration. Thirteen restoration projects were completed between 2006 and 2009 in the Homewood Creek watershed within the Project area. The project locations are identified in Figure 14-4 in Chapter 14, Geology, Soils and Seismicity and the actions and results are summarized below.

Road 31 is 6,180 square feet and was previously used for forest management actions. The site had a shallow layer of surface woodchips (less than one inch), two water bars, and very little vegetation before treatment in 2006. The main goal at Road 31 was to reduce sediment movement and surface erosion by incorporating organic matter and applying fertilizer, native seed, and mulch to initiate a successional process that leads to diverse, mid-seral, and self-sustaining native grass and shrub plant communities. Variations in amendment depth and mulch type were tested to determine whether differences exist in either soil density, plant cover, or mulch cover. At Road 31, Tier 3 treatments were completed and sediment yield decreased by seven times after treatment, from 381 to 54 pounds per acre per inch (lbs/acre/in). This data suggests that restoration treatments applied at Road 31 were successful in controlling sediment at the source.

Road 37 is an old road near the top of the Overload ski trail and approximately one hundred vertical feet below the top of Quail Chair lift. The goal at Road 37 was to determine the level of improvement in infiltration capacity and hydrologic function within an abandoned roadbed when mature vegetation is mowed and soil is loosened. Large woody debris was spread across the site to prevent vehicular and pedestrian traffic. Tier 3 treatments were applied to 15,561 square feet.

Creek Road is an old road near the bottom of Ellis Chair lift. The top of Creek Road intersects with the Smooth Cruise ski trail and the bottom intersects an active mountain access road. The project goals were to restore an abandoned roadbed, to improve infiltration capacity and hydrologic function, and to initiate a successional process that leads to a diverse native grass and shrub plant community through amendment incorporation, fertilizer, native seed and mulch addition. Treatment included, tilling four inches of tub grindings to 18 inches, 2,000 lbs/acre of Biosol, 125 lbs/acre of native seed, and one inch of tub grinding mulch. These Tier 3 treatments were applied across 11,400 square feet.

Rainbow Ridge Road was treated in 2007. The site is a decommissioned road on Rainbow Ridge ski trail at an elevation of 7,338 ft msl. The Rainbow Road project goals were to restore an abandoned roadbed, to improve infiltration capacity and hydrologic function, and to initiate a successional process that leads to a diverse native grass and shrub plant community through amendment incorporation, fertilizer, native seed, and mulch addition. Tier 3 treatments included tilling four inches of tub grindings to 18 inches, 2,000 lbs/acre of Biosol, 125 lbs/acre of native seed, and two inches of pine needle mulch.

Upper Wedding Road was treated in 2007. The site is a road that is located under the top portion of the Quail chairlift and along part of the El Capitan ski trail. The Wedding Road project goals were to restore an abandoned roadbed, to improve infiltration capacity and hydrologic function, and to initiate a successional process that leads to a diverse native grass and shrub plant community through amendment incorporation, fertilizer, native seed, and mulch addition.

Wedding Road received four inches of pine needles tilled to 18 inches, 2,000 lbs/acre of Biosol, 125 lbs/acre of native seed, and two inches of pine needle mulch. A portion of the treatment area was divided into 12 sections. Each section received one of four different seed mixes or an individual species. Seed tests were implemented to determine which mixture of seeds and which seeds alone produced the highest plant cover by seeded species, after one growing season, and throughout subsequent growing seasons.

Homewood Canyon Creek road was treated in 2008. Tier 3 treatments were implemented on 20,840 square feet. Smooth Cruise Ditch was treated in 2008 for a total of 32,150 square feet of

restored coverage. Tier 1 treatments were applied to 1,440 square feet, Tier 2 treatments were applied to 11,680 square feet, and Tier 3 treatments were applied to 19,030 square feet.

In 2009, Spur Road received Tier 2 treatments on 8,400 square feet. Tier 1 treatments were applied to Lower Wedding Road (1,920 square feet). Road 33 received Tier 1, Tier 2 and Tier 3 treatments on a total of 18,907 square feet. Homewood Bound 0 received Tier 1, Tier 2 and Tier 3 treatments on a total of 38,788 square feet. Homewood Bound 1 received Tier 3 treatments on 3,624 square feet and Lower Ellis Road received Tier 2 and Tier 3 treatments on a total of 13,500 square feet. Monitoring results are not published for 2008 and 2009 sediment source control and road restoration projects.

Cumulative Watershed Effects. The Project area comprises 81 percent of the Homewood Creek watershed. As presented in Table 15-2, the Total Watershed TOC for the Homewood Creek watershed is calculated at 955 T/yr for total sediment. The baseline (existing conditions) total sediment for the total Homewood Creek watershed is 906 T/yr, which is 5 percent less than the Total Watershed TOC.

The Project area TOC for Homewood Creek is calculated at 865 T/Yr. The baseline (existing conditions) sediment yield from the Project area is 828 T/Yr, which is 5 percent or 37 T/yr less than the Project Area TOC.

Quail Lake Creek Watershed

Hydrology and Flooding. The Quail Lake Creek watershed contains several tributaries that discharge to Quail Lake and the perennial Quail Lake Creek that flows south out of the Project area. The Quail Lake Creek Watershed (also titled H64 or TMDL watershed 7040) has an area of approximately 1.7 square miles or 947 acres, of which 26 percent of the total watershed area is located within the Project area. The headwaters flow from an elevation of 8,400 feet msl at Knee Ridge and discharge into McKinney Bay of Lake Tahoe near Lagoon Road. The upper portion of this creek (RM 0.5 – RM 0.97) does not have water year-round. Quail Lake is located in the lower half of the watershed. Less than half of the runoff from this watershed actually flows through this lake. The abandoned Noonchester Gold Mine is located south and upgradient of Quail Lake.

During the summer and fall, Tahoe City Public Utility District (TCPUD) at times diverts its water rights in Homewood Creek to fill Quail Lake. Section 15.1.11 below details the existing points of diversion and water rights of the Project area.

The average slope in the watershed is 45 percent and the general aspect is southeast and northwest. The parent material underlying the watershed is approximately ten percent volcanic and 90 percent mixed volcanic and glacial deposits. The land uses in the watershed include roads and vegetated ski trails (IERS 2010).

There are no FEMA designed floodplains identified for Quail Lake Creek watershed within the Project area.

Surface Water Quality. Quail Lake Creek is not sampled as part of the monitoring and reporting program for Lahontan's WDRs. Kleinfelder conducted baseline surface water quality sampling in this drainage in October 2006, March 2007, May 2007 and September 2007. Sampling occurred at an upstream station and a downstream station as well as at two stations on tributaries to Quail Lake. Baseline sampling concludes:

- Chloride concentrations in tributaries to Quail Lake at times exceeded water quality objectives (WQOs) of 0.1 mg/L, indicating natural sources of Chloride in the upper watershed where no ski area management occurs;

- Total Nitrogen highest concentrations measured up to 1.3 mg/L near Quail Lake in areas where fish and aquatic life are abundant;

- Total Phosphorus highest concentrations measured up to 0.77 mg/L in tributaries to Quail Lake, concentrations are considered to derive from natural sources and not at levels to cause impairment to the stream or lake;

- Sulfate concentrations in five receiving water samples exceeded 1.0 mg/L with the highest levels (7.3 and 11 mg/L) measured at the sampling station downstream of the Noonchester Mine;

- 50 percent of the Dissolved Iron concentrations exceeded 0.15 mg/L with the highest reading taken at the Quality Lake outfall (3.2 mg/L); and

- Total Dissolved Solids and Turbidity measurements were consistently low.

Channel Condition. The channel gradient is moderately high, 4.5 percent, between RM 0.0 to RM 0.2 (see Figure 15-2). The majority of Quail Lake Creek has a steeper gradient of approximately nine percent between RM 0.2 and RM 0.9, except for the very steep segment between RM 0.9 and RM 0.97, which has slope of 28 percent.

Overall, most of the stream banks, 88 percent, along Quail Lake Creek are rated Stable (Entrix) and in Good condition (Kleinfelder 2007). The lower reach of this stream (RM 0.0 – RM 0.32) has banks considered Vulnerable (12 percent of total channel length) based on episodic soil movement as a result of a flood or a shift in the course of the stream. The channel received no ratings of Unstable or Poor. Overall, the stream banks had very good coverage of both vegetation and large material and no major erosional features were present. HMR does not operate ski trails prone to disturbance in close proximity to this stream (Kleinfelder 2007).

Restoration. No restoration is reported for the Quail Lake Creek watershed.

Cumulative Watershed Effects. The Project area comprises 26 percent of the Quail Lake Creek watershed. As presented in Table 15-2, the Total Watershed TOC for the Quail Lake Creek watershed is calculated at 462 T/yr for total sediment. The baseline (existing conditions) total sediment for the total Quail Lake Creek watershed is 409 T/yr, which is 11 percent less than the Total Watershed TOC.

The Project area TOC for the Quail Lake Creek watershed within the Project area is calculated at 147 T/Yr. The baseline (existing conditions) sediment yield from the Project area is 152 T/Yr, which exceeds the Project Area TOC by 5 T/yr or three percent.

Intervening Zone 7000 (North Base Area and Portion of South Base Area)

Hydrology, Flooding and Seiches. The Intervening Zone 7000 and is approximately 1,740 acres, of which 116 acres or seven percent is contained within the Project area. The North Base area and a portion of the South Base area are located in Intervening Zone 7000.

The average slope for this area is 26 percent and the general aspect is northeast. The parent material underlying the area is approximately two-thirds volcanic and one-third granitic. The land uses in the area include developed areas, roads and vegetated ski trails (IERS 2010).

The *Geologic Hazards and Preliminary Geotechnical Evaluation* (Kleinfelder 2007) reports that the existing development in the North and South Base areas could be inundated by waves with maximum amplitudes of approximately six meters from a lake seiche resulting from a magnitude 7.2 earthquake modeled on the West Tahoe Fault.

Figure 8-2, Stream Environment Zones and 100-Year Floodplain Boundaries (see Chapter 8, Biological Resources), illustrates that no FEMA designated floodplains are mapped within the Project area in Intervening Zone 7000. There is one FEMA Zone A (100 year floodplain) identified in the South Base area, but note that this floodplain is within the Homewood Creek watershed and not Intervening Zone 7000. One SEZ is delineated within Intervening Zone 7000. SEZ resource analysis is referred to Chapter 8, Biological Resources.

Surface Water Quality. Kleinfelder conducted baseline surface water sampling in the North and South Base parking lots in October 2006, March 2007, May 2007 and September 2007. Total Dissolved Solids concentrations exceeded the WQO (60 mg/L) at the culvert near the South Lodge and at the South Parking Lot with concentrations between 100 and 130 mg/L. These concentrations are concluded to be higher than background levels due to deicing of the parking lots and interaction of surface water in these locations with anthropogenic activities (Kleinfelder 2007).

Compliance monitoring at sampling station P-1 (North Parking Lot) measures overflow from the stormwater system installed in 2006. Overflow occurred once on May 2, 2007. Total Phosphorus, Total Nitrogen, and Turbidity were below discharge to land treatment limits. Total Suspended Solids measured 59 mg/L.

Compliance monitoring at sampling station P-2 (South Parking Lot) measures overflow from the stormwater system installed in 2006. Overflow occurred April 14, 2008, April 21, 2008, April 28, 2008, May 5, 2008, May 12, 2008, April 22, 2009 and May 4, 2009. Based on these samples, the discharge to surface water limits for Homewood Creek are typically exceeded for Total Phosphorus and for Total Nitrogen. Total Suspended Solids measured below 10 mg/L and Turbidity measured below 9.8 ntu.

Channel Condition. There are no perennial stream channels located in Intervening Zone 7000 within the Project area. A portion of the stormwater runoff from compacted soils and impervious surfaces is captured in stormwater treatment systems that were installed in 2006 in the North and South Base areas.

Restoration. The Lower Lombard site is 3,500 square feet and located at an elevation of 6,370 feet msl. The site is an old access road that connects the Lombard Street ski trail with maintenance building AA. Pre-treatment, Lower Lombard had large rills running the entire length of the slope, which were a result of erosion. The main project goal was to reduce sediment movement and surface erosion by incorporating organic matter and applying fertilizer, native seed, and mulch to initiate a successional process that leads to diverse, mid-seral, and self-sustaining native grass and shrub plant communities. The amendment types were varied between two treatment areas to determine whether there is an improvement in soil nutrient status.

At Lower Lombard, the average sediment yield after treatment was 24 lbs/acre/in, which is nearly a 16 times reduction when compared to the pre-treatment sediment yield. The soil at Lower Lombard infiltrated approximately 85 percent of the water applied. This data suggests that restoration treatments applied at Lower Lombard were successful in controlling sediment at the source. Although rainfall simulation results were promising at Lower Lombard, the continued foot traffic disturbance has already most likely reduced the erosion control capacity and will continue to affect the treatment until abated (IERS 2008).

Cumulative Watershed Effects. The Project area comprises seven percent of the Intervening Zone 7000. As presented in Table 15-2, the Total Watershed TOC for the Intervening Zone 7000 is calculated at 355 T/yr for total sediment. The baseline (existing conditions) total sediment for the total Quail Lake Creek watershed is 409 T/yr, which is 11 percent above the Total Watershed TOC.

The Project area TOC for Intervening Zone 7000 within the Project area is calculated at 55 T/Yr. The baseline (existing conditions) sediment yield from the Project area is 62 T/Yr, which exceeds the Project Area TOC by 7 T/yr or nine percent.

The area described as Intervening Zone 7000 in land use maps, runs from Blackwood Canyon in the north to Tahoma (Tahoe Cedars) in the south and consists of a number of areas that are considered between watersheds. These discrete areas were apparently grouped together for simplicity; however that grouping makes modeling somewhat confusing in that the interests in those areas are contiguous to and influenced by the Project area. The existing conditions analysis shows a sediment yield that is slightly over the Total Watershed TOC because: 1) all BMPs have not been implemented on private parcels and 2) there is currently no known available, official TRPA coverage data, either as a whole or for areas contiguous to the Project area and the LSPC analysis, which used GIS data from aerial images, suggests that Intervening Zone 7000 is already over its allowable coverage. This excess land coverage is likely the result of 'grandfathered' coverage in the near shore areas where a great deal of pavement and coverage was installed in commercial and even residential areas that are outside of the Project area (IERS 2010).

15.1.5 Existing Stormwater Treatment Systems

Stormwater treatment systems and water quality protection BMPs were permitted by TRPA and Lahontan and installed by HMR in September 2006 to establish interim compliance and reporting with Lahontan Board Order No. 6-95-86A2.

North Base Area

The North Base Parking Lot BMP Drainage Improvement Project was implemented in the fall of 2006 on Placer County APN 97-130-05. Sheet C-5 of the plan sheets present the sizing of the system capacity to contain the 20-yr, 1hr storm volume (Placer County APN97-130-05). The system captures and infiltrates runoff from the parking lot with 30-inch corrugated metal pipe SD-82 stormchamber units and a Vortclarex VCL100 by Contech with a trench drain catch basin. Overflows from the system are routed to the Caltrans and Placer County stormwater treatment systems along State Route (SR) 89.

South Base Area

The South Base Parking Lot BMP Drainage Improvement Project was implemented on Placer County APN 97-050-05 in the fall of 2006. Because TRPA and Lahontan permitted the system,

the five infiltration basins are assumed to be sized to capture and treat the 20-year, 1-hour storm volume. The basin capacities and treatment volume as listed on the project plan sets are provided below:

- Basin 1 – Sized at 9,050 square feet with a treatment capacity of 754 cubic feet;
- Basin 2 – Sized at 32,450 square feet with a treatment volume of 2,704 cubic feet;
- Basin 3 – Sized at 8,395 square feet with a treatment volume of 700 cubic feet;
- Basin 4 – Sized at 13,227 square feet with a treatment volume of 1,102 cubic feet; and
- Basin 5 – Sized at 9,273 square feet with a treatment volume of 773 cubic feet.

The maintenance building was retrofitted with BMPs that include Rainstore™ units and trench drains. An oil and water separation system was installed in the parking lot, along with curb and gutter, drainage swales, rock inlet and outlet protections. Overflow from the system discharges to Homewood Creek.

15.1.6 Load Simulation Program in C++ (LSPC) – Existing Annual Loading at North, South, and Mid-Mountain Area and Tahoe Ski Bowl Way

The document *HMR Water Quality – Quantification of Design Benefits* (Grismer 2010) details the LSPC stormwater management analysis (Grismer 2010), which relies on three tracks of information associated in part with the TMDL-related studies of 2007 and 2008. The detailed LSPC stormwater management analysis for the Project area is provided in Appendix Z, summarized below for the existing conditions, and discussed under Impact HYDRO-1 for the Proposed Project (Alternative 1) and Alternatives 2, 3, 4, 5 and 6.

Total sediment loads for existing conditions of the North Base, South Base, and Mid-Mountain areas and Tahoe Ski Bowl Way were estimated by combining:

1) Sediment yield factors (sediment loading factors per unit runoff) used in the Homewood Creek LSPC TMDL modeling to represent urban areas;

2) Sediment yield results from upslope areas developed from rainfall simulations within the Project area; and

3) Runoff, sediment, nutrient and flow measurements completed by Desert Research Institute (DRI) researchers (Heyveart et al. 2008) in the East Stateline Point watershed to represent comparable loading scenarios.

The second part of the analysis developed a routing/water-balance model of stormwater runoff from the Project area utilizing rainfall records used in previous TMDL analysis from water years (WYs) 1993-2006. WYs 1994 and 2003 are identified as "dry" WYs with less than average precipitation and WYs 1995 and 2006 are identified as "wet" WYs with above average precipitation. Additionally, the storm distributions within these water years were accessed to determine the effects on the amount of sediment loading generated. Table 15-3 presents the modeled annual stormwater volumes estimated to exit the redevelopment areas under the existing conditions of the Project area. This volume is defined as the portion not infiltrated or otherwise captured. Total sediment leaving the Project area can then be related to these estimated annual stormwater volumes through basic regression relationships and computation of

sediment loads estimated. Stormwater runoff volumes for the existing conditions of the Project area are estimated to range from 154,514 cubic feet/year for representative dry water years to 1,978,010 cubic feet for representative wet water years.

Table 15-3

Estimated Annual Stormwater Volumes (Cubic Feet) Leaving the Project Area – Existing Conditions

	1994 WY	1995 WY	2003 WY	2006 WY
North Base Area	86,621	1,063,148	431,469	1,085,104
South Base Area	12,311	431,985	151,781	419,998
Mid-Mountain Area	9,094	121,508	46,399	116,377
Tahoe Ski Bowl Way	44,495	359,373	153,662	336,298
TOTALS	154,514 ft^3	1,978,010 ft^3	785,314 ft^3	1,959,783 ft^3

Source: Dr. Mark Grismer, PE – HMR Water Quality – Quantification of Design Benefits (full document is in Appendix Z)

15.1.7 Existing Snow Storage

The North and South Base areas and access roads require regular snow removal during ski resort operations to allow for parking and mountain operations. Plowing of these areas typically begin upon accumulation of six or more inches of snow (Nichols 2007). A number of locations on or adjacent to the base areas are used as snow storage areas. Snow is stockpiled adjacent to the parking facilities and snowmelt drains to the stormwater treatment systems that were completed in the fall of 2006. To the maximum extent practicable, snow storage is located a safe distance from SEZs. Snow storage for the base areas are summarized below. The detailed plan is referenced to the *Homewood Mountain Resort Snow Removal Plan* – January 2007 (Nichols 2007).

North Base Area

The North Base area is grouped into three snow removal and storage areas. Each area has a primary and secondary snow storage area. Primary snow storage areas include an existing access road that runs from east to west at the northwest corner of the parking facility and the existing access road adjacent to the Madden Triple chair. Secondary snow storage areas are directly adjacent to the parking facility north of the main lodge, the parking facility south and west of the main lodge and the strip of land around the west, north and east perimeter of the parking facility. Snowmelt drains towards stormwater treatment systems installed in 2006 in the parking lot near the corner of SR 89 and Sacramento Street.

There is an SEZ at the south end of the parking facility. In this area, snow removal operations are minimized and the following precautions are taken:

- Ensure snow removal equipment stays on improved surfaces;
- Blade levels are set to a minimum of 2 inches above the surface of the parking facility to ensure no gravel or base material are transported into or out of the SEZ and that underlying soils are not disturbed;
- Vegetation within the SEZ is protected from disturbance or damage by snow removal equipment and operations; and
- No deicing or traction abrasive material is deployed within the SEZ boundary.

Snow is stored in the SEZ only during large snow events (greater than 12 inches) where clean snow can be harvested and safely stockpiled in the SEZ, but never the stream channel. Clean snow is defined as snow more than six inches above the surface layer of the parking facility. At all times, dirty snow (snow within six inches of the surface layer of the parking facility and any other snow that contains sediment, deicing material, abrasives or other debris, is stored outside the SEZ boundary and setback.

South Base Area

The South Base area consists of three snow storage areas. The primary snow storage areas include the access road to the north of the current lodge, the access road adjacent to the lodge, and the access road located at the south end of the parking facility. The secondary snow storage areas include the north edge of the parking facility, the east and north ends of the parking facility and the relatively flat section of the mountain at the bottom of the ski trail. Snow storage areas are sited to drain to the stormwater treatment system installed in 2006 and located east of the snow storage areas along the south side of El Capitan Way.

HMR currently operates outside of a proposed 80-foot setback (40 feet on either side of the centerline of Homewood Creek). Snow removal operations occurring within the 80-foot setback follow the measures described above for the North Base SEZ.

15.1.8 Existing Snowmaking System

Current snowmaking operations within the Project area use airless, tower mounted fan guns. The system has the capability to cover 23.8 acres and currently uses up to 14.2 million gallons of water per year or 43.6 acre-feet/year (Snowmakers 2010). The existing pumping capacity is 1300 gallons per minute. Currently 18.9 acres of ski trails have snowmaking on the north side of the Project area and 4.9 acres of ski trails have snowmaking on the south side of the Project area (Snowmakers Inc. 2010).

HMR operates one well in the North Base area for snowmaking and other uses that support ski area operations. The North Base well is not located near active stream channels. Additional water supplies currently used for snowmaking are domestic water available from the TCPUD and the Madden Creek Water Company (MCWC) between 6 p.m. to 6 a.m. HMR's North Base well has not operated since the 2006-2007 winter ski season, and snowmaking operations are currently limited to domestic water provided by the TCPUD and MCWC. Existing pumping at the project area includes: 500 gallons per minute at the North Base area; 500 gallons per minute at the Water Cooling structure; and 300 gallons per minute at the South Base area (Snowmakers Inc. 2010).

Snow enhancement chemicals or biological agents are not used in the existing snowmaking systems (personal communications; David Tirman, November 23, 2009).

15.1.9 Groundwater

The Project area involves the Tahoe Valley Groundwater Basin (TVGB). The TVGB is located within the larger structural feature referred to as the Lake Tahoe Basin. The TVGB is bounded on the east by the western shore of the Lake and on the west by the Sierra Nevada. The approximate north-south boundary is one-half mile west of Dollar Point and two miles west of Meeks Bay (Nichols 2009). Within this sub-basin elevations range from 6,225 feet msl at lake level to above 6,400 feet msl in the west (California Department of Water Resources 2003).

Groundwater recharge in the Project area is primarily from infiltration of precipitation into faults and fractures in bedrock, into soils and decomposed granite that overlies much of the bedrock and into unconsolidated basin-fill deposits (Nichols 2010). Except where the land surface is impermeable or where the groundwater table coincides with land surface, groundwater is recharged over the extent of the flow path (Thodal 1997).

Kleinfelder completed groundwater evaluations in 2006, 2007 and 2008 for the North and South Base areas. Existing conditions are summarized below as reported to TRPA in the *Revised Soils Hydrologic Scoping and Final Report* (Kleinfelder 2010). Based on the results of precipitation evaluations using data from the WETS station in Tahoe City (6,235 ft msl) and following the methodology outlined in the *Technical Standard for Water-Table Monitoring of Potential Wetland Sites and the Natural Resources Conservation Services (NRCS) Engineering Field Handbook* (1997), total precipitation preceding and during the 2007 and 2008 monitoring periods was within normal range. The long-term annual groundwater discharge within the Project area has not been calculated; although, historic groundwater levels are well documented. A portion of the discharge occurs as groundwater pumping and another portion occurs as groundwater discharge to perennial and seasonal stream baseflows.

The existing groundwater quality within the Project area is not well characterized. Given that groundwater is used for domestic uses at the North and South Base areas, groundwater quality is assumed to be good. Contamination from fuel tanks was detected during analysis for the Phase I Environmental Site Assessment (Robinson Engineering 2005). A low concentration of MTBE was measured in the groundwater in the North Base area. The assessment concluded that natural attenuation has reduced the MTBE concentration to levels near the California WQO and that additional natural attenuation will result in the groundwater reaching the WQO.

North Base Area

The North Base paved parking lots contain seasonal high groundwater at depths ranging from 5.44 to 10.45 feet below ground surface (bgs) in an interlayered colluvial and lake sediment depositional environment. The gravel parking lot south of the North Base parking lot contains seasonal high groundwater at depths ranging from 0.89 to 5.95 feet bgs in a lake depositional environment. The slopes above the North Base and between the North and South Base contain groundwater at depths ranging from 9 to 18 feet bgs.

Groundwater flow in the North Base area generally follows topography and is to the north and east towards Lake Tahoe. Monitoring data are found in Appendix Y.

South Base Area

Shallow groundwater measured at the north end of Tahoe Ski Bowl Way and above the north portion of the South Base area ranged between 1 and 4 feet bgs. The southern portion of the slopes above the South Base area contained groundwater at depths of approximately 9 feet bgs.

During Spring 2007 or 2008 evaluations, the borings drilled in the South Base parking lots did not encounter groundwater to drilling depths of 18 feet bgs.

Mottled soils indicative of seasonal groundwater were noted at depths of four to five feet bgs in the parking lot area of the South Base. These wells, however, did not contain measurable groundwater during Spring 2007 and 2008 to depths of approximately 19 feet bgs; however, monitoring wells nearby contained groundwater at depths of approximately 15 to 17 feet between 1997 through 2001. Based on these data, the seasonal high groundwater levels are at depths of approximately 15 to 19 feet bgs in this area.

Groundwater flow in the South Base area generally follows the topography and is to the east towards Lake Tahoe. Monitoring data are found in Appendix Y.

Mid-Mountain Area

The geotechnical investigation (Holdrege and Kull 2010b) encountered no groundwater during ten test pit excavations at the Mid-Mountain Lodge and water tank locations. Groundwater depths are expected to be substantial based on topography (e.g. site location is along a ridge) and soils (e.g. indicative of a colluvial depositional environment).

15.1.10 Water Balance

The hydrologic balance within the Project area, which compares the quantity of water deposited and withdrawn from a hydrologic system, relates surface and groundwater within a watershed. Water deposited includes snow, precipitation and water piped or otherwise conveyed into snowmaking and other systems from sources outside the Project area. Water withdrawn includes surface water diversions, groundwater pumping, streamflow discharges, deep percolation, evaporation, sublimation, and transpiration.

The geology of the Project area is discussed in Chapter 14, Soils, Geology and Seismicity. The mapping of fractures has not been conducted to date and exact fracture planes are unknown. Generalized studies for the Sierra Nevada suggest that fracture planes run generally parallel with the land surface and accompany the vertical or near-vertical fracturing (Bateman and Wahrhaftig 1966; Bateman 1992).

HMR operates one well in the North Base area for snowmaking and other uses that support ski area operations. The TCPUD and MCWC supply water to existing snowmaking systems from their existing municipal system. Existing snowmaking systems apply up to 14.2 million gallons of water in the form of snow across the Project area.

The TCPUD-owned McKinney No. 1 well is located approximately 2,500 feet south of the South Base area on TCPUD property. The well is an artesian flowing well with potential discharge rates of over 1000 gallons per minute. The well has a 60-foot cement seal and is completed in glacial moraine deposits to a depth of 800 feet. As an artesian well with the measured water level about 20 feet above ground surface, it is not connected to Quail Lake Creek, and will not affect the flow in Quail Creek during pumping as the source of water is much deeper than the creek. Quail Creek is located approximately 300 feet south of the well (personal communication with Kleinfelder on November 25, 2009).

The North Base well and water cooling structure are not located near active stream channels. The North Base well is located about 1,800 feet north of Homewood Creek in the existing gravel parking lot. This well has a 60-foot cement seal and is completed in lake deposits. The static level in this well is approximately five to 13 feet bgs. The source of groundwater for this well is annual snowmelt from the mountain and does not appear to be hydrologically connected to the stream.

Existing pumping at the Project area includes: 500 gallons per minute at the North Base area; 500 gallons per minute at the Water Cooling structure; and 300 gallons per minute at the South Base area (Snowmakers Inc. 2010).

15.1.11 Water Rights and Water Supply

In California, water rights are required for diversion of surface water but not for use of groundwater. Water rights in California are subject to a constitutional and statutory requirement of both beneficial use and reasonable method of use. Riparian rights are water rights associated with land that is bordered or crossed by a watercourse. An appropriative water right is a right to divert surface water either for direct use on property that is not riparian to the surface water source or to storage for later use on non-riparian property. Priority of appropriative rights is based on the adage of "first in time, first in right".

HMR contracted with Kleinfelder, Inc. in 2007 to conduct a thorough legal search of water rights associated with the Project area going back to the very beginning of such record keeping in California. This search and a query of the California State Water Resources Control Board's (State Board) water rights database for points of diversion (POD) located in the Project area identified six points of diversion were found and diversion, storage and annual use data, as described below.

- A020487 – This POD is located on Madden Creek at the downstream property line near Trout Street Bridge. No additional information is provided in the State Board database.

- A018934 – This POD is located at the Lake Louise outfall to Madden Creek. The water could be diverted for domestic purposes within the Project area. The maximum direct diversion is 0.24 cfs or 108 gallons per minute, the maximum storage is 3 acre-feet/yr, and maximum annual use is reported as 0 acre-feet/yr.

- A011449 – This POD is located in the upper portion of Ellis (Homewood) Creek. The water is diverted for both mining and domestic uses by the LTBMU. The maximum direct diversion is 0.34 cfs or 153 gallons per minute, the maximum storage is 130.5 acre-feet/yr and the maximum annual use is 0 acre-feet/yr.

- A027988 01– This POD is located near the Quail Lake outfall to Quail Lake Creek. Quail Lake Water Company was the original permit holder until acquisition of the company by TCPUD and the water is diverted for municipal use.

- A027988 02 – This POD is located approximately mid-stream on Ellis (Homewood) Creek. Quail Lake Water Company was the original permit holder until acquisition of the company by TCPUD and the water is diverted for municipal use. The combined maximum direct diversion from A027988-01 and -02 is 0.68 cfs or 306 gallons per minute. The maximum storage is 88 acre-feet/yr and the maximum annual use is 288 acre-feet/yr.

- S006462 – This POD is located on the lakeshore between Madden Creek and Ellis (Homewood Creek) Creek. HMR is the permit holder and the water could be diverted from Lake Tahoe.

Currently, there are no reservoirs or water tanks that directly serve operations in the Project area. HMR does not currently divert water from Madden Creek nor are there plans to do so. Accordingly, there is no storage basin or other storage facility associated with such a diversion. There are also no diversions from Quail Creek, Quail Lake, or Homewood Creek or plans for such diversions (personal communications David Tirman, email received September 17, 2010).

The TCPUD provides domestic and irrigation waters to the South Base area, APN 097-060-022 and Mid-Mountain operations from the Crystal Way Well (Designation North Lahontan USGS Groundwater Basin 6-5.02). This portion of the Project area is located in the McKinney/Quail Sub-District. California's Water Plan Update, Bulletin 160-98 states that no overdrafts are expected in the North Lahontan Hydrologic Study Area, even in drought years, by 2020 (TCPUD 2006). The projected annual demand is estimated at 385 acre-feet/year or 0.84 acre-feet/yr per connection. (Nichols 2010).

Madden Creek Water Company supplies the North Base portion of the Project area. No data is available from Madden Creek Water Company, but the current demand of 160 connections is being met and it can be assumed that the water supply is sufficient to produce 134 acre-feet/year, which is based on TCPUD's projected annual demand per connection of 0.84 acre-feet/year (Nichols 2010).

The Homewood Mountain Resort Water Supply Assessment (Nichols 2010) prepared for the Project area does not address the use of public or municipal water supply current used for snowmaking.

15.2 REGULATORY SETTING

Key regulatory agencies with respect to hydrology, water rights and supply, surface water quality and groundwater in the Project area are listed below.

- TRPA is designated by the United States Environmental Protection Agency (USEPA), California and Nevada as the water quality planning agency in the region;
- California Department of Water Resources;
- State Water Resources Control Board (State Board);
- California Regional Water Quality Control Board – Lahontan Region;
- Placer County; and
- Placer County Flood Control and Water Conservation District.

15.2.1 Tahoe Regional Planning Agency

The TRPA is the designated area-wide water quality planning agency under Section 208 of the Clean Water Act (CWA).

Surface Water Quality

In 1988 the States of California and Nevada and the USEPA adopted the TRPA Water Quality Management Plan for the Lake Tahoe Basin (TRPA 1988), commonly referred to as the 208 Plan. The 208 Plan identifies water quality problems, proposes solutions or mitigation measures, identifies those entities responsible for implementing solutions, and determines agencies or jurisdictions responsible for enforcement. The TRPA Environmental Thresholds (Resolution 82-11 adopted in 1982) and State of California WQOs establish over 30 separate water quality standards for Lake Tahoe and its tributaries. The standards address algal growth potential, plankton count, clarity, turbidity, phytoplankton productivity, phytoplankton biomass, zooplankton biomass, periphyton biomass, dissolved inorganic nitrogen (DIN) loading, nutrient loading in general, tributary water quality, surface runoff quality, and the quality of other lakes in the Lake Tahoe Basin.

TRPA water quality thresholds are as follows:

- WQ1—Decrease sediment load as required to attain turbidity values not to exceed three NTU in littoral Lake Tahoe. In addition, turbidity shall not exceed one NTU in shallow waters of Lake Tahoe not directly influenced by stream discharges.

- WQ2—Average Secchi depth, December–March, shall not be less than 33.4 meters.

- WQ3—Annual mean phytoplankton primary productivity shall not exceed 52 grams of carbon content per meter squared per year (gC/m2/yr). California: algal productivity shall not be increased beyond levels recorded in 1967–1971, based on a statistical comparison of seasonal and annual mean values.

- WQ4—Attain a 90th percentile value for suspended sediment of 60mg/L, total nitrogen range of 0.15 to 0.23 mg/L, total phosphorus range of 0.005 to 0.030 mg/L, and total iron range of 0.01 to 0.07 mg/L (annual average).

- WQ5—Dissolved inorganic nitrogen, 0.5 mg/L; dissolved phosphorus, 0.1 mg/L; dissolved iron, 0.5 mg/L; suspended sediment, 250 mg/L, grease and oil 2.0 mg/L, total phosphate as P, 0.1 mg/L, and turbidity, 20 NTU.

- WQ6—Surface water infiltration into the groundwater shall comply with the Uniform Regional Run Off guidelines. For total nitrogen, 5 mg/L; total phosphorus, 1 mg/L; total iron, four mg/L; turbidity, 200 NTU; and grease and oil, 40 mg/L.

- WQ7—Attain existing water quality standards.

Regional water quality standards are outlined in the TRPA Code of Ordinances, Chapter 81. The chapter sets forth standards for the discharge of runoff water from parcels, and regulates the discharge of domestic, municipal, or industrial wastewaters. The standards and prohibitions apply to discharges to both surface and groundwaters. Chapter 82 addresses water quality mitigation for projects and activities that result in the creation of additional impervious coverage.

Pollutant concentrations in surface runoff shall not exceed the values as stated in Table 15-4 at the 90th percentile. Surface runoff that is directed to infiltrate into the soil shall not exceed the discharges to groundwater standards. Stormwater running on to the Project area or stormwater generated on the Project area must be captured, conveyed and treated to these surface and ground water standards or spread and infiltrated on the Project area to receiving soils and spreading areas with suitable assimilative capacities.

TRPA is presently updating the Regional Plan, a draft of which is expected for release for public review in 2011. Integration of research, conducted as part of the water quality restoration plan being undertaken by Lahontan and NDEP, is a critical element of the Regional Plan Update. The research for the TMDL analysis for Lake Tahoe shows that emphasis on load reduction strategies for fine sediments entering the lake from urban areas is necessary. Another key component to the Regional Plan Update is the incorporation of the TMDL requirements and proposed implementation strategies and control measures contained in the TMDL technical analysis. The TMDL recommended implementation strategies or pollution reduction opportunities call for the deployment of new and more advanced water treatment technologies including: area-wide stormwater treatment systems; vacuum sweeping of roads; wetland and passive filtration basins; placing media filters in stormwater vaults; improving BMP compliance; and intensifying maintenance of stormwater infrastructure. With the Regional Plan Update, TRPA may begin to focus on load reduction rather than site design standards and infiltration only.

Table 15-4

TRPA Surface Water Discharge Limits

Parameter	Unit	Surface Runoff Limits	
		Surface Discharge	Discharges to Groundwater
Turbidity	NTU	--	200
Suspended Sediment Concentration*	mg/L	250	--
Oil and Grease	mg/L	2	40
Dissolved Inorganic Nitrogen (NO2+NO3+NH3)	mg/L	0.5	--
Total Nitrogen	mg/L	--	5
Dissolved Phosphorus	mg/L	0.1	--
Total Phosphorus	mg/L	--	1
Dissolved Iron	mg/L	0.5	--
Total Iron	mg/L	--	4

Source: TRPA Code or Ordinances Chapter 81

Note: *Suspended Sediment Concentration (SSC) is the TRPA discharge standard listed in Chapter 81. Many stormwater monitoring programs measure Total Suspended Solids/Sediment or TSS, an arguably cheaper and more appropriate parameter for stormwater runoff measurement.

Grading Standards

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

Stream Environment Zones

TRPA defines a SEZ as a biological community that derives its characteristics from the presence of surface water or a seasonal high groundwater table. SEZs exhibit the ability to rapidly incorporate nutrients into the usually dense vegetation and moist to saturated soils. SEZs are riparian areas identified by the presence of at least one key indicator or three secondary indicators (TRPA Code Section 37.3.B). No additional land coverage or other permanent land disturbance is permitted in SEZs unless specific findings can be made to permit the exception (reference relevant Chap 20 code sections).

There are mapped and verified SEZs in the Project area. Potential impacts to SEZs are addressed in Chapter 8, Biological Resources.

Groundwater Regulations

According to the TRPA Code, Chapter 64, groundwater impacts are considered significant if implementation of the project results in the interception or interference of groundwater by:

- Altering the direction of groundwater;
- Altering the rate of flow of groundwater;
- Intercepting groundwater;
- Adding or withdrawing groundwater; or
- Raising or lowering the water table.

TRPA Code, Chapter 64, Section 64.7.B prohibits excavations in excess of five feet in depth or where there exists a reasonable possibility of interference of interception of a water table unless the following findings can be made:

"(1) A soils/hydrologic report prepared by a qualified professional, whose proposed content and methodology has been reviewed and approved in advance by TRPA, demonstrates that no interference or interception of groundwater will occur as a result of the excavation; and

(2) The excavation is designed such that no damage occurs to mature trees, except where tree removal is allowed pursuant to Subsection 65.2.E, including root systems, and hydrologic conditions of the soil. To ensure the protection of vegetation necessary for screening, a special vegetation protection report shall be prepared by a qualified professional identifying measures necessary to ensure damage will not occur as a result of the excavation; and

(3) Excavated material is disposed of pursuant to Section 64.5 and the Project area's natural topography is maintained pursuant to Subparagraph 30.5.A(1); or if groundwater interception or interference will occur as described in the soils/hydrologic report, the excavation can be made as an exception pursuant to Subparagraph 64.7.A(2) and measures are included in the project to maintain groundwater flows to avoid adverse impacts to SEZ vegetation, if any would be affected, and to prevent any groundwater or subsurface flow from leaving the Project area as surface flow."

HMR submitted the *Revised Soils Hydrologic Scoping and Final Report* (Kleinfelder 2010) to TRPA on October 7, 2010. The report includes a brief summary of the geologic, soil, and hydrologic conditions expected to be encountered within the construction areas at the North Base, South Base and Mid-Mountain areas. Qualifications of the personnel conducting the soil/hydrologic investigation are included in the report. The report specifies the dates and type of field exploration (whether conducted by backhoe excavation test pits or drill boring) and the depths to which the samples were taken. The boring logs reveal the vertical sequence of soil textures, percent rock fragment, soil colors, and depths associated with the contact boundaries of these features. The report proposes measures to ensure that SEZ vegetation will not be adversely impacted and that groundwater or subsurface flows will not exit the Project area as surface flow.

Public Water Supply

TRPA Code of Ordinance Chapter 83 sets forth regulations pertaining to recognition of source water, prevention of contamination to source water and protection of public health relating to drinking water. Source water is defined as water drawn to supply drinking water from an aquifer, or a well or from a surface water body by an intake, regardless of whether such water is treated before distribution.

Source water 09719101/11, operated by TCPUD and source water 08502048W11, operated by Agate Bay Water Company are located in the vicinity of the Project area. However, TRPA Source Water Assessment maps indicate that no source waters are located within 600 feet of the Project area.

The *HMR Water Supply Assessment* (Nichols 2010) was prepared for the Project area, which is attached in Appendix AA. Public water supply is further analyzed in Chapter 16, Public Services and Utilities.

Community Enhancement Program

The focus of the TRPA Community Enhancement Program (CEP) is to implement projects that demonstrate substantial environmental, as well as, social and economic benefits through mixed-use development projects on existing disturbed and/or underutilized sites. The CEP is based on the concept of net gain to achieve improvements that benefit the built and natural environments (TRPA 2007). One of the goals of the CEP is to provide area-wide (not parcel by parcel) urban water quality improvements that leverage private investment for environmental gain, linking existing or future systems, and providing long-term monitoring and maintenance.

The February 5, 2008 *Memorandum for Conditional Reservation of Allocations – Homewood Mountain Resort* (Governing Board Resolution) outlines the following requirements that relate to EIP projects for CEP participation:

> *For commodities to be reserved and projects to be approved, CEP projects must commit to substantial environmental improvements, which must include specifically identified EIP projects. The Project proposes a number of environmental benefits/improvements. TRPA requires written commitments regarding the funding, construction, and overall maintenance/monitoring for the specific EIP proposals. Some EIP components that were discussed in the pre- application or in verbal conversation are listed below:*
>
> *a. TRPA supports storm water from SR 89 and the Project area being diverted to properly sized treatment facilities that are constructed and maintained by Homewood Mountain Resort. Provide details and commitments regarding the Homewood water quality improvements and how they will be integrated with the Caltrans water quality improvements and the Placer County Homewood Erosion Control Project. Specifically, evaluate and specify the quantifiable reduction of sediment loads entering Lake Tahoe in the Homewood area garnered through the construction of these targeted water quality facilities.*
>
> *b. Provide design and written commitments for the implementation of the bike trail improvements referenced in the CEP application through the Homewood Project area.*
>
> *c. Provide details and commitments regarding the under grounding of the utilities that cross the Homewood site.*
>
> *d. Provide details and commitments regarding the day-lighting of the creek under the ski-bowl (new residential area) parking lot. Also, explore possibilities to restore creek/SEZ along proposed cat road between base areas.*
>
> *e. Additionally, consider participation in the SR 89 re-alignment EIP project # 855 at Tahoe City.*

15.2.2 Federal Emergency Management Agency (FEMA)

FEMA is part of the Department of Homeland Security and is tasked with responding to, planning for, recovering from and mitigating against disasters. Formed in 1979 to merge many of the separate disaster-related responsibilities of the federal government into one agency, FEMA is responsible for coordinating the federal response to floods, earthquakes, hurricanes, and other natural or man-made disasters and providing disaster assistance to states, communities and individuals. The Federal Insurance and Mitigation Administration (FIMA) within FEMA is responsible for administering the National Flood Insurance Program (NFIP) and administering programs that provide assistance for mitigating future damages from natural hazards. Established in 1968 with the passage of the National Flood Insurance Act, the NFIP is a federal program enabling property owners in participating communities to purchase insurance as a protection against flood losses in exchange for state and community floodplain management regulations that reduce future flood damages. Participation in the NFIP is based on an agreement between communities and the federal government. If a community adopts and enforces a floodplain management ordinance to reduce future flood risk to new construction in floodplains, the federal government will make flood insurance available within the community as a financial protection against flood losses. This insurance is designed to provide an insurance alternative to disaster assistance to reduce the escalating costs of repairing damage to buildings and their contents caused by floods.

Placer County participates in the National Flood Insurance Program (NFIP) by adopting and enforcing floodplain management ordinances to reduce future flood damage. Placer County Ordinance Article 15.52 - Flood Damage Prevention Regulations addresses floodplain management.

15.2.3 State of California

The primary responsibility for the protection of surface water and groundwater quality in California rests with the State Water Resources Control Board (State Board) and nine Regional Water Quality Control Boards (RWQCBs).

State Water Resources Control Board (State Board)

The State Board administers State and federal regulations that pertain to water quality including Sections 401 and 402 of the federal Clean Water Act.

National Pollutant Discharge Elimination System (NPDES)– General Construction

The State Board regulates construction activities resulting in the disturbance of one or more acres of soils through the California General Permit for Storm Water Discharges Associated with Federal Clean Water Act Section 402 Construction Activities and Land Disturbance Activities (Order No. 2009-009DWQ). This permit does not cover disturbance to lands classified as SEZ and does not cover construction activities within the Lake Tahoe Hydrologic Unit. The State Board defers to Lahontan Board Order No. R6T-2005-007 for construction activities within the Lake Tahoe Hydrologic Unit.

Truckee River Operating Agreement (TROA)

The TROA governs diversions of surface water from the Truckee River Basin and the Lake Tahoe Basin. The States of Nevada and California executed the TROA in September 2008 but have not implemented the TROA to date. The TROA provides for the quantified allocation of water from Lake Tahoe and the Truckee River. The State Board held processing of applications for water rights in the Lake Tahoe Basin in accordance with the pending implementation of the

TROA and the amount of water available for appropriation will be determined pursuant to the TROA.

The TROA provides that the total annual gross diversions for use within the Lake Tahoe Basin from all natural sources, including groundwater, and under all water rights in the basin cannot exceed 34,000 acre-feet/yr. From this total, 23,000 acre-feet/yr are allocated to the State of California and 11,000 acre-feet/yr are allocated to the State of Nevada for use within the Lake Tahoe Basin.

The first 600 acre-feet used for snowmaking in California each year will not be charged to the gross diversion allocation of the State. Where water from the Lake Tahoe Basin is diverted and used to make snow in excess of this first 600 acre-feet, the percentage of such diversions chargeable to the gross diversion allocations of each State will be specified in the TROA once executed. The consumptive use of water to make snow is charged at 16 percent (TROA 2008).

The particular water rights for each California water supplier that would draw on Lake Tahoe surface waters are presently being evaluated. The TCPUD is granted Lake Tahoe surface water diversions at this time and does operate in accordance with the Settlement Act; however, the portion of diverted California waters to be allocated specifically to TCPUD is not finalized (Laliotis 2009; Nichols 2009). TCPUD expects to receive a sufficient amount of diversions to meet their projected demands (Laliotis 2009). MCWC does not utilize surface water and relies solely on groundwater sources (Nichols 2010).

Low Impact Development – Sustainable Stormwater Management

On January 20, 2005, the State Board adopted sustainability as a core value for all California Water Boards' activities and programs, and directed RQWCB staff to consider sustainability in all future policies, guidelines, and regulatory actions.

Low Impact Development (LID) is a sustainable practice that benefits water supply and contributes to water quality protection. Unlike traditional storm water management, which collects and conveys storm water runoff through storm drains, pipes, or other conveyances to a centralized storm water facility, LID takes a different approach by using site design and storm water management to maintain the site's pre-development runoff rates and volumes. The goal of LID is to mimic a site's predevelopment hydrology by using design techniques that infiltrate, filter, store, evaporate, and detain runoff close to the source of rainfall. LID has been a proven approach in other parts of the country and is seen in California as an alternative to conventional storm water management. The RWQCBs are advancing LID in California in various ways.

LID provides economical as well as environmental benefits. LID practices result in less disturbance of the development area, conservation of natural features, and less expensive than traditional storm water controls. The cost savings applies not only to construction costs, but also to long-term maintenance and life cycle cost. LID provides multiple opportunities to retrofit existing highly urbanized areas and can be applied to a range of lot sizes.

LID includes specific techniques, tools, and materials to control the amount of impervious surface, increase infiltration, improve water quality by reducing runoff from developed sites, and reduce costly infrastructure. LID practices include; bioretention facilities or rain gardens, sidewalk storage, grass swales and channels, vegetated rooftops, rain barrels and cisterns, vegetated filter strips, swales and buffers, tree preservation, roof leader disconnection, and permeable pavements and pavers, impervious surface reductions and disconnection, soil

amendments, pollution prevention and good housekeeping, found at (http://waterbaords.ca.gov/water_issues/programs/low_impact_development).

California Regional Water Quality Control Board – Lahontan Region

Lahontan is one of the nine RWQCBs in California. The nine RWQCBs maintain Basin Plans that include comprehensive lists of water bodies in each area, as well as detailed language about the components of applicable WQOs. As authorized by the USEPA, the State Board and nine RWQCBs implement the Section 402 Clean Water Act NPDES Permitting Program and requirements in California. Clean Water Act Section 401 requirements generally relate to State certification of federal permits, including those issued by a federal agency under Clean Water Act Section 404. In addition, the Lahontan regulates waste discharges under the California Water Code, Article 4 (Waste Discharge Requirements) and Chapter 5.5 (Compliance with the Provisions of the Federal Water Pollution Control Act as Amended in 1972).

California Porter-Cologne Act

California's primary statute governing water quality and water pollution issues with respect to both surface waters and groundwater is the Porter-Cologne Water Quality Control Act of 1970 (Porter-Cologne Act). The Porter-Cologne Act grants the State Board and each of the nine RWQCBs power to protect water quality, and is the primary vehicle for implementation of California's responsibilities under the Clean Water Act. For the area in which the project would be sited, the applicable RWQCB is Lahontan. The Porter-Cologne Act, the State Board and Lahontan have the authority and responsibility to adopt plans and policies, regulate discharges to surface and groundwater, regulate waste disposal sites, and require cleanup of discharges of hazardous materials and other pollutants. The Porter-Cologne Act also establishes reporting requirements for unintended discharges of any hazardous substances, sewage, or oil or petroleum products.

Each RWQCB must formulate and adopt a water quality control plan for its region. The regional plans must conform to the policies set forth in the Porter-Cologne Act and established by the State Board in its state water policy. The Porter-Cologne Act also provides that a RWQCB may include within its regional plan water discharge prohibitions applicable to particular conditions, areas, or types of waste.

California Regional Water Quality Control Board's Basin Plan for the Lahontan Region

Lahontan implements the *California Regional Water Quality Control Board's Basin Plan for the Lahontan Region* or Basin Plan, which recognizes natural water quality, existing and potential beneficial uses, and water quality problems associated with human activities in Placer County (Lahontan 1995). Lahontan also has regulatory authority to enforce the requirements of the Clean Water Act and the California Water Code. This includes the regulatory authority to enforce the implementation of TMDLs, the adoption of waste discharge requirements (WDRs) to ensure compliance with surface WQOs, and groundwater management.

Specifically the Basin Plan outlines the narrative and numeric WQOs for water bodies within the Lake Tahoe Hydrologic Unit. Some water bodies have specific WQOs. In the Project area, Madden Creek has numeric WQOs for Total Dissolved Solids, Chloride, Total Nitrogen, Total Phosphorus, and Iron.

Waste Discharge Requirements and Anti-Degradation Findings

Lahontan previously established WDRs for the Project area under Board Order No. 6-79-51, which was adopted September 19, 1979, and Board Order No. 6-88-174, which was adopted November 9, 1988. The current Board Order No. 6-95-86 updated WDRs to be consistent with requirements placed on other ski resorts within the Region and established specific compliance dates, which extend those in Board Order No 6-88-174.

Lahontan must consider antidegradation pursuant to 40 CFR 131.12 and State Board Resolution No. 68-16 to find that the subject discharges are consistent with the provisions of these policies. Anti-degradation findings that consistent with the policies are necessary for reissuance of waste discharge requirements for operations and actions within the Project area.

HMR is the discharger and the receiving waters are the surface waters of the North Tahoe Hydrologic Area of the Lake Tahoe Hydrologic Unit (Department of Water Resources Hydrologic Unit No. 634.20). The beneficial uses include: municipal and domestic supply; agricultural supply, groundwater recharge, fresh water replenishment, water-contact recreation; non-water-contact recreation, commercial and sportfishing; cold freshwater habitat; wildlife habitat, and spawning, reproduction and development.

The effluent limitations apply to all surface flows generated within the Project area, or as a result of the development on the Project area, which are discharged to land treatment systems and/or surface waters. These flows cannot contain constituents in excess of the concentrations listed in Table 15-5. The discharge of surface flows generated within the Project area to surface waters or to stormwater runoff conveyance systems cannot cause the concentrations in Lake Tahoe, Homewood Creek, Madden Creek or Quail Lake Creek to exceed the WQO limits listed in Table 15-5.

Surface flows generated within the Project area that are discharged to groundwater or to land treatment systems cannot cause a violation of limits listed in Table 15-4 for land treatment or of the following WQOs for groundwaters of the Lake Tahoe Hydrologic Unit:

- Groundwaters cannot contain taste or odor-producing substances in concentrations that cause nuisance or adversely affect beneficial uses;

- The median concentration of coliform organisms, in groundwaters, over any seven-day period shall be less than 2.2/100 ml; and

- Groundwaters shall not contain concentrations of chemical constituents in excess of the maximum contaminant levels or secondary maximum contaminant levels based upon drinking water standards specified by the more restrictive of the California Code of Regulations, Title 22, Division 4, Chapter 15 or 40 CFR, Part 141.

Table 15-5

Lahontan Water Quality Objectives – Board Order No. 6-95-86

Parameter	Unit	Effluent Limitations		Receiving Water Limitations		
		Surface Waters	Land Treatment	Homewood Creek	Quail Lake Creek	Madden Creek
Turbidity	NTU	20	200	*	*	*
Total Dissolved Solids	mg/L	--	--	60/65**	60/65**	60
Oil and Grease	mg/L	2.0	40	--	--	--
Chloride	mg/L	--	--	3.0/4.0**	3.0/4.0**	0.1/0.2
Total Nitrogen	mg/L	0.5	5.0	0.15	0.15	0.18
Total Phosphorus	mg/L	0.1	1.0	0.008	0.008	0.015
Sulfate	mg/L	--	--	1.0/2.0**	1.0/2.0**	--
Boron	mg/L	--	--	0.01	0.01	--
Total Iron	mg/L	0.5	4.0	--	--	--

Source: Lahontan Board Order No. 6-95-86

Notes:

* Turbidity of waters shall not be raised more than 3 NTU. In no instance can an increase in turbidity exceed natural levels by more than 10 percent as determined by the mean of monthly means over a calendar year.

** Values are based on annual mean concentrations (arithmetic mean of 30-day averages over a calendar year)/90th percentile concentration (90 percent of data points are equal to or below value).

National Pollutant Discharge Elimination System – Lake Tahoe Basin

Lahontan Board Order R6T-2005-0007, entitled *Updated Waste Discharge Requirements and National Pollutant Discharge Elimination System for Permit No. CAG616002 for Discharges of Storm Water Runoff Associated with Construction Activity Involving Land Disturbance in the Lake Tahoe Hydrologic Unit*, applies to construction sites and activities resulting in the disturbance of one or more acres of soil disturbance in the Lake Tahoe Hydrologic Unit. Construction activities include clearing, grading, demolition, excavation, construction or new structures and reconstruction. This permit sets maximum concentration levels for discharges into surface waters for nutrients, sediment, turbidity, and grease and oil.

The permit requires submittal of a Notice of Intent (NOI) and that the construction contractor develop and implement a site-specific stormwater pollution prevention plan (SWPPP) to prevent stormwater and groundwater pollution caused by construction activities. At a minimum, implementation of the SWPPP must prevent debris, soil, silt, sand, rubbish, cement or concrete or washings thereof, oil or petroleum products or other organic or earthen material from construction or operation from entering into receiving waters, their tributaries and adjacent wetlands. The SWPPP outlines erosion control measures to be taken as well as BMPs to control and prevent to the maximum extent practicable the discharge of pollutants to surface waters and groundwater. Although the SWPPP focuses primarily on protection of surface waters, it also contains a plan for

responding to and managing accidental spills during construction and a plan for management and storage of pumped groundwater. The SWPPP addresses overall management of the construction project site such as designating areas for material storage, equipment fueling, concrete washout, and stockpiles.

California Environmental Quality Act (CEQA)

Under CEQA, Lahontan is a responsible agency with regard to the Project. The California Water Code section 13050(e) reads as follows: "Waters of the State means any surface water or groundwater, including saline waters, within the boundaries of the state." State waters include irrigation canals and surface impoundments (other than those solely constructed for wastewater), wetlands, and waters of the United States (a subset of State waters). Lahontan's policies concerning wetland and riparian protection are stated in chapter four of the Basin Plan as outlined under sub-section Wetlands Protection and Management (pages 12-8 to 12-14).

Lake Tahoe Total Maximum Daily Load (TMDL)

Section 303(d) of the Clean Water Act requires States to compile a list of impaired water bodies that do not meet WQOs. The Clean Water Act also requires States to establish total maximum daily loads (TMDLs) for such waters. The deep water transparency standard for Lake Tahoe is the average annual Secchi depth measured between 1967 and 1971, an annual average Secchi depth of 39.7 meters or 97.4 feet. The transparency standard for Lake Tahoe has not been met since its adoption. In 2007, the average annual average Secchi depth was 70 feet or 27.6 feet from the standard. Transparency loss is considered a water quality impairment from the input of nutrients and sediment. Consequently, Lake Tahoe is listed under Section 303(d) as impaired by inputs of nitrogen, phosphorus and sediment. The goal of the Lake Tahoe TMDL is to set forth a plan to restore Lake Tahoe's historic transparency to 97.4 feet.

The *Final Lake Tahoe Total Maximum Daily Load* report was released for public review and comment in June 2010. The report and the adoption and approval process are fully compliant with CEQA. The document states that the forthcoming adoption of the Final Lake Tahoe TMDL will not have a significant adverse impact on the environment (Lahontan and NDEP 2009).

California Department of Water Resources (DWR)

The mission of the DWR is "to manage the water resources of California in cooperation with other agencies, to benefit the State's people, and to protect, restore, and enhance the natural and human environments" DWR is responsible for promoting California's general welfare by ensuring beneficial water use and development statewide. To guide development and management of the State's water resources, DWR is responsible for preparing the California Water Plan Update (Water Code section 10000 et seq.).

Water Code section 10910(d) requires the identification of existing water supply entitlements, water rights or water service contracts relevant to the Project and a description of the quantities of water received in prior years by the public water supply system. Supplemental water demand and relevant analysis is provided in the *Homewood Mountain Resort Water Supply Assessment* (Nichols 2010).

Water Code section 10910 requires a determination if a project is included in the most recently adopted Urban Water Management Plan (UWMP). The McKinney/Quail Sub-district is included

in the urban water management plan (UWMP) prepared by TCPUD in March 2006 (TCPUD 2006), but this UWMP does not account for the Project.

Water Code section 10910 limits groundwater discussion to the basin or basins that serve the Project. Additional requirements for groundwater discussions are found in Water Code section 10631(b) and 10910(f)(5), which require adequate description of groundwater basins and assurance of sufficiency of the groundwater from the basin to meet the projected water demand of the Project.

15.2.4 Placer County

Placer County published the *Placer County Stormwater Management Manual* in 1990 *(Placer County 1990)* and the *Land Development Manual* in 2006 (Placer County 2006). The Placer County Tahoe Basin Stormwater Management Plan describes the Placer County stormwater quality improvement program to be implemented in compliance with Phase I of Lahontan Board Order No. R6T-2005-0026 (NPDES Permit No. CAG616001). Placer County shares a general permit with El Dorado County and the City of South Lake Tahoe for stormwater/urban runoff discharges within the Lake Tahoe Basin; however, the Project area is individually permitted under Board Order No. 6-95-86, which outlines the WDRs to specific to the ski area and its operations.

Placer County adopted the West Shore Area General Plan in 1998, which contains goals and policies that apply to the Homewood area and the Project area. The conservation element of the plan addresses issues related to natural resources of the Plan area, including water and fisheries and establishes goals and policies relevant to these subjects. The safety element identifies goals and policies related to the protection of the public from risks associated with flooding.

Placer County General Plan

The following Placer County General Plan (Placer County 1994) goals and policies pertain to water supply and delivery, stormwater drainage, water resources, and flood hazards and protection. The Grading, Erosion, and Sediment Control Ordinance is addressed in Chapter 14, Soils, Geology and Seismicity. This ordinance also contains policies addressing stormwater drainage.

Water Supply and Delivery

Goal 4.C: To ensure the availability of an adequate and safe water supply and the maintenance of high quality water in water bodies and aquifers used as sources of domestic supply.

Policies

4.C.1 The County shall require proponents of new development to demonstrate the availability of a long-term, reliable water supply. The County shall require written certification from the service provider that either existing services are available or needed improvements will be made prior to occupancy. Where the County will approve groundwater as the domestic water source, test wells, appropriate testing, and/or report(s) from qualified professionals will be required substantiating the long-term availability of suitable groundwater.

4.C.2 The County shall approve new development based on the following guidelines for water supply:

a. Urban and suburban development should rely on public water systems using surface supply.

b. Rural communities should rely on public water systems. In cases where parcels are larger than those defined as suburban and no public water system exists or can be extended to the property, individual wells may be permitted.

c. Agricultural areas should rely on public water systems where available, otherwise individual water wells are acceptable.

4.C.3 The County shall encourage water purveyors to require that all new water services be metered.

4.C.4 The County shall require that water supplies serving new development meet state water quality standards.

4.C.5 The County shall require that new development adjacent to bodies of water used as domestic water sources adequately mitigate potential water quality impacts on these water bodies.

4.C.6 The County shall promote efficient water use and reduced water demand by:

a. Requiring water-conserving design and equipment in new construction;
b. Encouraging water-conserving landscaping and other conservation measures;
c. Encouraging retrofitting existing development with water-conserving devices; and
d. Encouraging water-conserving agricultural irrigation practices.

4.C.7 The County shall promote the use of reclaimed wastewater to offset the demand for new water supplies.

4.C.8 When considering formation of new water service agencies, the County shall favor systems owned and operated by a governmental entity over privately- or mutually-owned systems. The County will continue to authorize new privately- or mutually-owned systems only if system revenues and water supplies are adequate to serve existing and projected growth for the life of the system. The County shall ensure this through agreements or other mechanisms setting aside funds for long-term capital improvements and operation and maintenance.

4.C.9 The County shall support opportunities for groundwater users in problem areas to convert to surface water supplies.

4.C.11 The County shall protect the watersheds of all bodies of water associated with the storage and delivery of domestic water by limiting grading, construction of impervious surfaces, application of fertilizers, and development of septic systems within these watersheds.

4.C-13 In implementation of groundwater use policies, the County will recognize the significant differences between groundwaters found in bedrock or 'hardrock' formations of the foothill/mountain region and those groundwaters found in the alluvial aquifers of the valley. The County should make distinctions between these water resources in its actions.

Stormwater Drainage

Goal 4.E: To collect and dispose of stormwater in a manner that least inconveniences the public, reduces potential water-related damage, and enhances the environment.

Policies

4.E.1 The County shall encourage the use of natural stormwater drainage systems to preserve and enhance natural features.

4.E.2 The County shall support efforts to acquire land or obtain easements for drainage and other public uses of floodplains where it is desirable to maintain drainage channels in a natural state.

4.E.3. The County shall consider using stormwater of adequate quality to replenish local groundwater basins, restore wetlands and riparian habitat, and irrigate agricultural lands.

4.E.4 The County shall ensure that new storm drainage systems are designed in conformance with the Placer County Flood Control and Water Conservation District's Stormwater Management Manual and the County Land Development Manual.

4.E.5 The County shall continue to implement and enforce its Grading Ordinance and Flood Damage Prevention Ordinance.

4.E.6 The County shall continue to support the programs and policies of the watershed flood control plans developed by the Flood Control and Water Conservation District.

4.E.8 The County shall consider recreational opportunities and aesthetics in the design of stormwater ponds and conveyance facilities.

4.E.9 The County shall encourage good soil conservation practices in agricultural and urban areas and carefully examine the impact of proposed urban developments with regard to drainage courses.

4.E.10 The County shall strive to improve the quality of runoff from urban and suburban development through use of appropriate and feasible mitigation measures including, but not limited to, artificial wetlands, grassy swales, infiltration/sedimentation basins, riparian setbacks, oil/grit separators, and other best management practices (BMPs).

4.E.11 The County shall require new development to adequately mitigate increases in stormwater peak flows and/or volume. Mitigation measures should take into consideration impacts on adjoining lands in the unincorporated area and on properties in jurisdictions within and immediately adjacent to Placer County.

4.E.12 The County shall encourage project designs that minimize drainage concentrations and impervious coverage and maintain, to the extent feasible, natural site drainage conditions.

4.E.13 The County shall require that new development conforms with the applicable programs, policies, recommendations, and plans of the Placer County Flood Control and Water Conservation District.

4.E.14 The County shall require projects that have significant impacts on the quantity and quality of surface water runoff to allocate land as necessary for the purpose of detaining post-project flows and/or for the incorporation of mitigation measures for water quality impacts related to urban runoff.

4.E.15 The County shall identify and coordinate mitigation measures with responsible agencies for the control of storm sewers, monitoring of discharges, and implementation of measures to control pollutant loads in urban storm water runoff (e.g., California Regional Water Quality Control Board, Placer County Division of Environmental Health, Placer County Department of Public Works, Placer County Flood Control and Water Conservation District).

Flood Protection

Goal 4.F: To protect the lives and property of the citizens of Placer County from hazards associated with development in floodplains and manage floodplains for their natural resource values.

Policies

4.F.1 The County shall require that arterial roadways and expressways, residences, commercial and industrial uses and emergency facilities be protected, at a minimum, from a 100-year storm event.

4.F.3. The County shall continue to work closely with the U.S. Army Corps of Engineers, the resource conservation district, the Federal Emergency Management Agency, the State Department of Water Resources, and the Placer County Flood Control District, in defining existing and potential flood problem areas.

4.F.4 The County shall require evaluation of potential flood hazards prior to approval of development projects. The County shall require proponents of new development to submit accurate topographic and flow characteristics information and depiction of the 100-year floodplain boundaries under fully-developed, unmitigated runoff conditions.

4.F.5 The County shall attempt to maintain natural conditions within the 100-year floodplain of all rivers and streams except under the following circumstances:

a. Where work is required to manage and maintain the stream's drainage characteristics and where such work is done in accordance with the Placer County Flood Damage Prevention Ordinance, California Department of Fish and Game regulations, and Clean Water Act provisions administered by the U.S. Army Corps of Engineers; or

b. When facilities for the treatment of urban runoff can be located in the floodplain, provided that there is no destruction of riparian vegetation.

4.F.6 The County shall continue to coordinate efforts with local, state, and federal agencies to achieve adequate water quality and flood protection.

4.F.7 The County shall cooperate with the Placer County Flood Control and Water Conservation District, surrounding jurisdictions, the cities in the County, and other public agencies in planning and implementing regional flood control improvements.

4.F.9 The County shall continue to implement floodplain zoning and undertake other actions required to comply with state floodplain requirements, and to maintain the County's eligibility under the Federal Flood Insurance Program.

4.F.10 The County shall preserve or enhance the aesthetic qualities of natural drainage courses in their natural or improved state compatible with flood control requirements and economic, environmental, and ecological factors.

4.5.11 To the extent that funding is available, the County shall work to solve flood control problems in areas where existing development has encroached into a floodplain.

4.F.12 The County shall promote the use of natural or non-structural flood control facilities, including off-stream flood control basins, to preserve and enhance creek corridors.

4.F.13 The County shall continue to implement and enforce its Grading Ordinance and Flood Damage Prevention Ordinance.

4.F.14 The County shall ensure that new storm drainage systems are designed in conformance with the Placer County Flood Control and Water Conservation District's Stormwater Management Manual and the County's Land Development Manual.

Water Resources

Goal 6.A: To protect and enhance the natural qualities of Placer County's streams, creeks and groundwater.

Policies

6.A.2 The County shall require all development in the 100-year floodplain to comply with the provisions of the Placer County Flood Damage Prevention Ordinance.

6.A.5 The County shall continue to require the use of feasible and practical best management practices (BMPs) to protect streams from the adverse effects of construction activities and urban runoff and to encourage the use of BMPs for agricultural activities.

6.A.7 The County shall discourage grading activities during the rainy season, unless adequately mitigated, to avoid sedimentation of creeks and damage to riparian habitat.

6.A.10 The County shall protect groundwater resources from contamination and further overdraft by pursuing the following efforts:

a. Identifying and controlling sources of potential contamination;
b. Protecting important groundwater recharge areas;
c. Encouraging the use of surface water to supply major municipal and industrial consumptive demands;
d. Encouraging the use of treated wastewater for groundwater recharge; and
e. Supporting major consumptive use of groundwater aquifer(s) in the western part of the County only where it can be demonstrated that this use does not exceed safe yield and is appropriately balanced with surface water supply to the same area.

Flood Hazards

Goal 8.B: To minimize the risk of loss of life, injury, damage to property, and economic and social dislocations resulting from flood hazards

Policies

8.B.1. The County shall promote flood control measures that maintain natural conditions within the 100- year floodplain of rivers and streams.

8.B.2 The County shall continue to participate in the Federal Flood Insurance Program.

8.B.3 The County shall require flood-proofing of structures in areas subject to flooding.

8.B.4 The County shall require that the design and location of dams and levees be in accordance with all applicable design standards and specifications and accepted state-of-the-art design and construction practices.

8.B.5 The County shall coordinate with neighboring jurisdictions to mitigate the impacts of new development in Placer County that could increase or potentially affect runoff onto parcels downstream in a neighboring jurisdiction.

8.B.6 The County shall prohibit the construction of facilities essential for emergencies and large public assembly in the 100-year floodplain, unless the structure and access to the structure are free from flood inundation.

8.B.7. The County shall require flood control structures, facilities, and improvements to be designed to conserve resources, incorporate and preserve scenic values, and to incorporate opportunities for recreation, where appropriate.

8.B.8. The County shall require that flood management programs avoid alteration of waterways and adjacent areas, whenever possible.

Placer County Flood Control and Water Conservation District

The Placer County Flood Control and Water Conservation District (District) was established in 1984 by the State Legislature as a Special District and is separate from County government, to address flood control issues arising with growth. District boundaries are the same as Placer County boundaries. A nine-person board of directors governs the District. Members include a representative from each of the six incorporated cities in Placer County, two representatives from the Board of Supervisors and one Member-at-large appointed by the Board of Supervisors.

The primary purpose of the District is to protect lives and property from the effects of flooding by comprehensive, coordinated flood prevention planning. The District uses consistent standards to evaluate flood risk, and implements flood control measures such as requiring new development to construct detention basins and operation and management of a flood warning system.

The District:

- Implements regional flood control projects;
- Develops and implements master plans for selected watersheds in the county;
- Provides technical support and information on flood control for the cities, the county, and the development community;

- Operates and maintains the County flood warning system;
- Reviews proposed development projects to see they meet District standards;
- Develops hydrologic and hydraulic models for county watersheds; and
- Provides technical support for Office of Emergency Services activities.

A Stormwater Management Manual is maintained by the District, which contains the following relevant regulations:

Section VI – Drainage Systems, Item 2. Design Storms

New development shall be planned and designed so that no damages occur to structures or improvements during the 100-yr event and no inundation on private property occurs during the 10-yr event.

a. Local Drainage – The 10-yr event is the minimum design storm for new developments in all drainages and all dedicated drainage facilities will be sized for this event.

b. The development plan shall identify the effects of the 100-yr event and provision will be made in the plan to prevent loss of life and damages to property during a 100-yr event.

15.2.5 Tahoe City Public Utility District

TCPUD provides services for water, sewer and recreational facilities to the west and north shore areas of Lake Tahoe, including unincorporated parts of Placer and El Dorado Counties. TCPUD operates five independent water sub-districts that have separate groundwater supply wells (Nichols 2010). Since water is not diverted from one sub-district to another, the sub-districts are considered separate entities (Laliotis 2009). The sub-districts include Tahoe City Sub-Regional, Rubicon, McKinney/Quail, Alpine Peaks and Tahoe-Truckee Forest Tract.

The Project area is within the McKinney/Quail sub-district, which is not considered a "public water system" by Water Code section 10912. TCPUD prepared their UWMP in March 2006. The UWMP does not account for the Project. The *HMR Water Supply Assessment* (Nichols 2010) provides the supplemental analysis of the projected water demand for the Project.

15.2.6 Madden Creek Water Company

MCWC provides water to the North Base area of the Project area. MCWC is not considered a "public water system" by Water Code section 10912 and has not prepared an UWMP. The projected water demand for the service district is included in the TCPUD annual water demand in the *HMR Waster Supply Assessment* (Nichols 2010).

15.3 EVALUATION CRITERIA WITH POINTS OF SIGNIFICANCE

The evaluation criteria for hydrology, water rights (supply), surface water quality and groundwater are presented in Table 15-6. These criteria are drawn from a review of the relevant literature on hydrology, water supply, surface water resources and groundwater, including a review of TRPA policies and procedures and Placer County regulations. The planning and technical documents prepared for the Project and consulted for the following impact analyses include:

Grismer, M. 2010. *HMR Water Quality – Quantification of Design Benefits*. May 26, 2010.

Integrated Environmental Restoration Services. 2010. *Homewood Mountain Resort Cumulative Watershed Effects Analysis*.

Integrated Environmental Restoration Services. 2008. *Homewood Mountain Resort Annual Report Restoration and Monitoring 2007-2008*. Prepared by Rachel Arst and Michael Hogan. July 21, 2008.

Holdrege and Kull, Inc. 2010a. *Geotechnical Investigation of the North Base Lodge, Homewood Mountain Resort.*

Holdrege and Kull, Inc. 2010b. *Geotechnical Investigation of the Mid-Mountain Lodge, Homewood Mountain Resort.*

Homewood Mountain Resort. *Homewood Mountain Resort Bi-Annual Waste Discharge Data and Reports* – Water Years 1989 - 2009

Kleinfelder. 2010a. *Second Revised Soils Hydrologic Scoping and Final Report. October 7, 2010.*

Kleinfelder.2010b. *Submittal of Revised Soils Hydrologic Exhibits . December 1, 2010. Revised Replacement exhibits dated December 15, 2010.*

Kleinfelder, Inc. 2008. *Updated Groundwater Investigation Report Homewood Mountain Resort Homewood, California*. July 14, 2008.

Kleinfelder West, Inc. 2007. *Stream Channel and Baseline Surface Water Assessment, Homewood Mountain Resort Homewood, California.* Submitted November 12, 2007.

Nichols Consulting Engineers. 2010. *Preliminary Drainage Report of Homewood Mountain Resort. December 2010.*

Nichols Consulting Engineers. 2010. *Homewood Mountain Resort Water Supply Assessment*

Nichols Consulting Engineers. 2009. *On-site Water Treatment of Stormwater*. Schematic memorandum submitted to TRPA September 22, 2009.

Nichols Consulting Engineers. 2007a. *Preliminary Technical Drainage Report for Homewood Mountain Resort, Placer County, California. Submitted to Tahoe Regional Planning Agency November 2007.*

Nichols Consulting Engineers. 2007b. *Homewood Mountain Resort Snow Removal Plan*. January.

Placer County - Flood Control and Water Conservation District. 1990. *Stormwater Management Manual*. September 1990.

Robison Engineering. 2005. *Phase I Environmental Site Assessment Homewood Mountain Resort Property Placer County, California.* December 12, 2005.

Snowmakers, Inc. 2010. *Homewood Mountain Resort Snowmaking Planning.* September 2010.

TRPA. 2010. *Soils Hydrologic Approval Homewood Mountain Resort – EIS/EIR Master Plan Alternative 1, Placer County, APNs 097-060-024, 097-050-072 and 075, TRPA File Numbers: LCA2010-0029, 0063 and 0064. January 5, 2011.*

TRPA. 2009. *Homewood Mountain Resort Land Capability Challenge*. Approved August 8, 2009.

TRPA. 2008. *Memorandum for Resolution 2008 – Exhibit 7 – Conditional Reservation Of Allocations – Homewood Mountain Resort*. February 5, 2008.

Table 15-6

Evaluation Criteria with Significance Thresholds – Hydrology, Water Rights, Surface Water Quality and Groundwater

Evaluation Criteria	Point of Significance	Justification
HYDRO-1. Will the construction or long-term operations of the Project violate existing waste discharge permit provisions or result in discharges into surface waters (streams, SEZs or Lake Tahoe) so that beneficial uses and water quality standards are not maintained?	a) Failure to implement effective, reasonable and appropriate measures to protect water quality b) Non-compliance with Board Order No R6T-2005-0007 and Board Order No. 6-95-86A2 c) Exceedance of Cumulative Watershed Effects (CWE) Project area Threshold of Concerns (TOCs)	a) TRPA Initial Environmental Checklist II (3e); TRPA 2006 Threshold Evaluation (WQ-4, tributaries, WQ-5 storm water runoff to surface water and WQ-6, storm water runoff to groundwater); TRPA Code of Ordinances, Chapters 25 (Best Management Practices), 64 (Grading Standards), and 81 (Water Quality Standards); CEQA Appendix G Checklist IX (a, f) and XVI (a); Lahontan Basin Plan Water Quality Objectives (Chapter 5); Placer County General Plan Policies 4.E.10, 4.E.15 b) CEQA Appendix G Checklist XVI (a); Lahontan Board Order No R6T-2005-0007 (NPDES General Permit) and 6-95-86A2 (Waste Discharge Permit) c) Requirements of TRPA's Ski Area Master Plan Guidelines
HYDRO-2. Will Project construction or operation alter the existing surface water drainage patterns or cause increased runoff resulting in flooding or stream bank erosion or contribute runoff in rates or volumes that will exceed the capacity of existing or planned stormwater drainage systems so that a 20-year, 1-hour	a) Change in existing watercourse alignment or capacity by Project construction or operations b) Increase in runoff (from disturbed areas because of compaction, vegetation removal and impervious surfaces)	a) CEQA Appendix G Checklist IX (c, d,); TRPA Initial Environmental Checklist II (3a, b and 16 e) TRPA Code of Ordinances, Chapters 25 (Best Management Practices), 64 (Grading Standards) and 81 (Water Quality Standards); Placer County General Plan Policies 6.A.5, 4.E.1, 4.E.3, 4.E.4, 4.E.5, 4.E.6, 4.E.8, 4.E.9, 4.E.11, 4.E.12, 4.E.13,

Evaluation Criteria	Point of Significance	Justification
storm runoff (approximately 1 inch per hour) cannot be contained on the site?	resulting from the 20-year, 1-hour design storm that cannot be captured by existing or proposed storm water drainage systems	4.E.14, 4.F.6, 4.F.7, 4.F.13, 4.F.14 b) CEQA Appendix G Checklist IX (e); TRPA Initial Environmental Checklist II (3 b); TRPA Code of Ordinances, Chapters 25 (Best Management Practices), 64 (Grading Standards) and 81 (Water Quality Control); Lahontan Basin Plan (Chapter 5) and Board Order No R6T-2005-0007; Placer County Stormwater Management Manual and Land Development Manual
HYDRO-3. Will Project construction activities or long-term operations result in a substantial degradation of groundwater or result in a substantial change in the quality, quantity, elevation, infiltration, or movement of groundwater?	a) Installation of improvements that intercept groundwater or otherwise cause substantial changes in existing groundwater quality, quantity, elevations or movement b) Excavations greater than 5 feet that intercept or interfere with groundwater movement c) Failure to comply with Lahontan requirements for disposal of groundwater during construction	a) TRPA Initial Environmental Checklist II (1 d, 3 f, g, j) TRPA Code of Ordinances, Chapters 25 (Best Management Practices), 64 (Grading Standards) and 81 (Water Quality Control); CEQA Appendix G Checklist IX (b); Placer County General Plan Policies 6.A.10, 4.C.1, 4.C.13 and 4.E.3 b) TRPA Initial Environmental Checklist II (1d); TRPA code of Ordinances Chapter 64 (Grading Standards) c) Lahontan Basin Plan Chapter 5.7; Board Order No R6T-2005-0007
HYDRO-4. Will the Project alter the course or flow of the 100-year floodwaters or expose people or structures to water related hazards such as flooding and/or wave action from 100-year storm occurrence or seiches?	Alteration of the course or flow of the 100-year floodwaters or inundation by seiche	CEQA Appendix G Checklist IX (g, h, i); TRPA Initial Environmental Checklist II (3c, i); TRPA Code of Ordinances Chapter 28 (Natural Hazard Standards); TRPA Code of Ordinance Chapter 64 (Grading Standards); Lahontan Basin Plan Chapter 5.7 and 5.8; Placer County General Plan Policy 6.A.2, 4.F.1 to 4.F.14, 8.B.1 to 8.B.8
HYDRO-5. Will the Project change the amount of surface water in any water body, substantially reduce the amount of water otherwise available for public water supplies, or be located within 600 feet of a drinking water source?	a) Substantial reduction in the amount of surface water in a water body b) A demand that exceeds available public water supplies c) Contaminating land use within 600 feet of a drinking water source identified on TRPA Source Water Assessment Maps d) TRPA Instream Flow Thresholds are Not Attained or Maintained e) Water diversions and/or uses that do not comply with the	a) TRPA Initial Environmental Checklist II (3d); TRPA Code of Ordinances Chapter 83 (Source Water Protection) and 64 (Grading Standards) b) TRPA Initial Environmental Checklist II (3h); TRPA Code of Ordinances Chapter 83 (Source Water Protection); CEQA Appendix G Checklist XVI (d); Placer County General Plan Policies 4.C.1 to 4.C.9, 4.C.11, 4.C.13 c) TRPA Initial Environmental Checklist II (3k); TRPA Code of Ordinances Chapter 83 (Source Water Protection) d) TRPA non-degradation of instream flows for all streams that flow to Lake

Evaluation Criteria	Point of Significance	Justification
	water rights or contractual entitlement for HMR or the entity from which the water was purchased and/or use of acre-feet of surface or ground waters not applied for in Truckee River Operating Agreement (TROA)	Tahoe e) TROA

Source: Hauge Brueck Associates 2010

15.4 ENVIRONMENTAL IMPACTS AND RECOMMENDED MITIGATION

Impact: **HYDRO-1: Will the construction or long-term operations of the Project violate existing waste discharge permit provisions or result in discharges into surface waters (streams, SEZs or Lake Tahoe) so that beneficial uses and water quality standards are not maintained?**

Analysis: *Significant Impact; No Project (Alternative 2)*

The No Project (Alternative 2) alternative will construct no new buildings or facilities and thus no impacts from construction activities will occur. Operations and maintenance activities will continue in support of existing conditions of the Project area.

Effective, reasonable and appropriate measures to protect water quality. HMR has worked with IERS since 2006 to complete a number of restoration projects addressing land coverage and disturbance as described in the Environmental Settings section above. Variations of treatment were implemented based on site-specific needs. A range of monitoring techniques, including rainfall and runoff simulations, soil density, soil moisture, and surface and vegetative cover and composition, were conducted. The *Homewood Mountain Resort Annual Report – Restoration and Monitoring 2007 - 2008* (IERS 2008) concludes that erosion control capacity, which was quantified through monitoring, increased significantly after treatments. Sediment yield was reduced by seven to 16 times and penetrometer depths increased on average by a factor of 4.3. Results and conclusions are not yet published for restoration projects completed in 2009 and 2010.

In 2006, stormwater treatment systems were installed and in 2007 a snow management plan was implemented in the North and South Base areas in compliance with the requirements of the Cease and Desist Order issued by Lahontan on December 23, 2005. Stormwater monitoring is inconsistent because of the absence of overflow from the systems and thus the results for stations P-1 (North Base parking lot) and P-2 (South Base parking lot) do not report trends. The absence of overflow from the systems is actually a metric gauging the treatment effectiveness. As discussed in the Environmental Setting section, the seven overflow events sampled at P-2 for the South Base stormwater treatment system measured Total Suspended Solids concentrations and Turbidity to be low, while Total Nitrogen and Total Phosphorus exceeded WQOs in these seven samples.

The effectiveness of the systems cannot be definitively quantified using the data collected for compliance with Lahontan monitoring and reporting requirements; however, because annual and post-storm inspection and maintenance occurs in compliance with Board Order No R6T-2005-0007 and overflow does not typically occur from the systems during spring runoff and typical storm events (see Appendix Y for monitoring data for water years 2006 through 2009), the systems are capturing and infiltrating stormwater runoff as designed and permitted. The potential impact to surface water quality and beneficial uses under Alternative 2 is considered less than significant based on the implementation of effective, reasonable and appropriate measures to protect water quality of the Project area.

Compliance with Board Order No R6T-2005-0007 and Board Order No. 6-95-86A2. Presently, surface water quality in Madden Creek, Quail Lake Creek and Homewood Creek is not significantly degraded by ski operations (personal communications 11/17/2009, Bud Amorfini, Lahontan Staff; IERS 2010; personal communications 10/8/2010, Bud Amorfini, Lahontan Staff). Since background Total Nitrogen and Total Phosphorus concentrations measured at monitoring stations above the Project area (stations M-1 and E-1) are occasionally above WQOs and no statistically significant increase is measured at the monitoring stations below the Project area (stations M-2 and E-2), exceedances of WQOs are not directly linked to ski area operations and could be attributable to sources such as atmospheric loading (for nitrogen) and soil, plant and animal material (for nitrogen and phosphorus) (Kleinfelder 2007). Turbidity in receiving water samples consistently measure below 4 to 6 ntu with most samples measuring below 2 ntu. Concentrations for Total Suspended Solids are typically below 10 mg/L (Appendix Y; Appendix W Figures 7, 8 and 9). The data do not indicate negatively trending degradation as a result of ski area operations and do not indicate consistent pollutant values between the downstream and upstream monitoring locations. The potential impact to surface water quality and beneficial uses under Alternative 2 is considered less than significant based on compliance with Board Order No R6T-2005-0007 and Board Order No. 6-95-86A2 (see Section 15.2.3).

Compliance with CWE Project area TOCs. Table 15-2 details the HMR CWE analysis results for the existing conditions of the Project area. Figure 15-6, presented in the analysis for the Proposed Project (Alternative 1) and alternatives, provides a graphical representation of the No Project (Alternative 2) compared to the Proposed Project (Alternative 1) and Alternatives 3, 4, 5 and 6. Based on the results, sediment yields generated under the No Project (Alternative 2) exceed Project area TOCs for Intervening Zone 7000, Madden Creek and Quail Lake Creek watersheds. Exceedance of Project area TOCs is a significant impact. Because the No Project (Alternative 2) will not change existing conditions of the Project area, the sediment yield in Intervening Zone 7000, Madden Creek and Quail Lake Creek would remain above the Project area TOCs as measured by the HMR CWE analysis. Based on the points of significance for the evaluation criteria for HYDRO-1, this impact is significant.

Mitigation: No mitigation is available.

After Mitigation: *Significant and Unavoidable Impact; No Project (Alternative 2)*

Existing BMPs, stormwater treatment systems, and restoration areas will be maintained under the No Project (Alternative 2). However, compliance with Project area TOCs (for Quail Lake Creek, Madden Creek and Intervening Zone 7000) will not be achieved because the No Project (Alternative 2) does not allow for redevelopment of the North and South Base areas, the installation of expanded stormwater treatment systems and land coverage removal. Under the No Project, the Project area continues to operate as a ski area and no Ski Area Master Plan approval results. TRPA, Lahontan and Placer County could require restoration projects and BMP retrofitting for adequate maintenance of the Project area, but it is the discretionary action of Ski Area Master Plan approval that requires conformance with Project Area TOCs as discussed in the Ski Area Master Plan Guidelines (TRPA 1990). Because sediment yields in Madden Creek, Quail Lake Creek and Intervening Zone 7000 currently exceed the Project Area TOCs and the No Project alternative does not propose specific actions to reduce sediment yields, the impact remains significant.

Analysis: *Less than Significant Impact; Alternative 4*

Under Alternative 4, the Project area will no longer operate as a ski facility. The Project area will be subdivided and sold as 16 residential estate lots. The North Base area will remain a commercial development lot. Short-term impacts to surface water quality from construction of residences will be reduced and minimized through compliance with State, Placer County and TRPA regulations and permit requirements, which require the implementation of effective, reasonable and appropriate measures to protect water quality and beneficial uses. Runoff will be contained on-site through application of temporary BMPs during construction activities and disturbed soils will be revegetated and stabilized in compliance with construction permits.

Compared to existing conditions, contributions to runoff, snowmelt and atmospheric deposition from the Project area will be reduced because of removal of impervious surfaces and decreased management of the Project area (i.e., less application of road abrasives on Placer County roads and reductions in stormwater runoff and snowmelt and associated pollutants from impervious surfaces). The existing stormwater treatment and infiltration system in the North Base area will be operated, maintained and retrofitted to comply with TRPA Code of Ordinance Chapter 25 and WDRs, as required by Lahontan.

As measured in the HMR CWE analysis (see Figure 15-6), the sediment yield generated from the Project area under Alternative 4 would be reduced as compared to baseline conditions and would not exceed the Project area TOCs for Madden Creek, Homewood Creek, Quail Lake Creek and Intervening Zone 7000 watersheds.

Because Alternative 4 represents a reduced project and reduced contribution to potential impacts as compared to the existing conditions of the Project area, the level of impact to surface water quality and beneficial uses is less than significant based on the evaluation criteria for impact HYDRO-1.

Mitigation: No mitigation is required.

Analysis: *Significant Impact; Proposed Project (Alternative 1) and Alternatives 3, 5 and 6*

Accelerated erosion potential and surface water quality impacts are present during construction phasing and occur when protective vegetative cover is removed and soils are disturbed. Site disturbance during construction could pose temporary impacts to surface water quality and beneficial uses of Project area receiving waters through increased pollutant concentrations in stormwater runoff. Runoff from disturbed and modified impervious surfaces, ski trails, roads and snow storage areas could occur as permanent

long-term impacts from ski area operations. Indirect impacts from atmospheric deposition of particulates could occur. If not addressed by the Project, potentially significant impacts to surface water quality could occur under the Proposed Project (Alternative 1) and Alternatives 3, 5 and 6 from construction runoff, post-construction runoff, eroding slopes, atmospheric deposition, snowmelt, accidental spills, or cumulative watershed effects within the Project area. A number of compliance measures, which are required by codified regulations or law, and standard engineering features and permanent BMPs are incorporated into the Project to avoid, reduce and minimize potential impacts to surface water quality and beneficial uses.

The Proposed Project (Alternative 1) and Alternatives 3, 5 and 6 will pose similar temporary and long-term potential impacts to surface water quality and beneficial uses and the strategies available for avoiding and reducing short-term and long-term, potential impacts will be similar under these alternatives. The potential impacts are analyzed below and followed by a discussion of the compliance measures built into the Project to address potential impacts. If the compliance and standard engineering measures and permanent BMPs are determined to be insufficient to assure that potential impacts to surface water quality and beneficial uses are avoided, reduced and minimized, then mitigation measures are recommended.

Effective, Reasonable and Appropriate Measures to Protect Water Quality. Construction activities associated with the Proposed Project (Alternative 1) and Alternatives 3, 5 and 6 will involve land disturbance and earthwork, including excavation and backfill, stockpiling of soils, trenching and removal of vegetative cover. These activities could cause temporary increases in runoff, erosion and sedimentation from the Project area if precautions and measures are not taken to contain runoff and erosion on site and to stabilize disturbed soils. The degree of disturbance is related to the amount of land coverage associated with each alternative, which is detailed in Chapter 14, Geology, Soils and Seismicity, under Impact GEO-3.

The Project will implement a number of compliance measures to control erosion, contain runoff and erosion on-site during construction activities and stabilize disturbed areas following construction activities to reduce potential impacts from erosion, loss of topsoil, or unstable soil conditions to a level of less than significant. Civil Sheets C15 through C18 details the BMP Plans for the developed portions of the Project area.

TRPA and Placer County codified regulations and Lahontan construction permit conditions require these compliance measures and plans for project-level permitting and approval and include, but are not limited to, the following:

- HMR Erosion and Sediment Control and BMP Plan (including Winterization Plans per TRPA Code Chapters 25, 64 and 81; Placer County Grading and Erosion Control Ordinance);
- Stormwater Pollution Prevention Plan (SWPPP – required for NPDES Construction Permit);
- Properly Locate and Protect Stockpile Areas (TRPA Code Chapter 64 and Placer County standard mitigation measure);
- Properly Locate and Manage Snow Storage Areas (TRPA Code Chapter 81, Lahontan WDRs);
- Landscaping/Revegetation Plan (per TRPA Code Chapters 20 and 77 and Placer County standard mitigation measure); and

- Conformance to TRPA and Placer County grading ordinances.

The following subsections discuss potential short-term, temporary impacts to surface water quality and beneficial uses from: general construction activities; soil disturbance, trenching and cut and fill slopes; landscaping, revegetation and irrigation; winter roadway and snowmelt managements; fuel storage; and atmospheric deposition. The analyses detail the effective, reasonable and appropriate measures of the Project for the protection water quality and beneficial uses of the Project area receiving waters.

General Project Construction Activities. Ground disturbance within the Project area will exceed one acre and is subject to the construction stormwater quality permit requirements of the NPDES program. The Project Applicant must obtain this permit from Lahontan and provide evidence of a state-issued WDID number or filing of a Notice of Intent (NOI) and fees prior to start of construction.

The Project is required to implement a TRPA-approved Erosion and Sediment Control Plan in conjunction with the Lahontan-approved SWPPP that is required under Board Order No. R6T-2005-007 (General Permit No. CAG616002) for discharges of stormwater runoff associated with construction activity involving land disturbance in the Lake Tahoe hydrologic unit. Installation of site-specific temporary BMPs and maintenance and monitoring to ensure that disturbed areas, SEZs and stream channels are protected during precipitation events and for over wintering will be required to minimize effects from construction activities (e.g., ground disturbance) associated with the Project. The Project Applicant will prepare a site-specific Erosion Control and BMP Plan based on the final project design to define and map temporary BMPs for the control of erosion and runoff from ground disturbing activities. BMPs will be installed in accordance with Chapter 25 of the TRPA Code of Ordinances and Placer County codified regulations as required for project permitting. The HMR Erosion and Sediment Control Plan will be complimentary to the SWPPP that is required by Lahontan for NDPES permitting.

At a minimum, the SWPPP must prevent debris, soil, silt, sand, rubbish, cement or concrete or washings thereof, oil or petroleum products or other organic or earthen material from construction or operation from entering into receiving waters, their tributaries and adjacent wetlands. The SWPPP outlines erosion control measures to be taken as well as BMPs to control and prevent to the maximum extent practicable the discharge of pollutants to surface waters and groundwater. Although the SWPPP focuses primarily on protection of surface waters, it also contains a plan for responding to and managing accidental spills (e.g., Spill Response Plan) during construction and a plan for management and storage of pumped groundwater (e.g., Dewatering Plan). The SWPPP addresses overall management of the construction project such as designating areas for material storage, equipment fueling, concrete washout, and stockpiles. The SWPPP components are further defined in Chapter 14, Geology, Soils and Seismicity, under impact GEO-4.

Placer County considers impacts from grading and earthwork potentially significant unless standard mitigation measures are applied to assure compliance with codified regulations to avoid and minimize construction-related impacts to soils. Standard mitigation measure GEO-4a outlines the requirements for Placer County Construction BMPs to control erosion and contain runoff and sediment on-site, as previously discussed for reduction in potential impacts related to grading activities under impact GEO-4 in Chapter 14, Geology, Soils and Seismicity.

To minimize effects to surface water quality and drainage patterns, Placer County requires the submittal of preliminary grading plans to County Staff for review and approval. Proposed grading, drainage improvements, vegetation and tree removal are shown on Civil Plan Sheets. Sheets C11, 12, 13 and 14 are specific to grading. Grading must conform to provisions of the County Grading, Erosion, and Sediment Control Ordinance (Ref. Article 15.48, Placer County Code) and Stormwater Quality Ordinance (Ref. Article 8.28, Placer County Code) that are in effect at the time of submittal. Approval of Improvement Plans, including project grading,will be required for project permitting, as detailed in mitigation measure GEO-4b. Placer County requires that stockpiling and/or vehicle staging areas be identified on the Improvement Plans and located as far as practical from existing dwellings and protected resources in the area. Mitigation measures GEO-4c details stockpiling for compliance with Placer codified regulations, as previously discussed for reduction in potential impacts related to grading activities under impact GEO-4 in Chapter 14, Geology, Soils and Seismicity.

Disturbed Areas, Trenching, and Cut and Fill Slopes. Approximately 59,300 linear feet of snowmaking pipe and 37,550 linear feet of utilities (water, sewer, gas and electrical will be installed and require trenching (Snowmakers, Inc. 2010 and NCE 12/1/2010 email) under the Proposed Project (Alternative 1) and Alternatives 3, 5 and 6. Portions of the Project area will be graded and fill and cut slopes ranging from 6:1 to 2:1 will be created. Portions of the Project area will be trenched during installation of utility lines and piping for water and sewer system. Trenches will not be greater than four feet in depth and 2 to 2.5 feet in width according to details provided on the preliminary Civil Plans. The majority of the utility lines and piping will be installed within existing access roadways, but some lines will require placement in ski trails.

Temporary BMPs to contain loose soils within the disturbance area will be installed prior to trenching activities and maintained until trenching is completed. A Revegetation and/or Landscaping Plan is required for TRPA and Placer County project permitting to assure that portions of the Project area that are disturbed during construction activities are revegetated and stabilized to minimize erosion and sedimentation; thus reducing potential impacts to surface water quality and beneficial uses.

Ski trails, ski chairlift lines, access roadways and hiking trails represent previously disturbed portions of the Project area. The Project commits to continued revegetation and restoration of previously disturbed areas under the Proposed Project (Alternative 1) and Alternatives 3, 5 and 6. A total of 500,000 square feet of existing land coverage will be removed and restored, with a portion permanently retired.

Alternatives 3, 5 and 6 will create cut and fill slopes of up to approximately 20.5 feet, as associated with the water tanks at the Mid-Mountain, and 29 to 32 foot retaining walls, as associated with the North Base underground parking structure, and 19 to 21 foot retaining walls, as associated with the South Base underground parking structure. Aboveground retaining walls range from 15 feet to one foot in height. The Project's impacts will be reduced to a level of less than significant through compliance with Placer County codified regulations. Mitigation measures GEO-4b and GEO-4f detail standard Placer County mitigation measures for mitigation of impacts associated with alteration of topography and relief features, as previously discussed for reduction in potential impacts related to grading activities under impact GEO-4 in Chapter 14, Geology, Soils and Seismicity.

Landscaping, Revegetation, and Irrigation. Due to the increase in landscaped area, nitrogen and phosphorus inputs could increase significantly if typical fertilizer and

irrigation regimes are employed. The preliminary revegetation plan outlines the methods for revegetating and stabilizing portions of the Project area that are disturbed during construction activities or will be utilized as bioretention areas for stormwater treatment. The landscaping and revegetation strategies are detailed in Chapter 3, Proposed Project and Alternatives. Impact HYDRO-2 provides analysis for the bioretention areas.

The Project Applicant has prepared a preliminary landscaping plan and calculated the expected irrigation requirements. The Landscaping Plan will apply to public use areas of the North Base, South Base and Mid-Mountain areas. Appendix CC contains the preliminary irrigation calculations, narrative explaining the assumptions for the irrigation calculations, defined hydrozone areas for the public use areas, and TRPA plant species lists associated with each hydrozone. The Project landscaping objective is to present a natural and native visual experience to the user while achieving erosion control, fire safety, water quality and water conservation.

The North Base, South Base and Mid-Mountain areas were delineated as high, medium and low hydrozones according to irrigation requirements. Areas of high visibility or use such as near project area or building entries are defined as high; areas of less visibility or use are medium; and revegetation areas further out from use areas, including areas of slope disturbance, are low. Plant species proposed for use in the high, medium and low hydrozone seed mixtures are native or adapted species that are approved by TRPA, the majority of which are drought-tolerant after establishment. Landscaping water usage for irrigation is estimated at 10.8 acre-feet/year for the first two years of plant establishment substantially declining after the first few growing seasons.

The Project proposes the following measures to minimize the potential for nutrients to enter surface water or escape the root zone and be delivered to groundwater:

- Use of non-mowed or slow-growing turf grass species, locally native or adapted species with annual fertilizer requirements that do not exceed 1.5 pounds per 1,000 square feet;
- Implementation of a Fertilizer Management Plan that meets the requirements of Section 81.7 of TRPA Code or Ordinances;
    - Determination of appropriate fertilizer rates by a soil-revegetation specialist and based on the results of soil nutrient testing;
    - Incorporation of fertilizer into soils prior to seed application to prevent burning and low germination rates;
    - Use of Biosol or other organic, slow-release fertilizers that do not contain nitrate or ammonium with careful application to avoid application on hardscape;
- Prohibition of fertilizer use on bioretention areas for stormwater treatment after initial establishment; and
- Installation of a highly controlled spray irrigation system to avoid over irrigation and overspray onto hardscape.

The final Landscaping Plan and irrigation demand will be developed based on the configuration of the preferred alternative and submitted to TRPA and Placer County for review and approval. To reduce potential impacts from landscaping on surface water quality and beneficial uses, a final landscaping/revegetation plan and fertilizer management plan are necessary and are outlined as mitigation measure BIO-9.

Atmospheric Deposition. Atmospheric sources are determined to contribute to surface water quality degradation, as more than half of the nitrogen loading in Lake Tahoe is delivered by air (TRPA and NDEP 2008). Several sources of airborne pollutants include motorized vehicle exhaust, dust and particulates from unvegetated slopes and driving on unpaved access roads during summer operations, and pulverized road salts and abrasives.

Short-term impacts to water quality from construction dust will be reduced to a level of less than significant through compliance with TRPA codified requirements (e.g., TRPA Erosion and Sediment Control Plan) and Lahontan NPDES permit requirements (e.g., SWPPP). These plans require the application of dust abatement actions during construction activities. Dust abatement is analyzed in Chapter 12, Air Quality.

Long-term, potential impacts to surface water quality from atmospheric deposition will be reduced through project design and maintenance, including watering of roadways during periods of high use and reductions in vehicle miles traveled (VMT), which is described in Chapter 11, Transportation and Circulation. Revegetation and landscaping of slopes and disturbed areas within the Project area will protect surface water quality by covering bare soils, stabilizing slopes and reducing sediment sources.

Combined Level of Construction Impact to Surface Water Quality and Beneficial Uses. In summary, the Proposed Project (Alternative 1), Alternatives 3, 5 and 6 will implement effective, reasonable and appropriate measures to protect water quality and beneficial uses of Project area receiving waters and will comply with TRPA, Lahontan and Placer County codified regulations and construction permit conditions.

Based on the evaluation criteria for impact HYDRO-1, the potential short-term, temporary impacts to surface water quality and beneficial uses during construction activities are reduced to less than significant under TRPA codified regulations and less than significant after mitigation for Placer County CEQA analysis. Placer County standard mitigation measures, detailed as HYDRO-1a GEO-4a, GEO-4b, GEO-4c and GEO-4e below, assure compliance with Placer County codified regulations. The mitigation measures serve to protect surface water quality and beneficial uses by requiring temporary BMPs be designed according to the California Stormwater Quality Association Stormwater BMP Handbooks and Improvement Plan approval to conform to the Placer County Grading, Erosion, and Sediment Control Ordinance.

Long-Term Operational Impacts and Compliance with Board Order No R6T-2005-0007 and Board Order No. 6-95-86A2. Runoff from impervious surfaces and disturbed slopes can carry a variety of pollutants, such as metals, oils and grease and sediment and chemical residues, from Project area roadways, parking lots, rooftops, and other surfaces and deposit them in adjacent waterways. Pollutant concentrations vary depending on storm intensity, land use, elapsed time between storms, and the volume of runoff generated in a given area that reaches a receiving water. Upon approval of a preferred project alternative, the Project Applicant will be required to submit a Form 200 for Application/Report of Waste Discharge for new facilities and changes in design and operations from the existing WDRs. Lahontan will then process the application for updated WDRs for the Project area. Ski area operations cannot violate WDR provisions or result in discharges into surface waters (streams, SEZs or Lake Tahoe) so that beneficial uses and WQOs are not maintained. Additionally, the Project will have to meet the anti-degradation findings under State Board Resolution 68-16.

The Project implements stormwater treatment systems, LID strategies (pervious pavement and pavers, cisterns, heated walk ways, bioretention areas for stormwater treatment and slope revegetation to improve infiltration of runoff), improved snow

storage and fuel storage, and revegetation and landscaping to protect beneficial uses and preserve and improve surface water quality.

Winter Roadway and Snowmelt Management. Snowmelt from snow disposal areas can represent not only a significant source of nutrients but also harmful hydrocarbons, metals, and biological oxygen demand. The current TRPA Code of Ordinances references the Handbook of Best Management Practices, which is Volume II of the 208 Plan and provides snow storage guidelines, including: adequate sizing of the area according to estimated snow amounts, avoidance of SEZ areas, and placement of storage areas up-gradient of stormwater treatment and BMP facilities. The TRPA CEP has a goal of improved snow storage. The Project improves upon existing snow storage and management under the Proposed Project (Alternative 1) and Alternatives 3, 5 and 6 through location of storage areas a greater distance from SEZ areas and in areas that will drain to bioretention areas and to stormwater treatment systems. Figure 15-4 illustrates the proposed snow storage areas in the North Base and Figure 15-5 illustrates proposed snow storage areas in the South Base. Snow storage will not occur within Placer County ROWs.

Sanding activities on Placer County roadways will continue between the months of October through May as dependent on weather conditions. In 2008/2009 Placer County Department of Public Works applied approximately 8.5 tons of sand in the vicinity of the Project area. In 2009/2010 approximately 21.5 tons were applied (Placer County Road Application Logs for Zone 1, Area 22 – 2008, 2009, 2010). Placer County Department of Public Works will typically send out a sweeper within 72 hours after the sand is applied and weather conditions permit removal of loose sand. Placer County Department of Public Works uses Vactor equipment each summer to clean out road culverts and remaining sand that was applied the prior winter season. Typically the amount of sand removed each year exceeds the amount applied by the County because Placer County also removes some abrasives applied to SR 89 by Caltrans as well as some incidental naturally occurring sediment/soils (personal communications, April 19, 2010 email from Allen Breuch, Supervising Planner with Placer County).

Figure 15-3. Snow Storage Areas Proposed for the North Base Area

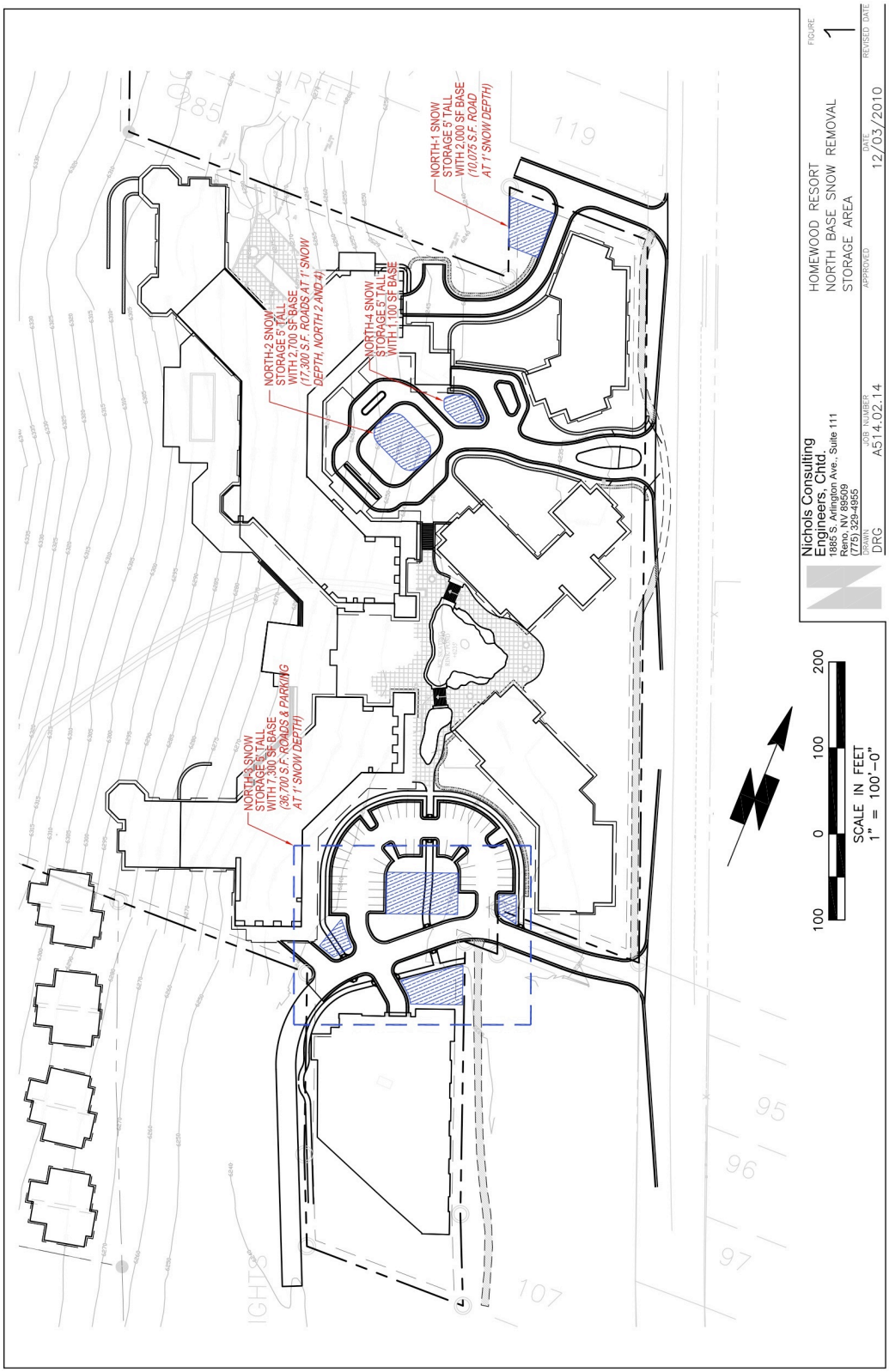
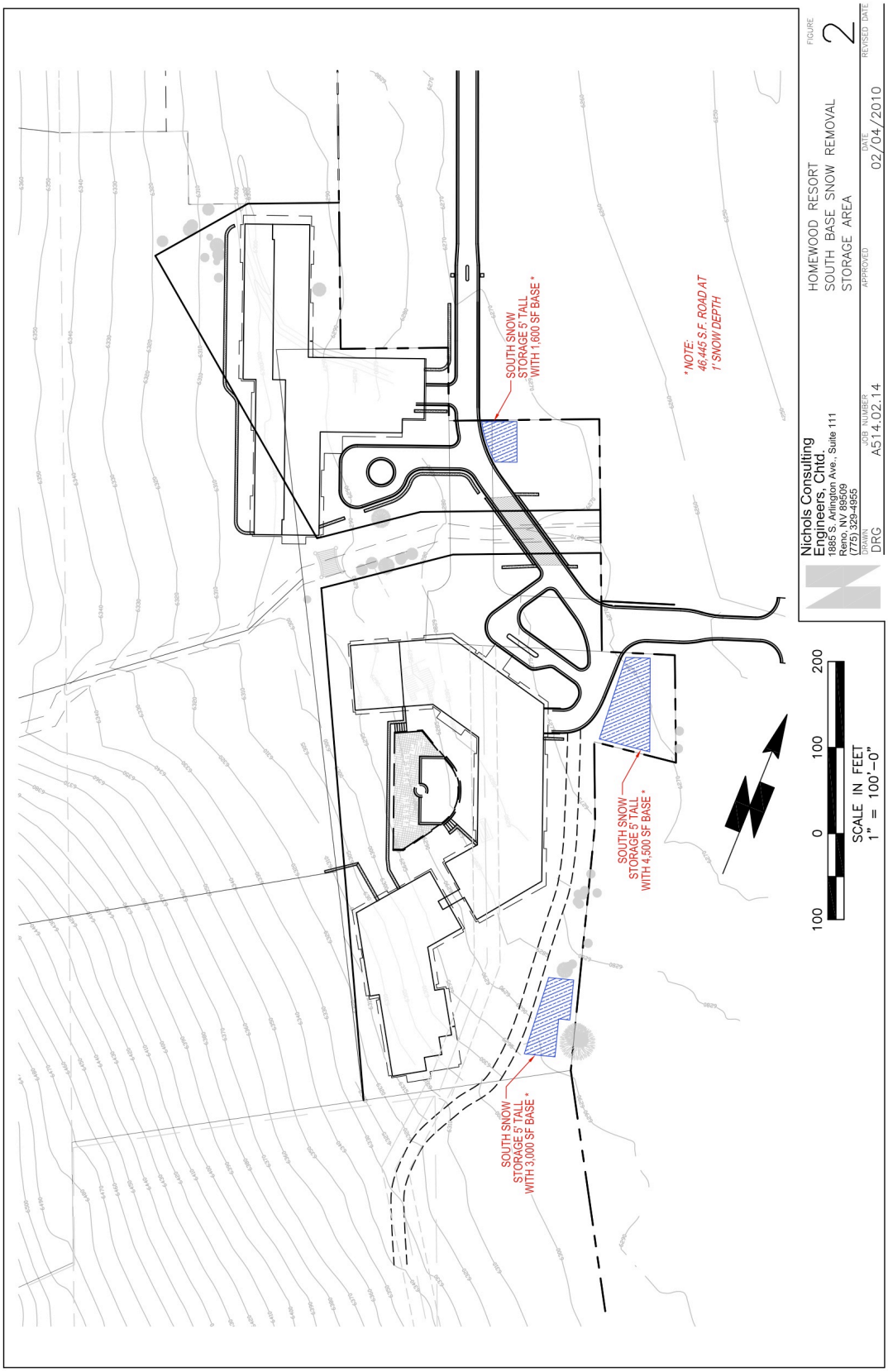


Figure 15-4. Snow Storage Areas Proposed for the South Base Area



Fuel Storage. Under Alternatives 1, 3, 5 and 6 the maintenance facility currently located in the South Base area and in proximity to Homewood Creek will be relocated to the Mid-Mountain area. The existing 5,000-gallon fuel tank will remain in use at the South Base area until the start of Phase 2 development when it will be removed. At that point, new diesel fuel tanks constructed at the new Mid-Mountain area maintenance facility in Phase 1 development will be used exclusively. These Mid-Mountain tanks will be sized to sustain operations throughout the winter since they will be inaccessible by fuel trucks when roadways are snow covered. The estimates for winter operations total 40,000 gallons that would be stored in two 20,000-gallon above ground tanks located beneath the maintenance facility within the crawl space. The tanks will be serviced from the paved apron adjacent to the maintenance building. The use and operations are required to conform to the California Fire Code and receive approval from the North Lake Tahoe Fire Protection District (NLTFPD), as discussed in Chapter 17, Public Safety and Hazards.

Moving fuel tanks from the South Base area, where accidental spills could reach Homewood Creek and SEZ areas, to the Mid-Mountain area, which contains no active stream channel, reduces the potential for surface water quality impacts from accidental spills.

Stormwater Treatment Systems and Bioretention Areas. There are three perennial stream channels draining the Project area and potential hydraulic connections between ground and surface waters within the Project area. TRPA environmental thresholds WQ-4, which outlines tributary standards, WQ-5, which outlines runoff water quality parameters and standards, WQ-6, which addresses discharges to groundwater, and WQ-7, which requires attainment of existing water quality standards, apply to the Project area. TRPA discharge limits are listed in Table 15-4 and Lahontan WQOs are listed in Table 15-5.

Madden Creek and Homewood Creek are sampled during spring runoff conditions. Sample stations M-1 and E-1 are located just above the Project area boundary. Sample stations M-2 and E-2 are located just below the Project area boundary. Because of the inability to obtain grab samples at stations M-1 and E-1 due to access issues and low or absent surface flows, comparison with pollutant concentration levels of stations M-2 and E-2 is difficult. No statistically significant degradation of surface water quality due to operations within the Project area have been measured (personal communications 11/17/2009, Bud Amorfini, Lahontan; IERS 2010; 10/8/10, Bud Amorfini). In other words, the nutrient concentrations measured on samples taken above the Project area boundary exceed WQOs as often as samples taken below the Project area, with no statistical increase in concentrations measured between the samples.

To address potential long-term effects to beneficial uses and surface water quality, the Proposed Project (Alternative 1) and Alternatives 3, 5 and 6 will revegetate disturbed areas (as discussed in Chapter 3 and under potential construction impacts above) and install permanent BMPs, LID strategies and stormwater treatment systems. The combined stormwater treatment approach will capture, treat and infiltrate runoff from the Project area for expected improvements in stormwater quality as compared to existing conditions.

The State Board defines LID as a sustainable practice that benefits water supply and contributes to water quality protection. Unlike traditional storm water management, which collects and conveys storm water runoff through storm drains, pipes, or other conveyances to a centralized storm water facility. LID takes a different approach by using site design and stormwater management to maintain the site's pre-development

runoff rates and volumes. The goal of LID is to mimic a site's predevelopment hydrology by using design techniques that infiltrate, filter, store, evaporate, and detain runoff close to the source of rainfall. LID has been a proven approach in other parts of the country and is seen in California as an alternative to conventional storm water management. LID provides economical as well as environmental benefits. LID practices result in less disturbance of the development area, conservation of natural features, and prove less expensive than traditional storm water controls. The cost savings applies not only to construction costs, but also to long-term maintenance and life cycle cost. LID includes specific techniques, tools, and materials to control the amount of impervious surface, increase infiltration, improve water quality by reducing runoff from developed sites, and reduce costly infrastructure. LID practices include; bioretention facilities or rain gardens, sidewalk storage, grass swales and channels, vegetated rooftops, rain barrels and cisterns, vegetated filter strips, swales and buffers, tree preservation, roof leader disconnection, and permeable pavements and pavers, impervious surface reductions and disconnection, soil amendments, pollution prevention and good housekeeping (http://waterbaords.ca.gov/water_issues/programs/low_impact_development).

A stormwater treatment "train", detailed in impact HYDRO-3, has been designed for the North and South Base areas. Runoff will be conveyed to a bioretention area prior to a stormwater drop inlet where grades permit or directly to stormwater drop inlets to be routed via stormdrain pipe. Once infiltrated or conveyed to the underground system, runoff will enter a Contech Vortech® treatment vault for coarse sediment and hydrocarbon removal and then be routed to a Contech Stormfilter® for secondary treatment and fine sediment removal down to 15 microns. After exiting the secondary treatment facility, the stormwater enters the underground infiltration gallery for infiltration and soil treatment. Civil Plan Sheets C10 through C13 detail the Grading and Drainage Plans for the North Base, South Base and Mid-Mountain areas.

Contech Stormfilters® target a range of pollutants in stormwater runoff, including TSS, soluble heavy metals, oil and grease and total nutrients. This is a passive filtration systems included in the stormwater treatment train for the removal of fine sediment and particles. The Contech Vortech® system is a high flow hydrodynamic separation system that removes coarse sediment, particles, free oil and debris from stormwater runoff. The design allows for inspection of components and unobstructed maintenance access. Product evaluations for Contech Stormfilters® report mean Total Suspended Solids removal efficiencies to be 87 percent by mass (P=0.05) over the range of stormwater event mean concentrations tested. The studied systems were capable of removing particles in the vicinity of 10 microns when operating at a test standard of 7.5 gallons per minute (Contech Stormwater Solutions Inc. 2004). Other results can be reviewed at http://www.stormwater360.co.nz/?s1=products&s2=StormFilter.

Stormwater treatment system configurations at the North and South Base areas will differ depending on the total impervious area and building layout, and will treat, at a minimum, the runoff volume from the 20-year, 1-hour storm event and function to reduce pollutant concentrations to levels that comply with Lahontan and TRPA discharge limits through pretreatment actions and infiltration. The stormwater treatment systems as designed for the Proposed Project (Alternative 1) are sized in excess of the 20-year, 1-hour storm volume with capacities maximized as site conditions allow. Alternative 3 would construct more impervious surfaces as a result of larger building footprints and compared to the Proposed Project (Alternative 1) would slightly increase stormwater runoff volumes. Alternatives 5 and 6 would construct slightly less impervious surfaces, which

would slightly decrease stormwater runoff volumes. Stormwater treatment system capacity is analyzed in more detail for impact HYDRO-2.

Placer County requires installation of standard mitigation measures to permanently mark/emboss with prohibitive language such as "No Dumping! Flows to Creek" or other language as approved by the ESD, and/or graphical icons to discourage illegal dumping. Diversion of stormwater runoff around trash storage areas to minimize contact with pollutants is also required. Mitigation measures to assure compliance with these Placer County codified regulations are detailed as mitigation measures HYDRO-1b and HYDRO-1c.

CEP Resolution Compliance – Reduction in Land Coverage and Sediment Loading. The CEP Resolution for the Project requires reductions in land coverage and sediment loading for the Project area. The Proposed Project (Alternative 1), Alternatives 3, 5 and 6 reduce total existing land coverage within the Project area by 13, 8, 23 and 20 percent, respectively, and relocate land coverage from lower capability LCDs 1a and 1b to higher capability LCDs 2, 4, 5 and 6. Land coverage is detailed in Chapter 14, Geology, Soils and Seismicity under impact GEO-3.

Reductions in land coverage are expected to result in reductions in sediment loading. Sediment loading was modeled for the North Base, South Base and Mid-Mountain areas and for Tahoe Ski Bowl Way (redevelopment areas). The LSPC stormwater management analysis for quantification of the Project design benefits relies on three tracks of information associated in part with the TMDL-related studies of 2007 and 2008. The detailed LSPC stormwater management analysis for the Project area is provided in Appendix Z. Using measured infiltration and sediment yield data and daily climate data for a range of WYs and conditions three treatment scenarios were modeled. These include the runoff and the treatment effectiveness of the existing stormwater treatment systems (termed "Existing Conditions"), the proposed stormwater treatment systems (termed the "Project SWMP") and the stormwater treatment systems that would meet the TRPA 20-year, 1-hour design storm requirements (termed the "20-year BMP SWMP"). Results are presented as annual total sediment load, expressed as kilograms per year (kg/yr).

It is important to note that this loading exercise is based on daily data representing particular water year conditions and cannot be directly compared to the HMR CWE modeling analysis that considers long-term averaged data to represent relative annualized sediment yields.

Table 15-7 summarizes the annual total sediment load modeled for the redevelopment areas under wet WYs 1995 and 2006 and dry WYs 1994 and 2003 precipitation regimes. The focus of the comparison is between the Project SWMP and the 20-year BMP SWMP, with the Project SWMP representing what is proposed under the Proposed Project (Alternative 1) and the 20-year BMP SWMP representing what is required under current TRPA Code of Ordinances. The North and South Base areas are the more substantial areas of the overall Project area affecting loading and serve to illustrate the model concepts.

Table 15-8 compares annual sediment loads between the 20-year BMP SWMP and the Project SWMP. Annual total sediment leaving the project area is connected to the amount of stormwater runoff leaving the Project area each year. The Project SWMP will capture more of the stormwater volume and thus more of the annual total sediment load as shown as the percent decreases in Table 15-8. The Mid-Mountain area and Tahoe Ski Bowl Way show a negative percentage and a smaller percentage decrease, respectively,

because the 20-year BMP SWMP does not include the uphill runoff that could enter the Project area. This runoff must be contained by the Project and is thus included in the Project SWMP analysis. As a result there is a net greater excess runoff and annual sediment load from the 20-year BMP SWMP than from the Project SWMP at the Mid-Mountain area. In the Tahoe Ski Bowl Way area, there is sufficient "over-design" in the Project SWMP conditions to contain uphill runoff such that there is still a slight improvement over 20-year BMP SWMP conditions.

Appendix Z presents additional graphs for comparisons of annual sediment loading for WYs 1994, 2003 and 2006. Figure 15-5, which represents comparisons of annual sediment loading for the North and South Base areas for WY 2006, is presented below to represent a worst-case scenario under a very wet WY. Under a precipitation regime for a very wet WY, the Project SWMP for the North and South Base areas is expected to decrease annual total sediment by approximately 85 percent as compared to the 20-year BMP SWMP.

While simple summary statements are difficult to make, given the complexity of storms, antecedent soil moisture conditions and other variables, the data shows that in wetter years, which represent worst-case scenarios, sediment and presumably fine sediment loads from the Project SWMP design are 80 to 86 percent less than those produced by the standard 20-year BMP SWMP design (Grismer 2010).

Table 15-7

Annual Stormwater Sediment Loads for Existing, 20-year BMP and Project SWMP Designs - Wet (1995 & 2006) and Dry (1994 & 2003) WY Analyses

Project Area	Existing Conditions (kg)*				20-yr BMP SWMP (kg)*				Project SWMP (kg)*			
	1994WY	1995WY	2003WY	2006WY	1994WY	1995WY	2003WY	2006WY	1994WY	1995WY	2003WY	2006WY
North Base Area	246,584	3,749,270	1,496,700	3,715,798	520,583	4,489,815	1,925,338	4,387,778	10,339	652,201	222,518	646,511
South Base Area	56,549	1,851,045	651,730	1,800,059	249,545	2,420,741	1,023,528	2,411,095	9,479	372,205	131,627	368,548
Mid-Mtn Base Area	15,353	475,818	166,708	461,902	21,493	491,426	177,498	497,680	28,649	187,886	68,063	162,855
Tahoe Ski Bowl Way	98,685	1,324,050	522,235	1,260,036	100,199	1,209,091	492,269	1,125,043	72,542	510,820	219,642	491,384
Total	**419,165**	**7,402,179**	**2,839,377**	**7,239,801**	**893,813**	**8,613,068**	**3,620,637**	**8,423,602**	**123,003**	**1,725,107**	**643,854**	**1,671,304**

Source: HMR Water Quality – Quantification of Design Benefits, Dr. Mark Grismer, May 26, 2010

Notes: * 1 kilogram = 0.001 Metric Tonnes

Table 15-8

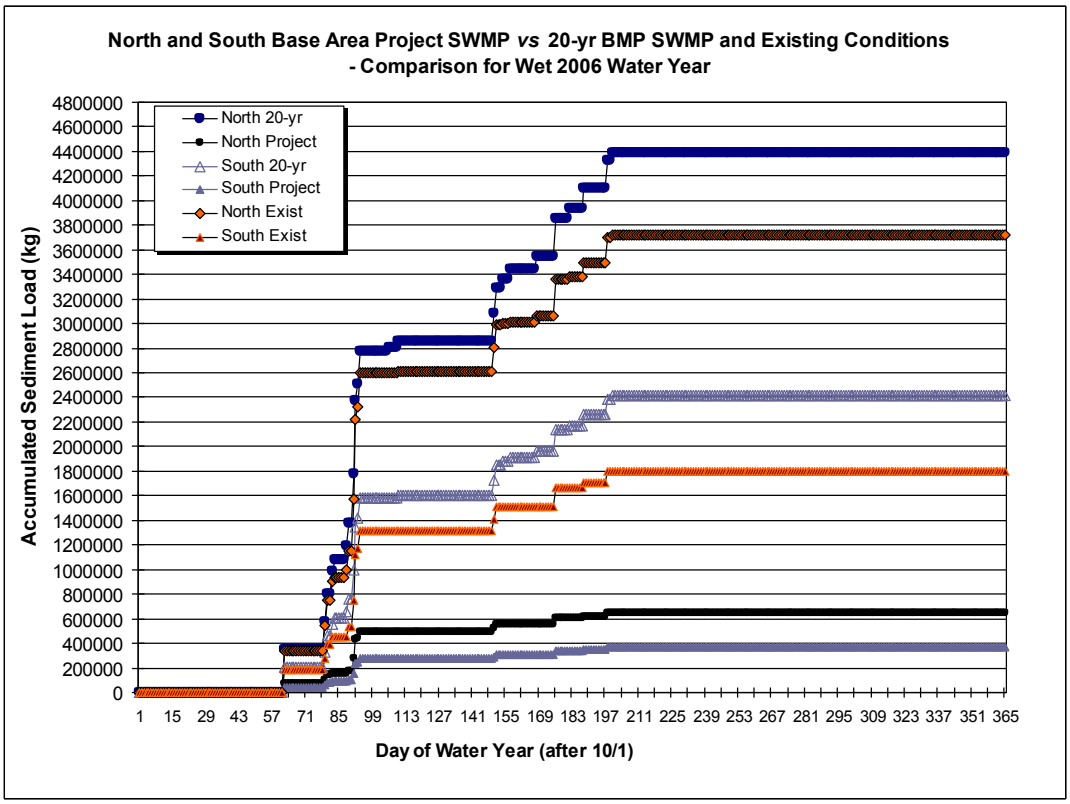
Decrease in Stormwater Sediment Loads for Project SWMP Compared to 20-year BMPs SWMP Designs in Wet (1995 & 2006) and Dry (1994 & 2003) WY Analyses

Project Area	Project SWMP (kg*)							
	1994WY	% Change	1995WY	% Change	2003WY	% Change	2006WY	% Change
North Base Area	510,243	98.0%	3,837,614	85.5%	1,702,820	88.4%	3,741,267	85.3%
South Base Area	240,065	96.2%	2,048,536	84.6%	891,901	87.1%	2,042,547	84.7%
Mid-Mtn Base Area	-7,156	-33.3%	303,540	61.8%	109,435	61.7%	334,825	67.3%
Tahoe Ski Bowl Way	27,657	27.6%	698,271	57.8%	272,627	55.4%	633,659	56.3%
Overall	**772,804**	**86.5%**	**6,889,956**	**80.0%**	**2,978,786**	**82.3%**	**6,754,304**	**80.2%**

Source: HMR Water Quality – Quantification of Design Benefits, Dr. Mark Grismer, May 26, 2010

Notes: * 1 kilogram = 0.001 Metric Tonnes

Figure 15-5. Accumulated sediment load from the North and South Base Areas Under Wet WY Conditions (WY 2006)



Source: HMR Water Quality – Quantification of Design Benefits, Dr. Mark Grismer, May 26, 2010

Combined Level of Long-term Impact to Surface Water Quality and Beneficial Uses. Compared to existing conditions, long-term contributions from the Project area to stormwater runoff, snowmelt and atmospheric deposition will be reduced and minimized through installation of stormwater treatment systems, bioretention areas, reductions in land coverage, and continued revegetation of disturbed areas and ski trails. Conclusive results concerning effectiveness of compliance measures cannot be adequately stated without inspection, monitoring and maintenance of the proposed treatment systems and permanent BMPs, however.

As a result, the level of impact is considered potentially significant until monitoring results prove compliance with TRPA discharge standards, as outlined in the TRPA Code of Ordinances Chapter 81, and State WQOs, as outlined in the Lahontan Basin Plan and forthcoming updated WDRs. Mitigation measure HYDRO-1d outlines the requirements of the Inspection, Operations, Maintenance and Monitoring Plan for Stormwater Treatment Systems and Permanent BMPs. Mitigation measure HYDRO-1e outlines follow up measures to be taken should monitoring results report compromised effectiveness of permanent BMPs or stormwater treatment systems.

Compliance with CWE Project Area TOCs. The HMR CWE analysis was completed in compliance with TRPA Ski Area Master Plan requirements and models the annualized total sediment (T/yr) or sediment yield that could result from implementation of the Proposed Project (Alternative 1) and alternatives. Following the methodology outlined in Section 3 of Appendix W, sediment yield is modeled for the four Project area watersheds. Figure 15-6 compares the four sediment yields predicted under the conditions of each alternative to the Project Area TOCs for Madden, Homewood and Quail Lake Creek watersheds and Intervening Zone 7000. Exceedance of an individual Project Area TOC is considered a significant impact. Each of the four watersheds is considered individually so that a significant decrease in total sediment in one watershed does not mask an increase in another watershed.

The existing sediment yields for Intervening Zone 7000, Madden Creek, and Quail Lake Creek Project area watersheds currently exceed the Project Area TOCs, while the existing sediment yield for Homewood Creek watershed is below its Project area TOC. Note that existing sediment yields are termed "Baseline" in Figure 15-6.

The HMR CWE analysis concludes that implementation of the Proposed Project (Alternative 1) or Alternative 3, 5 and 6 will reduce sediment yields originating within the Project area watersheds as compared to existing conditions. Three of the four sediment yields will be at or below their Project Area TOC through implementation of the Project. The results are discussed below according to watershed.

Intervening Zone 7000. The existing sediment yield for Intervening Zone 7000 is 62 T/yr, which exceeds the Project Area TOC (55 T/yr) by 7 T/yr. Under the Proposed Project (Alternative 1) and Alternatives 3, 5 and 6, the sediment yield will be reduced to 56, 58, 56, and 56 T/yr, respectively, a reduction of 5.3 T/yr which is within 1 T/yr of the Project Area TOC for Intervening Zone 7000. This 1 T/yr is within the expected 10 percent margin of error of the CWE model (personal communications September 22, 2010 – Mark Grismer). The HMR CWE analysis takes into consideration the installation of the stormwater treatment systems proposed for Alternatives 1, 3, 5 and 6 in the North Base area that are located in Intervening Zone 7000; however, because the model is based on standardized sedimentation rates that are applied to certain land uses, the model may not adequately assess the treatment levels of these systems. Additionally, treatment level sediment reduction assumptions for the model exercise erred on the conservative side when treatment systems, BMPs and other approaches had a reported range of effectiveness. The Project installs a number of higher-level treatments that are not reflected fully in the CWE model, as to not overstate the treatment effects. If higher level treatment assumptions were incorporated into the model, post-project sediment yields under Alternative 1, 3, 5 and 6 conditions would likely decrease by 2 to 10 Percent. Thus, where sediment yields are close to the TOC, specifically in Intervening Zone 7000, the actual reduction can be expected to be greater than modeled (IERS 2010).

Furthermore, the sediment loading analysis specific to the North and South Base areas and the Mid-Mountain and Tahoe Ski Bowl Way considers the affects of the proposed stormwater treatment "trains" (Please see Figure 15-8 below for the treatment train schematic). When considering the results from the base area loading analysis presented in Table 15-7, the Project is measured to reduce annual sediment loads originating from the North Base area by approximately 83 percent compared to existing conditions during a wet water year such as WY2006. It is recognized that the sediment loading results for the North and South Base areas cannot be directly compared to the HMR CWE results because of the scale differences; the HMR CWE analysis considers annualized sediment yields, while the loading exercise considers data on a daily timescale for particular water

years. The conclusion can be made, however, that the relative yield reduction from the North and South Base stormwater treatment systems would be reflected as more than a 1 T/yr decrease sediment yield.

Additional analysis and support for the conclusion that post-project conditions reduce sediment yield from Intervening Zone 7000 to the level of the TOC are referenced to Appendix W.

Figure 15-6. Sediment Yields (T/yr) for Project Area Watersheds vs. Project Area TOCs

	Baseline	TOC	Project	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6
INT 7000	62	55	56	62	58	49	56	56
Madden	459	435	425	459	425	380	425	425
Homewood	828	865	799	828	777	814	784	784
Quail	152	147	151	152	149	136	149	150
Combined	1500	1502	1431	1500	1409	1379	1414	1415

Source: IERS 2010

Notes: Existing Sediment Yields are termed "Baseline" in this figure. The terms are used interchangeably.

Madden Creek Watershed. Sediment yield in Madden Creek watershed is currently 459 T/yr, which exceeds the Project Area TOC for this watershed (i.e., 435 T/yr) by 24 T/yr. Under the Proposed Project (Alternative 1) and Alternatives 3, 5 and 6, sediment yield would be reduced to 425 T/yr, which is below the Project Area TOC for Madden Creek watershed.

Homewood Creek Watershed. Sediment yield in Homewood Creek watershed is currently 828 T/yr, which is below its Project Area TOC (865 T/yr). Under the Proposed Project (Alternative 1) the sediment yield will be reduced to 799 T/yr and under

Alternatives 3, 5 and 6, sediment yield will be reduced to 777, 784 and 784 T/yr, respectively.

Quail Lake Creek Watershed. Sediment yield from Quail Lake Creek watershed is currently 152 T/yr, which exceed the Project Area TOC (147 T/yr) by 5 T/yr. Under the Proposed Project (Alternative 1) and Alternatives 3, 5 and 6, sediment yield will be reduced to 151, 149, 149 and 150 T/yr, respectively, but the sediment yield would still exceed the Project Area TOC for Quail Lake Creek watershed by 2 to 4 T/yr. This is likely within the expected error range of the CWE analysis as discussed above for Intervening Zone 7000, but because no supplemental analysis can be referenced in support of this conclusion, the impact is considered significant. Implementation of mitigation measure HYDRO-1f is recommended to reduce this impact to a level of less than significant.

Combined Compliance with CWE Project Area TOCs. Project Area TOCs for Madden Creek and Homewood Creek watersheds and Intervening Zone 7000 will not be exceeded under the Proposed Project (Alternative 1) and Alternatives 3, 5 and 6. Sediment yields from the Project area are expected to decrease through implementation of these alternatives, as supported by the CWE analysis results and conclusions summarized above and detailed in Appendix W. Implementation of the Proposed Project (Alternative 1) and Alternatives 3, 5 and 6 will reduce sediment yield in Quail Lake Creek watershed but could still result in exceedance of the Project Area TOC. This is a potentially significant impact that requires mitigation based on the evaluation criteria for HYDRO-1.

Mitigation: **HYDRO-1a. Design Water Quality Protection BMPs According to the California Stormwater Quality Association Stormwater BMP Handbooks and TRPA's Handbook of BMPs**

Water quality Best Management Practices (BMPs) shall be designed according to the California Stormwater Quality Association Stormwater Best Management Practice Handbooks for Construction, for New Development / Redevelopment, and/or for Industrial and Commercial, (and/or other similar source as approved by the Engineering and Surveying Department (ESD)).

Storm drainage from on- and off-site impervious surfaces (including roads) shall be collected and routed through specially designed catch basins, vegetated swales, vaults, infiltration basins, water quality basins, filters, etc. for entrapment of sediment, debris and oils/greases or other identified pollutants, as approved by the ESD. BMPs shall be designed at a minimum in accordance with the Placer County Guidance Document for Volume and Flow-Based Sizing of Permanent Post-Construction Best Management Practices for Stormwater Quality Protection. Post-development (permanent) BMPs for the project include, but are not limited to: underground water quality treatment vaults, infiltration galleries, sediment basins, bioretention areas and revegetation of disturbed areas. No water quality facility construction shall be permitted within any identified wetlands area, floodplain, or right-of-way, except as authorized by project approvals.

No water quality facility construction shall be permitted within any identified wetlands area, floodplain, or right-of-way, except as authorized by project approvals. All BMPs shall be maintained as required to insure effectiveness. The Project Applicant shall provide for the establishment of vegetation, where specified, by means of proper irrigation. Proof of on-going maintenance, such as contractual evidence, shall be provided to ESD upon request. Maintenance of these facilities shall be provided by the project owners/permittees unless, and until, a County Service Area is created and said facilities

are accepted by the County for maintenance. Contractual evidence of a monthly parking lot sweeping and vacuuming, and catch basin cleaning program shall be provided to the ESD upon request. Failure to do so will be grounds for discretionary permit revocation. Prior to Improvement Plan or Final Map approval, easements shall be created and offered for dedication to the County for maintenance and access to these facilities in anticipation of possible County maintenance.

HYDRO-1b. Storm Drain Stenciling

All storm drain inlets and catch basins within the Project area shall be permanently marked/embossed with prohibitive language such as "No Dumping! Flows to Creek" or other language as approved by the Engineering and Surveying Department and/or graphical icons to discourage illegal dumping. Message details, placement, and locations shall be included on the Improvement Plans. ESD-approved signs and prohibitive language and/or graphical icons, which prohibit illegal dumping, shall be posted at public access points along channels and creeks within the project area. The Homeowners' and/or Property Owner's association is responsible for maintaining the legibility of stamped messages and signs.

HYDRO-1c. Stormwater Routing for Refuse Management

All stormwater runoff shall be diverted around trash storage areas to minimize contact with pollutants. Trash container areas shall be screened or walled to prevent off-site transport of trash by the forces of water or wind. Trash containers shall not be allowed to leak and must remain covered when not in use.

HYDRO-1d. Inspection, Operations, Maintenance and Monitoring Plan for Stormwater Treatment Systems and Permanent BMPs

The Project Applicant shall prepare and implement an Inspection, Operations, Maintenance and Monitoring Plan for Stormwater Treatment Systems and Permanent BMPs. This plan shall comply with TRPA Code of Ordinances Chapter 25 and Chapter 81 and Lahontan's updated WDRs. TRPA, Lahontan, and Placer County shall review the plan prior to issuance of final Project approval. Post-project monitoring shall include post-project BMP effectiveness monitoring and stormwater monitoring as detailed below.

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

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

<u>Post-Project Stormwater Monitoring.</u> Post-project stormwater monitoring shall be performed for comparison with pre-project monitoring results and for determination of compliance with State and TRPA discharge standards. Fine sediment shall be monitored as specified by TRPA and future Lake Tahoe TMDL research directives.

Monitoring results shall address the following components:

- Compliance of project area runoff with State and TRPA discharge standards;
- Stormwater treatment system effectiveness;
- Permanent BMP effectiveness;
- Revegetation/Landscaping effectiveness;
- Assessment of performance of strategies outlined in the Stormwater treatment calculations; and
- BMP and Stormwater treatment system maintenance regimes.

Miscellaneous Monitoring. Performance of LID strategies (pervious pavement and pavers, cisterns, heated walk ways, bioretention areas for stormwater treatment and revegetation of slopes to improve infiltration of runoff) shall be monitored in accordance with requirements and conditions outlined in the TRPA Project Permit.

Inspection and Maintenance Program. All stormwater treatment systems and permanent BMPs shall be visually inspected monthly and maintained as necessary to assure optimal performance of systems. A long-term maintenance program shall be developed as based on monitoring results.

Reporting. Monitoring results shall be submitted to TRPA in the Post-Project Bi-Annual Monitoring Report. Recommended reporting dates are December 1st to accommodate for winterization of the project area and stormwater quality reporting according to water year (i.e., October 1, 2010 to September 30, 2011 is Water Year 2011) and June 1st during spring runoff. The report shall summarize site conditions, maintenance activities, physical observation on water quality and the degree of sedimentation, if apparent. The report will include 6 months worth of observations and corresponding field measurements and laboratory analytical results.

Surface water that is infiltrated onto groundwater shall not exceed the TRPA and State discharge to land treatment limits:

- Total Nitrogen as N: 5 mg/L;
- Total Phosphorus as P: 1mg/L;
- Iron as Fe: 4 mg/L;
- Turbidity: 200 NTU; and
- Oil and Grease: 40 mg/L.

Surface water runoff discharged to Homewood Creek shall not exceed the TRPA surface runoff concentrations stated in Chapter 81 of the TRPA Code of Ordinances and the water quality objectives of the State for receiving waters outlined in the WDRs.

HYDRO-1e. Apply Project Security Fee Towards BMP and Stormwater System Improvements and/or Restoration Projects if Discharge Limits are Not Met

If post-project monitoring determines that TRPA or State discharge standards are exceeded, the TRPA Security Deposit shall be used to implement additional water quality treatment needs in Madden Creek, Quail Lake Creek and Homewood Creek watersheds and portions of Intervening Zone 7000. The Project Applicant and its contractors shall make repairs or improvements to the proposed permanent BMPs, LID strategies (pervious pavement and pavers, cisterns, heated walk ways, bioretention areas for stormwater treatment, and revegetation of slopes to improve infiltration if runoff) and

stormwater treatment systems to improve performance and effectiveness per TRPA and Lahontan requirements. If the repairs and/or improvements result in compliance with receiving water quality objectives and discharge to land treatment and surface water limits, then no additional mitigation is required.

HYDRO-1f. Restrict Development within Quail Lake Creek Watershed until Compliance with Project Area TOC

The Project proposes no development or change in existing conditions within this watershed. Based on exceedance of the Quail Lake Creek Project Area TOC, no development within Project area portion of the Quail Lake Creek Watershed shall be permitted until annualized total sediment (T/yr) is reduced to below the Project Area TOC (147 T/yr). The Project Applicant shall identify sediment source control and land coverage removal projects within this watershed that will be completed prior to implementation of capital improvements or other actions that create soil disturbance. The Project Applicant shall monitor the effectiveness of these projects and update the HMR CWE analysis for the Quail Lake Creek watershed based on the results.

BIO-9. Final Landscape/Revegetation Plan and Fertilizer Management Plan

The Project Applicant shall prepare and implement a landscape and fertilizer management plan for the Project area. This plan shall comply with TRPA Code of Ordinances Section 31.7 Landscaping Standards and Section 81.7 Fertilizer Management. The plan shall be reviewed and approved by TRPA and the Placer County Planning Department prior to issuance of the final Project approval.

See Impact BIO-9 in Chapter 8, Biological Resources for further description.

GEO-4a. Design Construction-related BMPs According to the California Stormwater Quality Association Stormwater BMP Handbooks and TRPA's Handbook of BMPs

See impact GEO-4 in chapter 14, Soils, Geology and Seismicity.

GEO-4b. Conform to Provisions of Placer County Grading, Erosion and Sediment Control Ordinance

See impact GEO-4 in chapter 14, Soils, Geology and Seismicity.

GEO-4c. Identify Stockpiling and/or Vehicle Staging Areas on Improvement Plans

See impact GEO-4 in chapter 14, Soils, Geology and Seismicity.

GEO-4e. Obtain NPDES Permit

See impact GEO-4 in chapter 14, Soils, Geology and Seismicity.

GEO-4f. Satisfy the requirements of Section II of the Land Development Manual. (LDM).

See impact GEO-4 in chapter 14, Soils, Geology and Seismicity.

After Mitigation: *Less than Significant Impact; Proposed Project (Alternative 1) and Alts 3, 5 and 6*

Temporary construction-related impacts to surface water quality will be avoided and reduced through implementation of effective, reasonable and appropriate measures (compliance measures) to protect water quality as required by federal, regional, State and local regulations and TRPA and NPDES permit requirements. Revegetation and

landscaping are required for all disturbed areas to protect and stabilize soils and thus minimize potential impacts to surface water quality and beneficial uses. Fertilizer management (i.e. mitigation measure BIO-9) will conform to TRPA Code of Ordinances Section 81.7 to minimize the potential for fertilizers to enter surface waters. Implementation of mitigation measures HYDRO-1a, 1b and 1c and GEO-4a, 4b, 4c and 4e, respectively, assure that permanent BMPs are designed to proven effectiveness levels identified in the California Stormwater Quality Association Stormwater BMP Handbooks, that storm drain inlets are marked to discourage illegal dumping, that stormwater runoff is diverted around trash storage areas, and that final grading plans conform to Placer County grading and erosion control ordinance.

The degree of surface water quality improvement is based on engineering design objectives (e.g. Vortech treatment vault and Contech Stormfilter specifications), sediment models (e.g. project area LSCP base area loading and HMR CWE sediment yield exercises), BMP and stormwater treatment effectiveness ratings, and best available science (Referenced to IERS 2010; Grismer 2010; Ballestero, T.P. et al. 2009; Clear Creek Solutions 2005; Kennedy Jenks Consultants 2007; NDOT 2006; Praul and Sokulsky 2008; Roseen et al 2009; Puget Sound Action Team 2005; USEPA 2000; Hood et al. 2007; Funkhouser 2007; Montalto et al. 2007). Post-project monitoring, to be outlined as a requirement of mitigation measure HYDRO-1d, will determine the degree of predicted improvements to surface water quality and ensure that stormwater treatment systems and permanent BMPs are maintained to the highest levels of effectiveness.

If the appropriate plans are approved and post-project monitoring (HYDRO-1d) determines compliance, project design and recommended mitigation measures are effective in reducing ski area operational impacts to surface water quality, then long-term impacts are reduced to a level of less than significant. Should post-project monitoring determine that measures are ineffective, mitigation measure HYDRO-1e shall be implemented, which requires the application of the TRPA project security fee towards replacement, expansion and/or upgrade of BMPs and stormwater treatment systems to maintain surface water quality and beneficial uses. If monitoring shows WQOs are continually exceeded, the Project Applicant will be required to make repairs or improvements to BMPs and stormwater treatment systems to improve effectiveness per TRPA permit requirements and WDRs. If WQOs continue to be exceeded, the Project will be subject to Lahontan and TRPA directives towards the upgrade and/or expansion and/or replacement of the installed stormwater treatment systems. These additional measures, if necessary, will ensure continued efforts toward installation and maintenance of effective, reasonable and appropriate measures to protect surface water quality and beneficial uses.

Impact: **HYDRO-2: Will Project construction or operation alter the existing surface water drainage patterns or cause increased runoff resulting in flooding or stream bank erosion or contribute runoff in rates or volumes that will exceed the capacity of existing or planned storm water drainage systems so that a 20-year, 1-hour storm runoff (approximately one inch per hour) cannot be contained on the site?**

Analysis: *Significant Impact; No Project (Alternative 2)*

Snow storage management was upgraded at HMR and stormwater treatment systems were installed in the South and North Base areas in 2006. The existing systems were permitted by TRPA and Lahontan and are assumed to capture and treat the 20-year, 1-hour peak runoff volume based on permitting conditions and on the absence of overflow from the current systems. Revegetation of ski trails and restoration of Project area roadways have reduced erosion on the upper mountain (IERS 2008), and changes in ski area operations management, such as establishing setbacks for snow storage and improving road crossings, have been made to protect Project area SEZs and stream channels.

New construction will not occur under the No Project Alternative, but continued operations of the resort could contribute to streambank erosion downstream of the Project area, as noted in the Stream Channel and Baseline Water Assessment (Kleinfelder, Inc. 2007). Existing structures will not be removed from the TRPA-delineated SEZ or 100-year FEMA flood hazard zone in the South Base area and day lighting of this reach of Homewood Creek will not occur. Existing flood risk within the Project area and to downstream private residences will persist. Based on evaluation criteria for Impact HYDRO-2, this is a significant impact.

The existing impact to surface water drainage patterns is significant based on baseline conditions, which indicate degradation of streambanks and incised channel conditions downstream of the South Base portion of the Project area (Kleinfelder 2007). Under the No Project (Alternative 2), existing impacts to Homewood Creek alignment and channel instability will persist.

Mitigation: No mitigation is available.

After Mitigation: *Significant and Unavoidable Impact; No Project (Alternative 2)*

The existing culvert conveying Homewood Creek under the Placer County Tahoe Ski Bowl Way ROW through the South Base area poses flood risk potential within the Project area and to private residences downstream. Existing flood risk and existing impacts to Homewood Creek channel stability will persist if reconfiguration of the South Base area and concurrent SEZ restoration does not occur for compliance with TRPA and Placer County set back requirements. The level of impact remains significant and unavoidable based on non-compliance with TRPA codified regulations. For purposes of Placer County, there would be no change in conditions, and therefore no impact.

Analysis: *Significant Impact; Proposed Project (Alternative 1) and Alternative 3*

Construction and operation of the Proposed Project (Alternative 1) or Alternative 3 will not cause increased runoff resulting in flooding or stream bank erosion or contribute runoff in rates or volumes that will exceed the capacity of existing or planned storm water drainage systems so that a 20-year, 1-hour storm runoff (approximately one inch per hour) cannot be contained on the site. Stormwater treatment systems are proposed to capture, treat, and infiltrate a minimum of the 20-year, 1-hour storm volume on-site; thus

removing this stormwater volume from entering existing stormwater systems downgradient from the North Base area and Homewood Creek in the South Base area. Stormwater treatment system capacities are maximized for measured site conditions.

The current surface water drainage patterns of Homewood Creek will be altered through the removal of the existing culvert under Tahoe Ski Bowl Way in the South Base area. The Proposed Project (Alternative 1) and Alternative 3 will implement the Homewood Creek SEZ Restoration project in the South Base area for improvements to existing surface water drainage patterns and stream bank and channel conditions and to alleviate flood risk within the Project area and to private residences down stream. Figures 15-7, 15-8, and 15-9 were prepared by Nichols Consulting Engineers to analyze the potential downstream impacts of removing the existing culvert crossing at Tahoe Ski Bowl Way and replace it with a bottomless arch bridge crossing. Figure 15-7 shows the calculated pre- and post-project 100-year flood plain for Homewood Creek. Removal of the culvert will improve the existing condition, which currently overtops the roadway during a 100-year event. The proposed bridge crossing will convey the 100-year peak flow without overtopping the roadway, and there will be no downstream impacts to existing structures or property, as the creek attenuates to the 100-year water surface elevation prior to leaving the Homewood property.

Section VI (Drainage Systems, Item 2. Design Storms) of the Placer County Stormwater Management Manual (SWMM) (Placer County 1990) requires that new development be planned and designed so that no damages occur to structures or improvements during the 100-year/1-hour storm and no inundation on private property occurs during the 10-year/1-hour event. The 10-year, 1-hour storm is the minimum design storm for new developments in drainages and dedicated drainage facilities in Placer County. The Project's systems are sized in excess of this event to meet the minimum TRPA 20-year/ 1-hour storm volume capacities. The development plans must identify the effects of the 100-year/1-hour storm and provision be made in the plan to prevent loss of life and damages to property during a 100-year, 1-hour storm.

Figure 15-7. Homewood (Ellis) Creek 100-Year Flood Plain

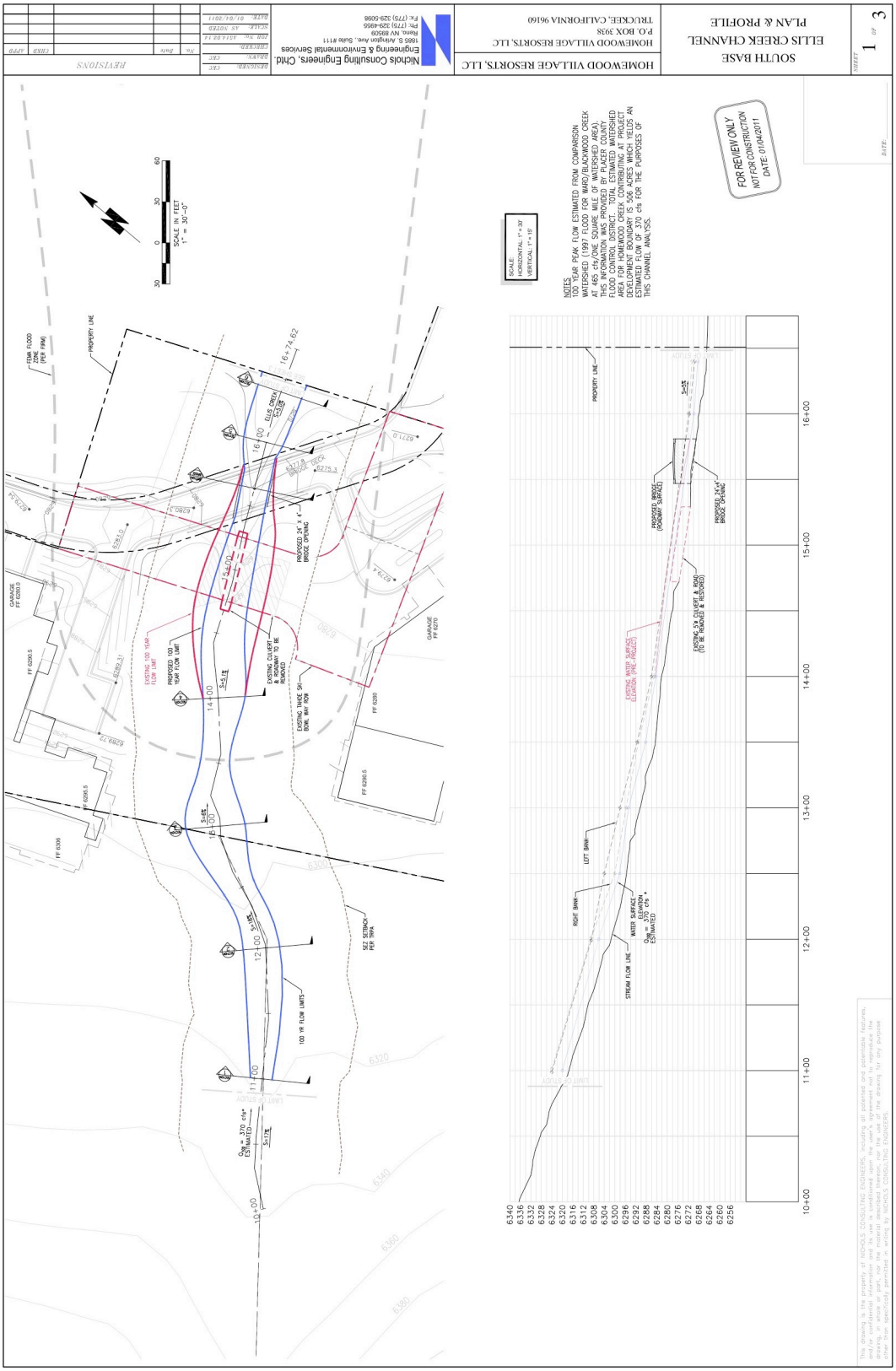


Figure 15-8. Homewood (Ellis) Creek Cross Sections

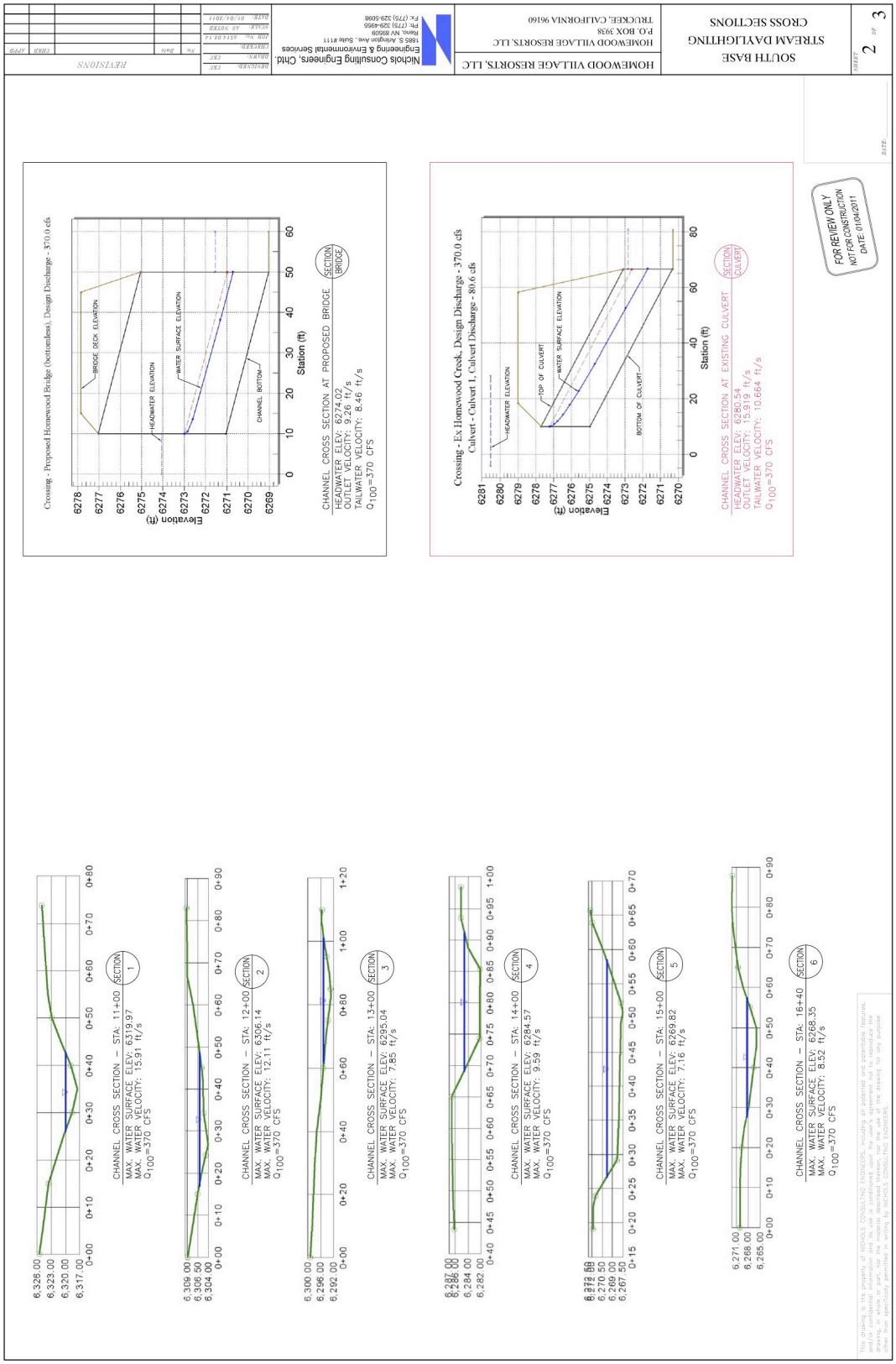
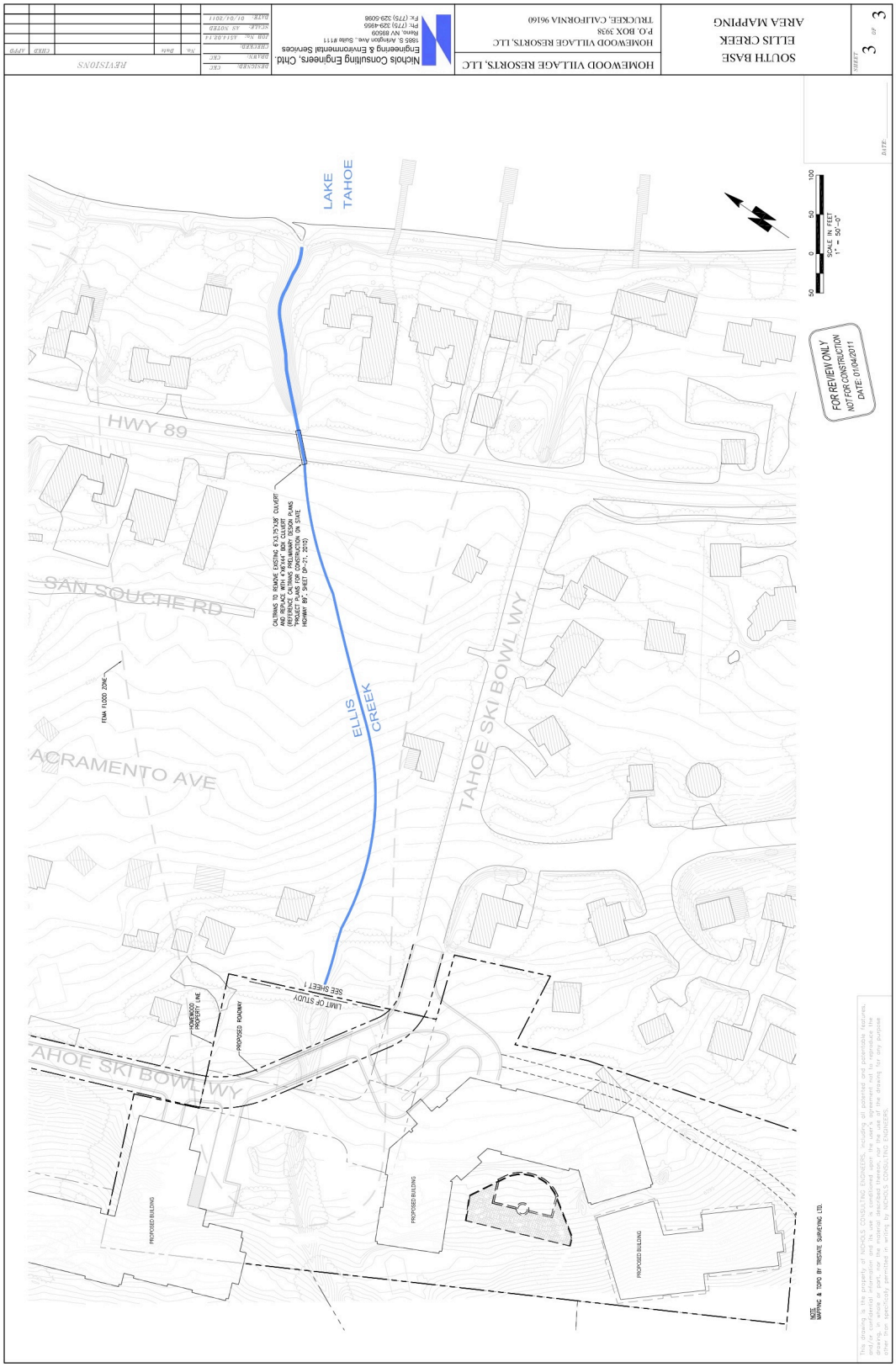


Figure 15-9. Homewood (Ellis) Creek 100-Year Flood Plain (Below Project Area)



TRPA 20-year/1-hour Storm Volumetric Analysis (TRPA Code 25.5.A). Stormwater treatment systems are proposed for the North Base, South Base and Mid-Mountain areas, Tahoe Ski Bowl Way extension, and off-site Caltrans/Placer County/HMR EIP project, as described below. The systems are considered part of the Project and are outlined as compliance measures for conformance with TRPA and Lahontan requirements for project approval and permitting. Under the Proposed Project (Alternative 1) and Alternative 3 existing stormwater treatment systems will be replaced and expanded with systems that are located and sized to capture and treat runoff from proposed impervious coverage and contributing watershed areas in the North Base, South Base and Mid-Mountain areas and along the extended Tahoe Ski Bowl Way.

A range of site-design measures and stormwater treatment measures allow for improved stormwater treatment and infiltration as categorized below:

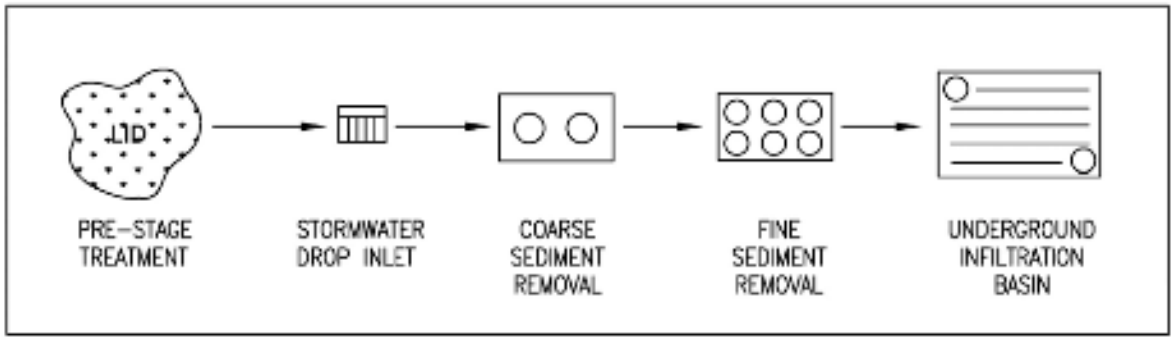
- Site design measures such as clustering development or otherwise laying out the site to reduce impervious area, routing drainage from building roofs to landscaped or bioretention areas, and using pervious pavement.

- Indirect infiltration methods, which allow stormwater runoff to percolate into surface soils. The infiltrated water may either percolate down into subsurface soil sand eventually reach groundwater, or it may be underdrained into subsurface pipes. Examples of indirect infiltration methods include bioretention areas and vegetated swales. Bioretention is defined as an integrated stormwater management practice that uses the chemical, biological and physical properties of plants, microbes and soils to remove, or retain, pollutants from stormwater (Puget Sound Action Team 2005).

- Direct infiltration methods, which are designed to bypass surface soils and transmit runoff directly to subsurface soils and eventually groundwater. These types of devices must be located and designed to limit the potential for groundwater contamination. Examples of direct infiltration methods include infiltration trenches, infiltration basins, infiltration galleries and dry wells.

Figure 15-10 illustrates the typical "treatment train" schematic for the North and South Base areas. Roof runoff and other clean runoff (i.e. stormwater that does not interact directly with pollutant sources) will be conveyed to a bioretention area for indirect infiltration. "Dirty" runoff from parking areas, streets and other managed areas are conveyed directly to stormwater drop inlets to be routed via stormdrain pipe. Runoff conveyed by stormdrain will enter a Contech Vortech® treatment vault for coarse sediment and hydrocarbon removal and then be routed to a Contech Stormfilter® for secondary treatment and fine sediment removal down to 10 microns. After exiting the secondary treatment facility, the stormwater enters the underground infiltration gallery for infiltration and soil treatment. In instances where bioretention areas overlay stormwater infiltration galleries, a portion of clean runoff will bypass the primary and secondary treatment to enter the gallery for infiltration and soil treatment.

Figure 15-10. Treatment Train Schematic Proposed for the North and South Base Areas



Source: Nichols Consulting Engineers 2010

The impervious areas of the North and South Base areas, with the exception of the 16 residential units (Townhomes) and expanded Tahoe Ski Bowl Way, were considered in the capacity sizing for the six underground on-site stormwater infiltration galleries, which effectively function as six individual stormwater treatment systems: North-1, North-2, North-3, North-4, South-1 and South-2 as depicted on Figures 15-11 and 15-12. Civil Plan Sheet D2 illustrates the stormwater gallery design schematic. Stormwater runoff along the Tahoe Ski Bowl Way extension will be treated by bioretention areas for stormwater treatment, as discussed below.

The Project will utilize LID strategies such as porous pavers and pavement, cisterns, heated walkways, revegetation of slopes to improve infiltration of runoff, bioretention areas for stormwater treatment, and revegetation of slopes to improve source control. The bioretention areas will include soil amendments to balance infiltration rates with nutrient uptake, spreading of upland seed mixtures for revegetation, soil stabilization and vegetative uptake, as detailed in Chapter 3 and on preliminary Civil Plan Sheet C2.

The stormwater infiltration galleries are designed to maximize separation between bottom of galleries and the seasonal high water table. TRPA Code of Ordinances Section 25.5.A requires that the bottom of infiltration facilities be a minimum of one foot (12 inches) above the seasonal high water table. The stormwater infiltration galleries are designed to maintain at least 18 to 24 inches of separation between the bottom of the galleries and the seasonal high water table as measured in 2006, 2007 and 2008 (see Appendix D for groundwater data, modeling results and cross-sections of the North and South Base areas).

To determine the vertical and horizontal sphere of influence of stormwater infiltration galleries infiltrating a 20-year, 1-hour storm volume, Kleinfelder staff modeled a 7-day period of infiltration using the UCAM2 model (Unconfined or Confined Analytical Model authored by Brian J. Peck, PG, CHG of Schlumberger Water Services, Inc. Reno Nevada 89502). The maximum-modeled groundwater rise is 0.7 feet directly under stormwater infiltration galleries with the extent of a 0.5-foot rise in the water table extending up to 20 feet from the edge of the gallery. The effect will extend radially because the background groundwater gradient is 0.02 feet/1.0 foot, an extremely shallow gradient. Soil-Hydrologic exhibits attached in Appendix D illustrate the spheres of influences modeled for the stormwater infiltration galleries. The vertical sphere of influence will not result in impacts to stormwater infiltration gallery capacities or function; however, the vertical sphere of influence reduces the separation of bottom of

gallery to the seasonal high water table to 0.8 feet (North-1) and 1.5 feet (North-2, North-3 and North-4) in the North Base area. The seasonal high water table measured at the South Base area is of sufficient depth to maintain separations of 11 feet and 4 feet from the bottom of stormwater infiltration galleries South-1 and South 2, respectively, with consideration of the 0.5-foot vertical sphere of influence.

Because of the complexity of the North Base area and its proximity to Lake Tahoe, TRPA Soil Hydrologic approval conditions require final stormwater systems designs to maintain a minimum two (2) foot separation between bottom of galleries and the seasonal high water table. Mitigation measure HYDRO-2a outlines the conditions for Soil Hydrologic Approval from TRPA.

A description of the proposed stormwater treatment systems follows. Figure 15-11 illustrates the Alternative 1 overall stormwater treatment design for the North Base Area and Figure 15-12 illustrates the overall stormwater treatment design for the South Base Area, noting that the South Base stormwater treatment systems have subsequently been relocated outside of the proposed Placer County ROW as updated on preliminary Civil Plan Sheet C12 (see Figure 3-9). Table 15-9 details the calculations in support of sizing for the stormwater treatment system capacities.

Figure 15-11. Stormwater Treatment Systems – North Base Area (Alternative 1)

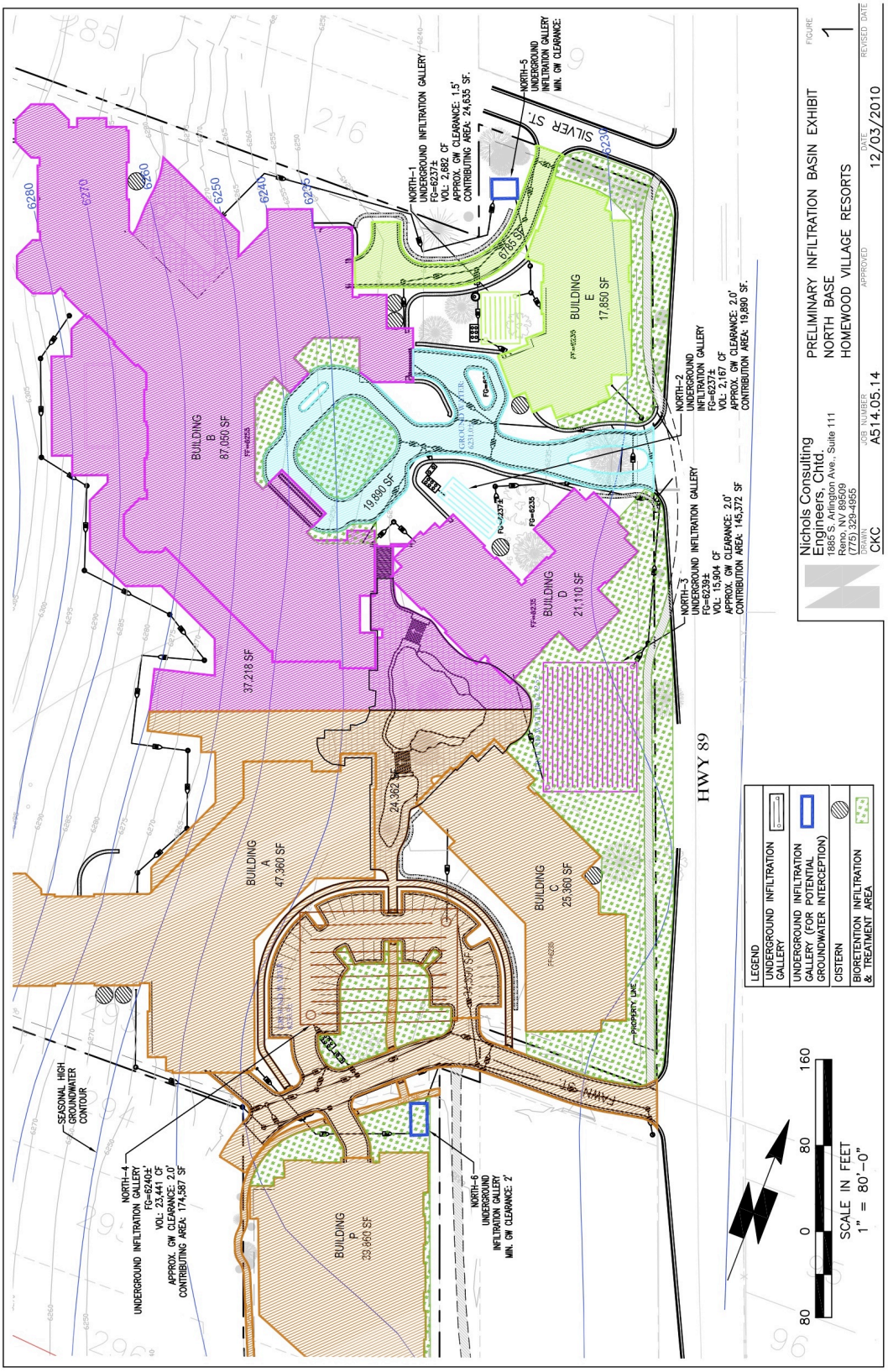


Figure 15-12. Stormwater Treatment Systems – South Base Area (Alternative 1)

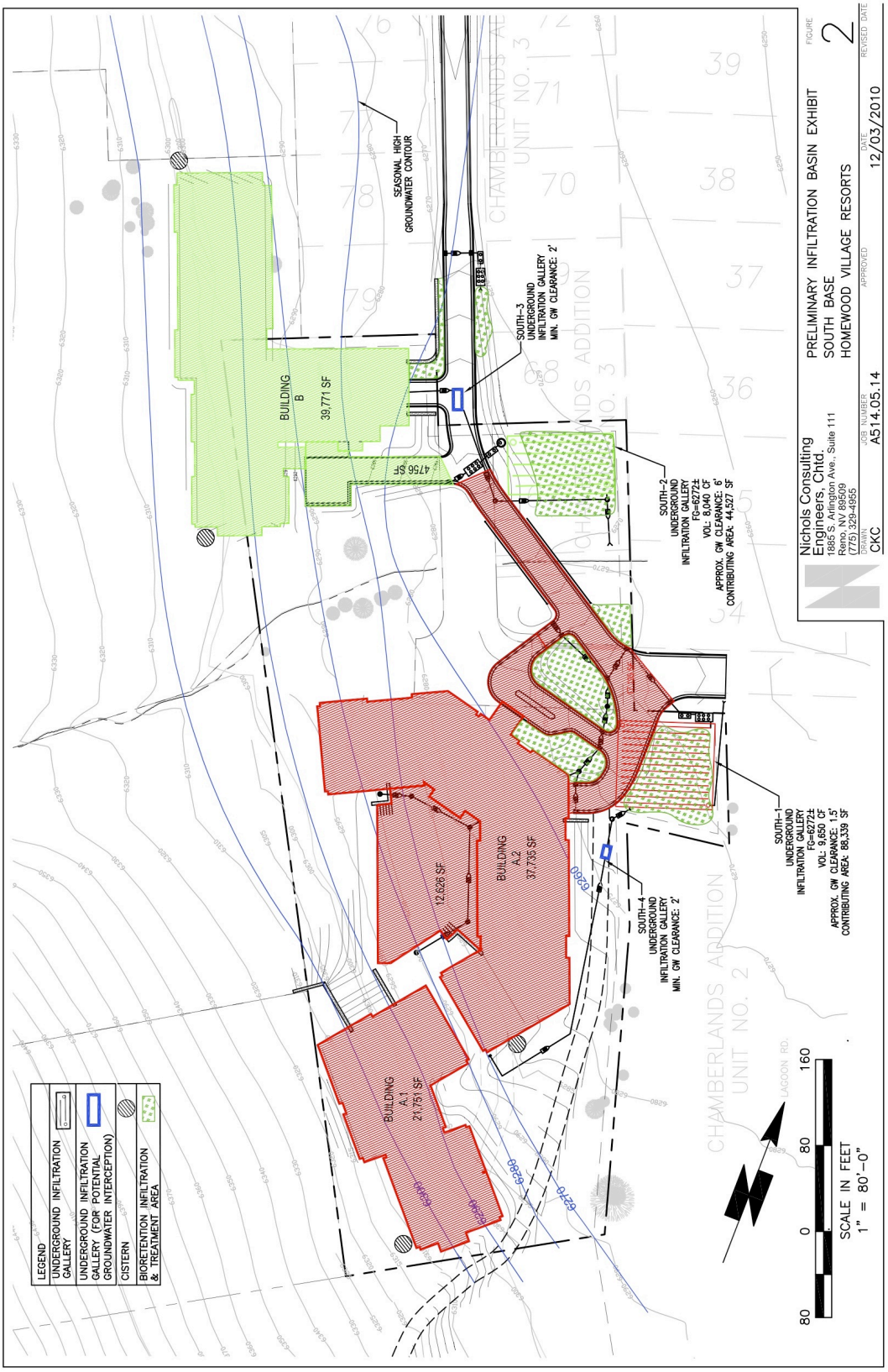


Table 15-9

Stormwater Treatment System Calculations – North, South, Mid-Mountain Areas, Tahoe Ski Bowl Way and Off-site Caltrans/Placer/HMR EIP Project (Alternative 1)

	North #1 Underground Basin	North #2 Underground Basin	North #3 Underground Basin	North #4 Underground Basin	South #1 Underground Basin	South #2 Underground Basin	Tahoe Ski Bowl Way #1	Tahoe Ski Bowl Way #2	Tahoe Ski Bowl Way #3	Mid Mountain	CALTRANS
CONTRIBUTING WATERSHED AREA (sf) *	55,420	43,800	285,400	337,400	332,900	169,030	71,200	33,600	157,400	280,400	
OPEN SPACE AREA* (sf)											
Total Open Space Area	30,785	23,910	47,416	108,027	114,853	75,253	9,271	17,534	85,691	158,289	
TREATED PERVIOUS AREA* (sf)											
Type A Revegetation Strategy (cf) **	0	0	45,293	16,423	45,810	2,450	15,140	0	0	64,023	
Type B Revegetation Strategy (cf) **	0	0	47,313	45,523	82,930	46,800	27,000	0	0	12,100	
Total Contributing Pervious Area	0	0	92,606	61,946	128,740	49,250	42,140	0	0	76,123	
CONTRIBUTING IMPERVIOUS AREA* (sf)											
North Base Buildings											
Building A	0	0	0	47,360	0	0	0	0	0	0	0
Building B	0	0	87,050	0	0	0	0	0	0	0	0
Building C	0	0	0	25,360	0	0	0	0	0	0	0
Building D	0	0	21,110	0	0	0	0	0	0	0	0
Building E	17,850	0	0	0	0	0	0	0	0	0	0
Building P	0	0	0	32,700	0	0	0	0	0	0	0
Hardscape	0	0	37,218	27,617	0	0	0	0	0	0	0
Road	6,785	19,890	0	34,390	0	0	0	0	0	0	0
South Base Buildings											
Building A.1	0	0	0	0	21,751	0	0	0	0	0	0
Building A.2	0	0	0	0	37,735	0	0	0	0	0	0
Building B	0	0	0	0	0	39,771	0	0	0	0	0
Hardscape	0	0	0	0	12,626	0	0	0	0	0	0
Road	0	0	0	0	17,195	4,756	0	0	0	0	0
Tahoe Ski Bowl Way											
Townhomes	0	0	0	0	0	0	0	0	43,280	0	0
Road	0	0	0	0	0	0	19,789	16,066	28,429	0	0
Mid-Mountain											
Building	0	0	0	0	0	0	0	0	0	45,988	0
Off-site Water Quality Mitigation (CALTRANS ROW)											
Roadway											28,314
Total Impervious Area (sf)	**24,635**	**19,890**	**145,378**	**167,427**	**89,307**	**44,527**	**19,789**	**16,066**	**71,709**	**45,988**	**28,314**
Required Infiltration Volume - 20yr/1hr Storm (cf)	**2,053**	**1,658**	**12,115**	**13,952**	**7,442**	**3,711**	**1,649**	**1,339**	**5,976**	**3,832**	
INFILTRATION VOLUME (cf)											
REQUIRED											
Required Infiltration Volume (cf)	2,053	1,658	12,115	13,952	7,442	3,711	1,649	1,339	5,976	3,832	
PROPOSED											
Proposed Infiltration Gallery Capacity (cf)	2,681	2,167	15,904	23,441	9,650	8,040	See LID	See LID	See LID	See LID	
"OVER & ABOVE" INFILTRATION											
Proposed Infiltration Gallery Capacity "Over and Above" 20yr/1hr Capacity (cf)	628	510	3,789	9,489	2,208	4,329	NA	NA	NA	NA	
Percentage "Over and Above" 20yr/1hr Capacity **	**30.6%**	**30.7%**	**31.3%**	**68.0%**	**29.7%**	**116.7%**	**-**	**-**	**-**	**-**	

	North #1 Underground Basin	North #2 Underground Basin	North #3 Underground Basin	North #4 Underground Basin	South #1 Underground Basin	South #2 Underground Basin	Tahoe Ski Bowl Way #1	Tahoe Ski Bowl Way #2	Tahoe Ski Bowl Way #3	Mid Mountain	CALTRANS
LID* STRATEGY REDUCTIONS (cf)											
Porous Pavers/Pavement (cf) **	0	0	321	525	0	0	0	0	0	0	
Cisterns (cf) (Roof Runoff Volume Removed)**	600	0	2,400	2,400	1,200	1,200	0	0	0	0	
Bioretention Area for Stormwater Treatment (cf) **	4,205	4,327	6,806	8,969	3,036	566	1,780	1,600	7,436	4,000	
Total LID Volume Reductions (cf)* **	**4,805**	**4,327**	**9,527**	**11,894**	**4,236**	**1,766**	**1,780**	**1,600**	**7,436**	**4,000**	
TOTAL REDUCTIONS											
REQUIRED											
Required Infiltration Volume (cf)	2,053	1,658	12,115	13,952	7,442	3,711	1,649	1,339	5,976	3,832	
PROPOSED											
Proposed Infiltration Gallery Capacity "Over and Above" 20yr/1hr Capacity (cf)	628	510	3,789	9,489	2,208	4,329	0	0	0	0	
Proposed LID Volume Reductions (cf)	4,805	4,327	9,527	11,894	4,236	1,766	1,780	1,600	7,436	4,000	
"OVER & ABOVE" INFILTRATION											
Total "Over and Beyond" Capacity (cf)**	5,433	6,494	25,431	35,335	13,886	9,806	1,780	1,600	7,436	4,000	
Total Percentage "Over and Above" 20yr/1hr Capacity **	**165%**	**292%**	**110%**	**153%**	**87%**	**164%**	**8%**	**20%**	**24%**	**4%**	
TREATMENT VAULT FLOW (cfs)											
REQUIRED											
Treatment Vault Flow for 20yr/1hr (cfs)	0.148	0.443	-	0.750	0.375	0.161	0.431	0.351	0.62	-	
PROPOSED											
Proposed Treatment Vault Flow (cfs)	0.222	0.665	-	1.125	0.563	0.242	0.647	0.527	0.930	-	
"OVER & ABOVE" TREATMENT CAPACITY (cfs)											
Percentage "Over and Above" 20/yr/1hr Vault Flow	50%	50%	-	50%	50%	50%	50%	50%	50%	-	

Source: NCE and HBA 2010

Table 15-9 Notes:
Impervious coverage (i.e., land coverage) is detailed in Tables 14-4 and 14-6 in Chapter 14, Geology, Soils ands Seismicity.

*** Definition of Terms:**

1. Contributing watershed area = Open Space + Pervious Area + Impervious Area
2. Open Space = undisturbed area with no change to existing infiltration rates
3. Pervious Areas = areas that have no land coverage but will have infiltration rates increased through Type A or Type B Revegetation Strategies as described in Chapter 3.
4. Impervious Areas = area that will have land coverage and will require infiltration of captured and conveyed stormwater runoff
5. LID = a site design strategy with a goal of maintaining or replicating the pre-development hydrologic regime through the use of design strategies to create a functionally equivalent hydrologic landscape (EPA 2000). LID Strategies effectively attenuate, disconnect or remove a volume of runoff that does not require mechanical pretreatment prior to entering the stormwater system.

**** Calculations and Assumptions:**

1. Type A Revegetation Strategy (cf) = Area (sf) * Depth (12 inches) * 30% void space = Volume (cf). Strategy is detailed in Chapter 3, Description of Proposed Project and Alternatives.
2. Type B Revegetation Strategy (cf) = Area (sf) * Depth (12 inches) * 30% void space = Volume (cf). Strategy is detailed in Chapter 3, Description of Proposed Project and Alternatives.
3. Infiltration Rates = To be suitable for infiltration, underlying soils should have an infiltration rate of 0.52 in/hr or greater, as initially determined from NRCS soil textural classification, and subsequently confirmed by field geotechnical tests (SMRC www.stormwatercenter.net accessed October 8, 2010). The soils within the North and South Base areas have infiltration rates measured at 4 in/hr (Kleinfelder 2010)
4. Bioretention calculation= (Bioretention area, sf) * (depth, 1.5 ft) * (void space, 30%); Minimum soil depth is 1.5 feet (18 inches to provide acceptable minimum pollutant attenuation and good growing conditions for selected plants. Void space is recommended at 30% to dictate the composition of engineered soils and maintain a minimum long-

term hydraulic conductivity of 1.0 in/hr; up to 40% void space is typically used in bioretention planting mix soils (Puget Sound Action Team 2005). A porosity value or void space (Vv/Vt) of 0.32 can be used to design for infiltration practices (SMRC www.stormwatercenter.net accessed October 8, 2010).

5. Porous Paver Calculation= (porous paver area, sf) * (20Yr-1Hr storm, 1 inch) = volume (cf) * 40%= reduction of stormwater volume; Porous pavers and pavement allow stormwater to infiltrate into underlying soils promoting pollutant treatment and recharge as opposed to producing large volumes of runoff requiring conveyance and treatment. Porous pavers have been measured to reduce stormwater runoff volumes by up to 80% depending on site conditions and maintenance (EPA 2000). The conservative assumption of 40% is used in the reduction equation to assure systems are not undersized and to consider late winter and early spring site conditions for cold weather climates.
6. Cisterns = Total Cistern Capacity, cf = Total Volume Reduction from Stormwater Treatment System, cf; the reduction is long-term storage and is primarily clean runoff from roofs that does not require mechanical treatment.
7. Percentage "Over & Above" Capacity= [(Proposed Infiltration Gallery Capacity, cf) - (Required Infiltration Volume, cf)] / (Required Infiltration Volume, cf)
8. Total "Over and Above" Capacity = (Proposed Infiltration Gallery Capacity "Over and Above" 20yr/1hr Capacity (cf) + Proposed LID Volume Reductions, cf)
9. Total Percentage "Over and Above" 20yr/1hr Capacity = (Total "Over and Beyond" Capacity - Required Infiltration Volume, cf)/(Required Infiltration Volume, cf))

***** Bioretention Area Reductions**

1. The calculations do not consider runoff directed to bioretention areas located directly above stormwater infitlration galleries North-3, North-4, South-1 and South-2 in reduction pecentages, as to not overstate the "over and above" treatment capacities. To provide the most conservative calculations a 5 -foot buffer from the edge of gallery is included in the adjustment. This runoff will still enter stormwater infiltration galleries for further soil treatment but will not increase runoff volumes to Vortech vaults and Contech Stormfilters.

Underground Gallery North-1. North-1 conveyance begins at the northern most entrance road off of Silver Street. Stormwater runoff is collected in the drop inlets near the Silver Street intersection and conveyed south to the first treatment vault (Vortechs) for coarse sediment removal. The vault is sized to convey 0.222 cfs, which is 50 percent greater than the required flow rate. After leaving the Vortechs unit the stormwater is routed to the secondary treatment facility (Contech Stormfilter) for fine sediment removal down to 15 microns. Immediately after exiting the secondary treatment facility the stormwater enters the stormwater infiltration gallery for soil treatment. North-1 has the capacity to infiltrate up to 2,681 cubic feet of runoff, which exceeds the TRPA Code of Ordinances requirement to capture and treat the 20-year/1-hour storm volume (2,053 cubic feet) by close to 31 percent.

One cistern tank (600 cubic feet removed) will capture a portion of Building E roof runoff. The remaining runoff is routed to North-1. A bioretention area is proposed along SR 89. The bioretention area and cistern hydrologically disconnect or attenuate 4,805 cubic feet of runoff to increase the treatment capacity of North-1 to 165 percent above the TRPA required infiltration volume.

The separation of the bottom of North-1 to the seasonal high water table is 1.5 feet. During stormwater infiltration, this separation decreases to 0.8 feet, which poses a potentially signficant impact. Mitigation measure HYDRO-2a details the actions required to reduce this potential impact from planned stormwater treatment systems to a level of less than significant.

Underground Gallery North-2. North-2 conveyance begins on the hotel entrance road with snowmelt occurring over the heated walkway area. Stormwater runoff sheet flows across the hotel building road and into the bioretention area for stormwater treatment in the middle of the roundabout. Overflow for this bioretention area is provided through a curb cut-out to a drop inlet on the east side of the roundabout that ultimately ends in the stormwater infiltration gallery.

Stormwater that does not enter the bioretention area is conveyed through a stormdrain pipe to the first treatment vault (Vortechs) for coarse sediment removal. The vault is sized to convey 0.665 cfs, which is 50 percent greater than the required flow rate. After leaving the Vortechs unit the stormwater is routed to the secondary treatment facility, a Contech Stormfilter, for fine sediment removal down to 15 microns. Immediately after exiting the secondary treatment facility the stormwater enters the stormwater infiltration gallery for soil treatment. North-2 has the capacity to infiltrate up to 2,167 cubic feet of runoff, which exceeds the TRPA Code of Ordinances requirement to capture and treat the 20-year/1-hour storm volume (1,658 cubic feet) by close to 31 percent.

Bioretention areas are proposed around the hotel entrance road and roundabout, which will hydrologically disconnect or attenuate 4,327 cubic feet of runoff, increase the potential treatment capacity of North-2, reduce total runoff volumes entering North-2 and allow for treatment capacity that is 292 percent more than the TRPA required infiltration volume.

Underground Gallery North-3. North-3 conveyance begins at the hardscape (i.e., ice skating rink area) in the middle of the North Base area redevelopment. Runoff from the hardscape is directed to the bioretention area east of the ice rink for stormwater treatment. Roof runoff is directed to the four cisterns located next to Buildings B and D, the bioretention areas sited along the perimeter of the hotel roundabout and east of the ice rink towards SR 89, or the stormwater infiltration gallery by means of stormdrain pipe.

Three cistern tanks (approximately 1,800 cubic feet of storage) will capture Building B roof runoff and one cistern tank (approximately 600 cubic feet) will capture Building D roof runoff. The remaining runoff is routed to the bioretention area east of the ice rink and to North-3.

North-3 has the capacity to infiltrate up to 15,904 cubic feet of runoff, which exceeds the TRPA Code of Ordinances requirement to capture and treat the 20-year/1-hour storm volume (12,115 cubic feet) by just over 31 percent. LID strategies, including porous pavers and pavement (321 cubic feet reduction), the cisterns (2,400 cubic feet removed and stored), bioretention areas (6,806 cubic feet reduction) described above, and serve to hydrologically disconnect or attenuate runoff volumes to North-3. The reduction and attenuation in runoff volume increases the potential treatment capacity of North-3 to 110 percent above the TRPA required infiltration volume.

Type A and Type B revegetation techniques that increase soil infiltration rates and water holding capacity on the slopes above the North Base area will be applied to 45,293 and 47,313 square feet, respectively. These revegetation areas are not considered in the direct stormwater treatment capacity calculations, but are noted as important LID alternatives in replacement of cutoff trenches that would capture and convey surface runoff from these steeper contributing slope area to existing down stream drainage systems or channels.

The separation of the bottom of North-2 to the seasonal high water table is 2 feet. During stormwater infiltration, this separation decreases to 1.5 feet, which poses a potential impact. Mitigation measure HYDRO-2a details the actions required to reduce this potential impact from planned stormwater treatment systems to a level of less than significant.

Underground Gallery North-4. North-4 conveyance begins at the eastern end of Fawn Street. This road runoff sheet flows to drop inlets along the curb and gutter. Runoff is then conveyed west to the first treatment vault (Vortechs) for coarse sediment removal. The vault is sized to convey 1.125 cfs, which is 50 percent greater than the required flow rate. After leaving the Vortechs unit the stormwater is routed to the secondary treatment facility, a Contech Stormfilter, for fine sediment removal down to 15 microns. Immediately after exiting the secondary treatment facility, runoff enters the infiltration gallery for soil treatment.

Hardscape runoff (ice rink area) is directed to the bioretention area east of the ice rink. Roof runoff from Buildings C and P is directed to bioretention areas surrounding the buildings. Overflow for the bioretention areas is provided by curb cutouts at low points to direct the runoff into the above mentioned drop inlet system, ultimately reaching the underground infiltration gallery. Three cistern tanks (1,800 cubic feet removed and stored) will capture Building A roof runoff and one cistern tank (600 cubic feet removed and stored) will capture Building C roof runoff. The remaining runoff is routed to the adjacent bioretention areas and infiltration gallery, North-4, under the horseshoe parking lot area.

North-4 has the capacity to infiltrate up to 23,441 cubic feet of runoff, which exceeds the TRPA Code of Ordinances requirement to capture and treat the 20-year/1-hour storm volume (14,549 cubic feet) by 61 percent. LID strategies, including porous pavers and pavement (545 cubic feet reduction), four cisterns (2,400 cubic feet removed and stored) and bioretention areas (11,894 cubic feet reduction) described above, serve to hydrologically disconnect or attenuate runoff volumes to North-4. This reduction and attenuation of this runoff volume subsequently increases the potential treatment capacity of North-4 to 153 percent above the TRPA required infiltration volume.

Type A and Type B revegetation techniques to increase soil infiltration rates and water holding capacities on the slopes above the North Base area will be applied to 16,423 and 45,523 square feet, respectively. These revegetation areas are not considered in the direct stormwater treatment capacity calculations, but are noted as important LID alternatives in replacement of cutoff trenches that would capture and convey surface runoff from these steeper contributing slope area to existing down stream drainage systems or channels.

The separation of bottom of North-4 to the seasonal high water table is 2.0 feet. During stormwater infiltration, this separation decreases to 1.5 feet, which poses a potential impact. Mitigation measure HYDRO-2a details the actions required to reduce this potential impact from planned stormwater treatment systems to a level of less than significant.

Underground Gallery South-1. South-1 conveyance begins on the road just north of Homewood Creek. Runoff sheet flows south over the road to drop inlets and is conveyed to the first treatment vault (Vortechs) for coarse sediment removal. The vault is sized to convey 0.563 cfs, which is 50 percent greater than the required flow rate. After leaving the Vortechs unit the stormwater is routed to the secondary treatment facility, a Contech Stormfilter, for fine sediment removal down to 15 microns. Immediately after exiting the secondary treatment facility the stormwater enters the infiltration gallery for soil treatment.

Two cistern tanks (1,200 cubic feet removed and stored) will capture Building A.1 & A.2 roof runoff. Excess roof and hardscape runoff will be directed to bioretention areas surrounding Buildings A.1 & A.2. In case of overflow, curb cutouts are provided at low points to direct the runoff into the above mentioned drop inlet system, ultimately accessing South-1 adjacent to the drop-off area.

South-1 has the capacity to infiltrate up to 9,650 cubic feet of runoff, which exceeds the TRPA Code of Ordinances requirement to capture and treat the 20-year/1-hour storm volume (7,442 cubic feet) by almost 30 percent. LID strategies, including the cisterns (1,200 cubic feet removed and stored) and bioretention areas (5,481 cubic feet reduction) described above, serve to hydrologically disconnect or attenuate runoff volumes to South-1. This reduction and attenuation of runoff volume subsequently increases the potential treatment capacity of South-1 to 87 percent above the TRPA required infiltration volume.

Type A and Type B revegetation techniques to increase soil infiltration rates on the slopes above the North Base area will be applied to 45,810 and 82,930 square feet, respectively. These revegetation areas are not considered in the direct stormwater treatment capacity calculations, but are noted as important LID alternatives in replacement of cutoff trenches that would capture and convey surface runoff from these steeper contributing slope area to existing down stream drainage systems or channels.

Underground Gallery South-2. South-2 conveyance begins at the roundabout drop-off area for Building B. Stormwater is conveyed east to the first treatment vault (Vortechs) for coarse sediment removal. The vault is sized to convey 0.242 cfs, which is 50 percent greater than the required flow rate. After leaving the Vortechs unit the stormwater is routed to the secondary treatment facility, a Contech Stormfilter, for fine sediment removal down to 15 microns. Immediately after exiting the secondary treatment facility the stormwater enters the infiltration gallery for soil treatment.

Approximately 150 linear feet of road runoff north of the Building B drop-off road sheet flows to the curb and gutter and is conveyed north to the drop inlets on Tahoe Ski Bowl Way. The stormwater flows through the drop inlets and enters the first treatment vault

(Vortechs) for coarse sediment removal. The vault is sized to convey 0.242 cfs, which is 50 percent greater than the required flow rate. After leaving the Vortechs unit the stormwater is routed to the secondary treatment facility, a Contech Stormfilter, for fine sediment removal down to 15 microns. Immediately after exiting the secondary treatment facility the stormwater is dispersed into a bioretention area adjacent to the road for infiltration and soil treatment.

Roof runoff will be directed to bioretention areas adjacent to the buildings or to the stormwater treatment system described above. Overflow for the bioretention areas is provided by curb cutouts at low points to direct the water into the above mentioned drop inlet system, ultimately entering South-2. Two cistern tanks (1200 cubic feet removed and stored) is provided to capture Building B roof runoff with the remaining runoff routed to the bioretention area and South-2.

South-2 has the capacity to infiltrate up to 8,040 cubic feet of runoff, which exceeds the TRPA Code of Ordinances requirement to capture and treat the 20-year/1-hour storm volume (3,711 cubic feet) by almost 117 percent. LID strategies, including the cisterns (1,200 cubic feet removal) and bioretention areas (2,686 cubic feet reduction) described above, serve to hydrologically disconnect or attenuate runoff volumes to South-2. This reduction and attenuation of runoff volume subsequently increases the potential treatment capacity of South-2 to 164 percent above the TRPA required infiltration volume.

Type A and Type B revegetation techniques to increase soil infiltration rates on the slopes above the North Base area will be applied to 2,450 and 46,800 square feet, respectively. These revegetation areas are not considered in the direct stormwater treatment capacity calculations, but are noted as important LID alternatives in replacement of cutoff trenches that would capture and convey surface runoff from these steeper contributing slope area to existing down stream drainage systems or channels.

Maintenance for Underground Infiltration Galleries North, 1, North-2, North-3, North-4, South-1 and South-2. An Inspection, Maintenance and Monitoring Plan will be completed based on the final design of the selected alternative and as required for project approval and permitting. Underground infiltration galleries will be regularly inspected and cleaned, seasonally and following significant precipitation events, to prevent an accumulation of build up that could inhibit filtration effectiveness or reduce treatment capacities. Cleaning will be completed at the discretion of maintenance personnel to maintain proper storage and flow, preferably during a relatively dry period. The Monitoring and Reporting Program of the WDRs require sampling of discharge from the systems to measure compliance with discharge to land water quality objectives. The following is the manufacturers recommended procedure for inspections and maintenance:

1) Remove lid from riser.

2) Measure sediment buildup at each riser and cleanout location. If measured buildup is between five and 20 percent of the pipe diameter, cleaning should be planned based on occurrence and severity of next precipitation event. If sediment buildup exceeds 20 percent, cleaning should be performed at the earliest opportunity.

3) Inspect and remove sediment build up from each manifold, all laterals and outlet pipes.

4) A thorough cleaning of the system (manifolds and laterals) should be performed by either manual methods or by a vacuum truck. A vacuum truck or a water-jetting can be connected to the system at the cleanout ports. These are

usually four, six or eight-inch diameter pipe and are placed on the manifold fittings.

Tahoe Ski Bowl Way Extension. Figure 15-13 illustrates the stormwater treatment approach for the Tahoe Ski Bowl Way portion of the Project area, including treatment vault and bioretention area layout. Bioretention areas will infiltrate the roadway runoff after the stormwater is conveyed through pre-treatment facilities.

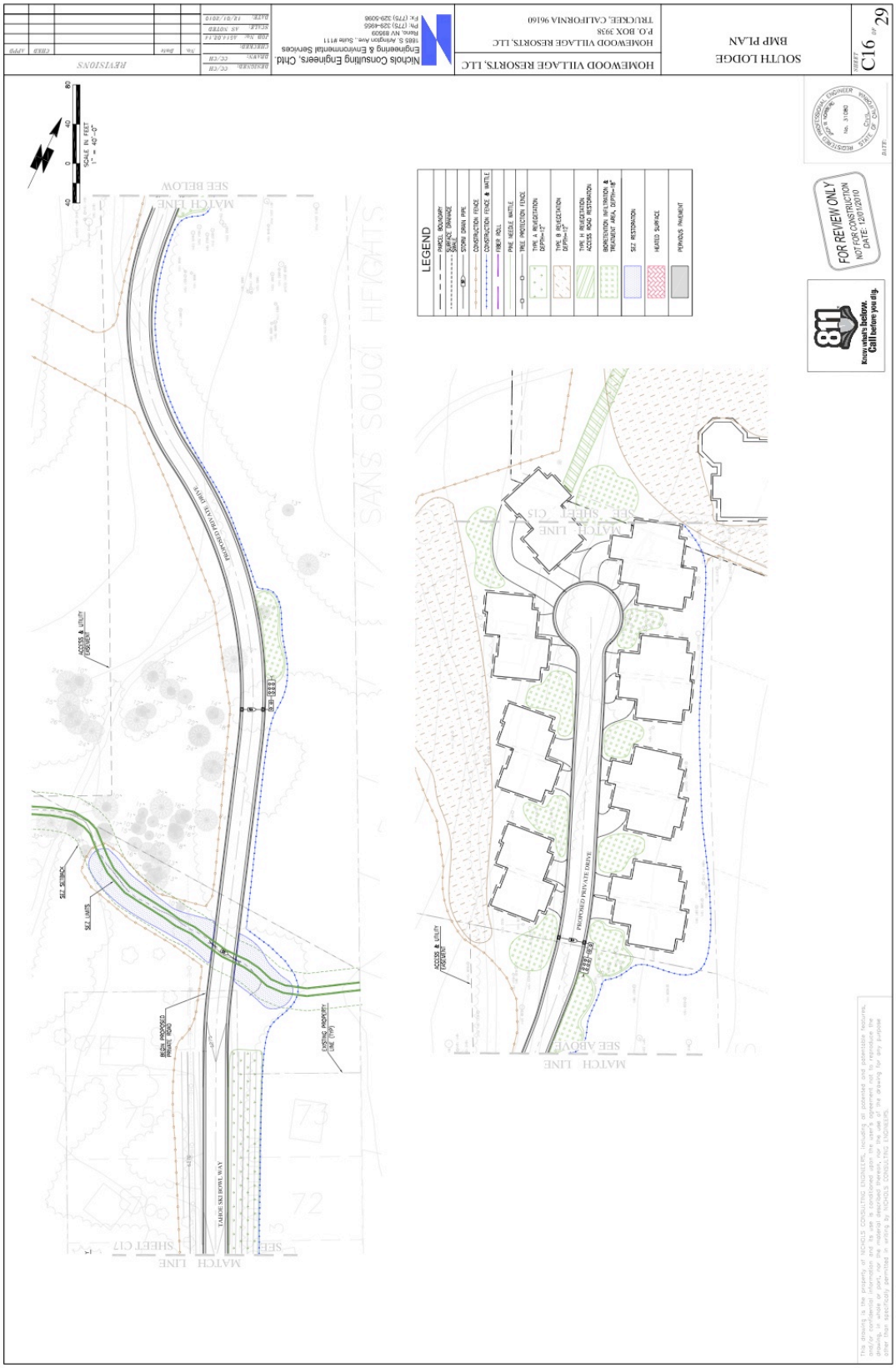
Stormwater conveyance along the Tahoe Ski Bowl Way Extension is broken into two sections. The first section includes road runoff sheet flowing to a drop inlet at a low point on Tahoe Ski Bowl Way approximately half way in between the South Base Area and the proposed Townhomes. The runoff will enter the primary and secondary treatment vaults before being dispersed into the bioretention area for stormwater treatment. Stormwater is conveyed first to the treatment vault (Vortechs) for coarse sediment removal. The vault is sized to convey 0.647 cfs, which is 50 percent greater than the required flow rate. After leaving the Vortechs unit the stormwater is routed to the secondary treatment facility, a Contech Stormfilter, for fine sediment removal down to 15 microns. Immediately after exiting the secondary treatment facility the stormwater enters a bioretention area sized to infiltrate 1,780 cubic feet of runoff, which exceeds the TRPA Code of Ordinances requirement to capture and treat the 20-year/1-hour storm volume (1,649 cubic feet) by 8 percent.

The second section includes approximately 600 linear feet of the roadway leading up to the Townhome turnaround. Stormwater runoff will sheet flow to the curb and gutter and flow north to the drop inlets south of the Townhomes. The runoff will enter the primary and secondary treatment vaults before being dispersed into the bioretention area for soil treatment. The vault is sized to convey 0.527 cfs, which is 50 percent greater than the required flow rate. The bioretention areas are sized to treat 1,600 cubic feet of runoff, which exceeds the TRPA Code of Ordinances requirement to capture and treat the 20-year/1-hour storm volume (1,339 cubic feet) by 20 percent.

Approximately 15,140 square feet will receive Type A revegetation treatment and 27,000 square feet of Type B revegetation to increase soil infiltration rates.

Townhome roof runoff is directed to adjacent bioretention areas for infiltration and soil treatment. Bioretention areas are sized to treat 7,436 cubic feet of runoff, which exceeds the TRPA Code of Ordinances requirement to capture and treat the 20-year/1-hour storm volume (5,976 cubic feet) by 24 percent.

Figure 15-13. Stormwater Treatment Systems – Tahoe Ski Bowl Way



The proposed systems are based on a design that assumes maximum allowable land coverage for each unit or a worst-case scenario for analysis to assume that at a minimum, peak runoff volumes from the TRPA design storm can be retained, treated and infiltrated on site.

Mid-Mountain Area. Figure 15-14 illustrates the stormwater treatment approach for the Mid-Mountain portion of the Project area. The bioretention areas proposed at the Mid-Mountain assume a maximum depth of five feet. The layout consists of several bioretention infiltration areas, each serving the proposed buildings.

Stormwater runoff uphill of the Mid-Mountain Lodge will be infiltrated in the Type B revegetation area uphill of the proposed gravel access road. Runoff downhill of the proposed road will sheet flow to the bioretention area adjacent to the lodge and proposed road. Overflow from the bioretention area will be conveyed through stormdrain pipe under the proposed road into a secondary bioretention area and ultimately reach the over-sized bioretention areas downhill of the development for infiltration and soil treatment.

Mid-Mountain roof runoff is conveyed separately for each building via stormdrain pipe to bioretention areas downhill of the proposed development for infiltration and soil treatment. The Mid-Mountain system will treat 4,000 cubic feet of runoff, which is 4 percent greater than the required 20-year/1-hour storm volume.

Type A and Type B revegetation strategies will be applied to 64,023 and 12,100 square feet of disturbed area to increase soil infiltration rates by increasing void space to approximately 30 percent up to one foot in soil depth (See Chapter 3 for additional details on revegetation strategies). These revegetation areas are not considered in the direct stormwater treatment capacity calculations, but are noted as important LID alternatives in replacement of cutoff trenches for the water tanks that would capture and convey surface runoff from steep slope areas to traditional infiltration systems. A swale is proposed at the top of the water tank slopes per preliminary Civil Plan sheet C18. Runoff will be infiltrated on the length of the slopes of the water tanks. No runoff will flow along the access road and thus no ditch improvements will be necessary.

Off-Site Caltrans/HMR EIP Project.

Working in conjunction with Caltrans, HMR will provide additional treatment for off-site stormwater through a cooperative formed between the HMR and Caltrans. Caltrans will implement EIP project No. 996 and install two water quality treatment basins. HMR will contribute between $150,000 to $200,000 dollars towards a Contech Stormfilter or similar vault for treatment of fine sediment removal down to 15 microns particle size. The vault will serve as secondary treatment for the removal of fine sediments. HMR will not construct physical improvements; HMR will provide a monetary contribution only towards the EIP project, with Caltrans being responsible for environmental review, permitting, design, and construction of the improvements.

The runoff generated from the contributing areas along SR 89 and conveyed through the stormwater treatment system is approximately 3,600 cubic feet (cf) for the 20-year/1-hour storm. Vault flows would equal: 10-year = 3.54 cfs, 25-year = 4.28 cfs, 100-year = 5.39 cfs.

A simple schematic to document the proposed off-site project is illustrated in Figure 15-15. Preliminary civil plans for the EIP project are found in Appendix BB.

Figure 15-14. Stormwater Treatment Systems – Mid-Mountain Area

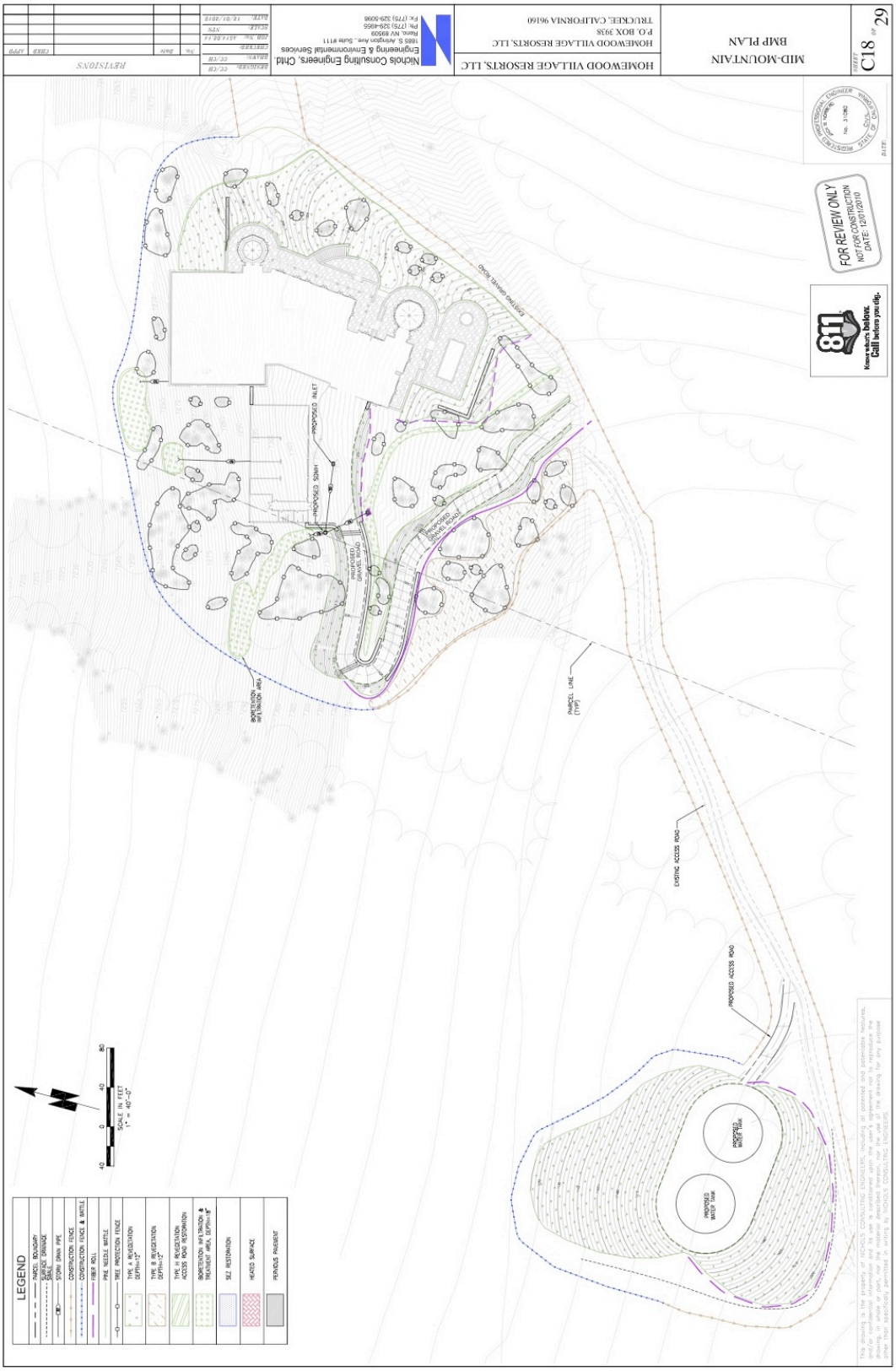
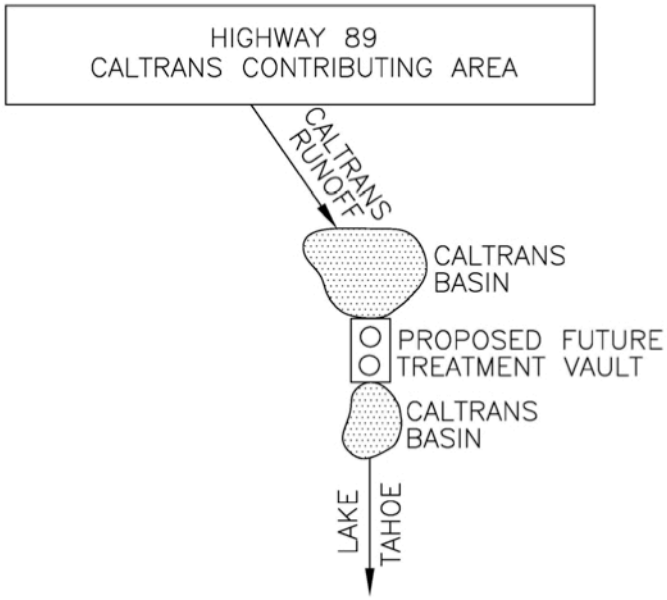


Figure 15-15. Off-Site EIP Project Design Schematic



Source: Nichols Consulting Engineers 2009

Placer County 10-year and 100-year Peak Flow Analysis. The following analysis is based on the Preliminary Drainage Report for Homewood Mountain Resort attached in Appendix X (NCE 2010). Placer County will require a final drainage report at the time of Improvement Plan review that addresses project design criteria. Typically, Placer County considers the impacts of a project "altering existing drainage of the site or area" or "increasing the rate or amount of surface runoff" as significant impact requiring mitigation. Under Placer County codified regulations, the 10-year event is the minimum design storm for sizing drainage facilities and new development must be planned and designed so that no damage occurs to structures or improvements and to prevent loss of life during the 100-year storm event.

The criteria set forth in the Placer County SWMM dictate the evaluation of existing and proposed stormwater runoff peak flows from the Project area, as analyzed using the Small Watershed Peak Flow Worksheet outlined in the SWMM. The method is based on the relationship between the characteristic watershed response time and peak flow per unit area form precipitation patterns typical for the region. The peak flow is a function of the area, unit peak flow, infiltration rate and impervious surface area, as reported in the tables in section 3.2, Peak Flow Analysis, of Appendix X for summer and winter precipitation regimes. Conclusions in the Preliminary Drainage Report state that the design for the Proposed Project (Alternative 1) and Alternative 3 incorporates current requirements by Placer County for stormwater collection and conveyance as well as the requirements by the TRPA. The SWMM post-development calculations show a cumulative reduction in peak flow from existing to proposed conditions for the 10 and

100-year storm events. The proposed stormwater treatment systems for collection, conveyance and infiltration will comply with the Placer County SWMM dated September 1, 1990.

Placer County staff review of the Preliminary Drainage Report indicates that the report adequately demonstrates that the proposed development has a less than significant impact on peak flow runoff leaving the Project area. Therefore, Placer County does not require onsite stormwater detention capacity in excess of the systems proposed as part of the Proposed Project (Alternative 1) and Alternative 3.

Although the Project will improve upon project area drainage, reduce post-project runoff volumes and maintain peak flows compared to existing conditions, implementation of standard mitigation measures HYDRO-2b, HYDRO-2c and HYDRO-2d assure compliance with Placer County codified regulations to reduce impacts from drainage and stormwater runoff to a level of less than significant. Implementation of these measures minimize potential impacts to down-gradient properties and existing drainage facilities by assuring that the rate or amount of surface runoff does not exceed existing conditions and does not significantly impact downstream properties or existing drainage facilities.

Existing Surface Water Drainage Patterns, Flooding, and Stream Bank Erosion. The Proposed Project (Alternative 1) and Alternative 3 will not alter the existing surface water drainage patterns of Quail Lake Creek, Madden Creek or the unnamed channels within the Project area. No existing flooding impacts have been identified along these drainages. The Proposed Project (Alternative 1) and Alternative 3 do not propose changes in the Project area that will increase flood risk or stream bank erosion resulting from increased flooding along these drainages.

The Proposed Project (Alternative 1) and Alternative 3 will daylight Homewood Creek, which is currently collected and piped under the north-south extension of Tahoe Ski Bowl Way. Downstream impacts to Homewood Creek streambanks below the Project area were identified during channel evaluations completed in 2006 and 2007 (Kleinfelder 2007). Approximately 48 percent of the stream channel located in the South Base area to Lake Tahoe (RM 0.0 – RM 0.7 as depicted on Figure 15-2) was rated Unstable. Bank instability between RM 0.3 and 0.68 appears to be from mass wasting sites along a steep gradient. Overall Stable and Vulnerable banks are 29 percent and 23 percent, respectively. In the lower 0.2 mile of the channel, undercutting was observed.

The SEZ in the South Base area will be restored to a more natural state with the removal of the culvert and the day lighting of the stream channel under Alternatives 1 and 3. In its existing condition, Homewood Creek is highly constrained with steep banks and a culverted section under the South Base parking area. To alleviate the Project area's contribution to downstream channel impacts and flood risk, the existing culvert in the South Base parking lot will be removed, TRPA verified existing land coverage within the SEZ and floodplain will be removed to comply with TRPA and Placer County setbacks, and SEZ and floodplain functions will be restored as described in Chapter 3. The FEMA flood hazard area within the Project area is estimated at 1.47 acres or 64,124 square feet and is illustrated on Figure 8-1 in Chapter 8, Biological Resources, along with the TRPA SEZ boundaries. Figures 15-7, 15-8, and 15-9 illustrate the pre and post-project conditions associated with the Homewood Creek unmitigated 100-year floodplain, as defined in the Placer County LDM. Removal of the culvert will improve the existing condition, which currently overtops the roadway during a 100-year event. The proposed bridge crossing will convey the 100-year peak flow without overtopping the roadway, and there will be no downstream impacts to existing structures or property, as the creek

attenuates to the 100-year water surface elevation prior to leaving the Homewood property.

A bridge will be used to cross the stream channel, which will be reconstructed to increase the overall cross-sectional area and flow length to maximize stream function and connection to the floodplain. The restoration area is within the FEMA flood hazard area. The bridge span will be constructed at a height and width that accommodates the 100-year floodway. Improving channel conditions in conjunction with reducing land coverage in the FEMA flood hazard areas will reduce the Project area's contribution to downstream impacts to stream channels.

The SEZ restoration plan for Homewood Creek (see Appendix C) includes widening of the creek to allow for increased cross sectional area and will contain primary and secondary flood plains (IERS, April 2010). Widening of the stream cross-section results in a reduction of the kinetic energy and creates benefits to the SEZ. The following benefits have been taken from a memo prepared by IERS dated April 3, 2010:

- Flood Attenuation – Widening of the stream channel allows for more space for the water to be contained in and allows flood water to stay within the banks.
- Culvert Removal – Culverts present an increased potential for clogging by debris in large flow events. Clogging often lead to failure of the culvert and can result in channel incision, increased sediment delivery to the creek, overtopping of culvert and/or stream banks, destruction of adjacent infrastructure and/or habitats. Removal of the culvert will eliminate the potential for clogging.
- Bed Contact – Expansion of the SEZ allows for increase area for groundwater recharge and increase aquatic invertebrate habitat.
- Ground Water Recharge – Widening of the SEZ channel and reduction of flow rates allows for increased residence time for water to infiltrate into the groundwater system. Increased width of the SEZ channel also allows for lateral rewatering of the soil profile in the restoration area.
- Bank Erosion Reduction – Widening of the SEZ channel results in decreased flow rates which thereby decreases the energy available for bank cutting and erosion.
- Fish Passage – Passage of fish will be enhanced though the expansion of aquatic habitat. The restoration plan includes step pools and removal of the culvert which drastically improves habitat in the area.
- Aeration – Water moving through the restored area will pass through step pools which results in the infusion of oxygen. This reintroduction of oxygen into the water column results in increased availability of oxygen to aquatic species, carbon dioxide reduction and ammonia and hydrogen sulfide reduction.
- Habitat – Improvements to riparian habitat and function in the area are likely to result from restoration activities. Increased diversity of plant species will be planted which will result in improved avian habitat. Shading of the creek bed will become more consistent, thereby maintaining water temperature for aquatic species.
- Sediment Load and Transport Reduction– Velocity reduction of the stream will allow for decreased transport of sediment.

The proposed restoration will provide a connection to two day lighted areas that exist above and below the South Base development area. The restoration may have a positive impact on downstream floodplains as it will allow for increased area for groundwater recharge and also allow for the floodplain downstream to retain its character. The restoration of the Homewood Creek and SEZ will likely result in improvements to the SEZ; however, TRPA staff determines that the Preliminary Conceptual Revegetation and SEZ Restoration Plan described in Appendix C is insufficient to allow for permitting and subsequent construction and does not provide sufficient detail to substantiate a conclusion that impacts will be beneficial and no negative impacts will occur to the SEZ or check channel below the Project area. This impact is considered potentially significant and implementation of mitigation measure BIO-5a will be necessary to assure that potential impacts to existing surface water drainage patterns and stream bank erosion are reduced to a level of less than significant.

The Proposed Project (Alternative 1) and Alternative 3 will install stormwater treatment systems capable of containing and treating the stormwater runoff in excess of the 20-year, 1-hour storm volume, effectively removing this volume of runoff from entering existing downstream drainage systems. Based on the evaluation criteria for HYDRO-2, the level of impact from stormwater runoff and flooding is less than significant.

The Proposed Project (Alternative 1) and Alternative 3 will implement measures to improve stream bank conditions and related streambank erosion and will not cause increased runoff resulting in flooding. However, because the Preliminary Conceptual Revegetation and SEZ Restoration Plan described in Appendix C is insufficient to allow for TRPA permitting and subsequent construction, the potential impacts to existing surface water drainage patterns and stream bank erosion are considered significant, requiring implementation of mitigation measure BIO-5a to reduce potential impact to a level of less than significant.

For Placer County, impacts associated with alterations to drainage patterns of the Project area will be mitigated to a less than significant level by implementing mitigation measures GEO-4b and GEO-4f.

Mitigation: **HYDRO-2a. TRPA Soil Hydrologic Approval Conditions for BMPs**

The TRPA soil hydrologic review does not give approval for the BMP design, but rather, evaluates the location and depths of BMPs as currently presented on the Civil Plans. As the Project is not at 100 percent design, it is understood that the design for BMPs may be modified and could potentially require an additional soil hydrologic review at the time of the project application. It is recognized that the project area has site-specific constraints related to the depth of excavations in relationship to groundwater, interception of groundwater by subterranean garages (i.e. underground parking structures) and significant amounts of stormwater and surface water that need to be treated and infiltrated as part of the proposed development. As such, the TRPA Stormwater Management Program staff has indicated that they require the bottom of all stormwater infiltrating features to be at least two (2) feet above the seasonal high water table, which will aid in achieving 'above and beyond' mitigation measures required for this Project as a participant in the CEP. These guidelines have been met under the current proposed design in all areas except "North-1". For this area, or any stormwater infiltrating areas that may have less than two (2) feet of separation to the seasonal high water table, the stormwater being infiltrated must meet TRPA Code of Ordinances Chapter 81 in regard to surface water discharge standards and/or be redesigned to provide the required two (2)

feet separation. The final BMP plan to be submitted as part of the project application will be reviewed, and approved, by TRPA Stormwater Management Program staff.

The soil hydrologic review gives conceptual approval for the depth (18 inches) and location of bioretention areas as presented on the site plans. This approval is based on the concept that bioretention areas are located over open and infiltrating matrices, but does not apply to bioretention over closed impermeable pretreatment vaults.

HYDRO-2b. Submit Final Drainage Report– Conformance with Section 5 of the Placer County Land Development Manual and Stormwater Management Manual

The Project Applicant shall prepare and submit with the project Improvement Plans, a Final drainage report for each project phase in conformance with the requirements of Section 5 of the LDM and the Placer County Storm Water Management Manual that are in effect at the time of submittal, to the Engineering and Surveying Department for review and approval. The report shall be prepared by a Registered Civil Engineer and shall, at a minimum, include: A written text addressing existing conditions, the effects of the improvements, all appropriate calculations, a watershed map, increases in downstream flows, proposed on- and off-site improvements and drainage easements to accommodate flows from this project. The report shall identify water quality protection features and methods to be used both during construction and for long-term post-construction water quality protection. "Best Management Practice" (BMP) measures shall be provided to reduce erosion, water quality degradation, and prevent the discharge of pollutants to stormwater to the maximum extent practicable.

HYDRO-2c. Drainage Facilities to Conform to Placer County Stormwater Management Manual

Drainage facilities, for purposes of collecting runoff on individual lots, shall be designed in accordance with the requirements of the County Storm Water Management Manual that are in effect at the time of submittal, and shall be in compliance with applicable stormwater quality standards, to the satisfaction of the Engineering and Surveying Department (ESD). These facilities shall be constructed with subdivision improvements and easements provided as required by ESD. Maintenance of these facilities shall be provided by the Homeowners' Association.

HYDRO-2d. Reduce Stormwater Runoff to Pre-Project Volumes

The Improvement Plan submittal and Drainage Report shall provide details showing that storm water runoff shall be reduced to pre-project conditions through the installation of detention facilities. Detention facilities shall be designed in accordance with the requirements of the Placer County Storm Water Management Manual that are in effect at the time of submittal, and to the satisfaction of the Engineering and Surveying Department (ESD). No detention facility construction shall be permitted within any identified wetlands area, floodplain, or right-of-way, except as authorized by project approvals.

BIO-5a: Homewood Creek Restoration Plan

See impact BIO-5 in chapter 8, Biological Resources

GEO-4b. Conform to Provisions of Placer County Grading Ordinance

See impact GEO-4 in chapter 14, Soils, Geology and Seismicity.

GEO-4f. Satisfy the requirements of Section II of the Land Development Manual. (LDM).

See impact GEO-4 in chapter 14, Soils, Geology and Seismicity.

After Mitigation: *Less than Significant Impact; Proposed Project (Alternative 1) and Alternative 3*

Implementation of mitigation measure HYDRO-2a assures compliance with TRPA Soil Hydrologic Approval conditions that a separation of 2 feet from the bottom of stormwater infiltration galleries and seasonal high water table is maintained and soil treatment remains effective.

Mitigation measures HYDRO-2b, HYDRO-2c, HYDRO-2d, GEO-4b and Geo-4f are standard mitigation measures required by Placer County to assure compliance with codified regulations. HYDRO-2b requires a drainage report for each phase of the Project that identifies water quality protection features and methods to be used during construction and post-construction to reduce erosion, water quality degradation and prevent the discharge of pollutants to stormwater to the maximum extent practicable. HYDRO-2c assures that stormwater treatment facilities are designed in accordance with the requirements of the Placer County Stormwater Management Manual. HYDRO-2d assures that post-development runoff is reduced to at or below pre-project conditions. Compliance with codified regulations adequately reduces potential impacts to a level of less than significant. GEO-4b and GEO-4f satisfy the requireme5tns of the Placer County Grading Ordinance and LDM for the protection of existing drainages.

Implementation of BIO-5a will improve the level of detail presented in the Preliminary Conceptual Revegetation and SEZ Restoration Plan to allow for TRPA permitting and subsequent construction. Through adequate site-specific restoration measures, the potential impacts to existing surface water drainage patterns and streambank erosion are reduced to a level of less than significant.

Analysis: *Significant Impact; Alternative 4*

For Alternative 4, the Project area will no longer operate as a ski resort. The Project area will be subdivided into 16 estate parcels and one commercial parcel, Homewood Creek will not be daylighted and SEZ restoration will not occur. It is assumed that the stormwater treatment system in the South Base area will be removed to allow for residential land use and that residential units will not be located within SEZ setbacks. It is also assumed that the South Base parking lot will be removed and restored leaving the County ROW and existing mountain access roadway for access to the estate home sites. The North Base parking areas will be sold for redevelopment as a commercial use area.

Stormwater Treatment Systems. Stormwater treatment systems will be reconfigured to contain and treat the 20-year, 1-hour storm runoff volume from 248,696 square feet of impervious surfaces in accordance with future redevelopment in the North Base area. On-site containment of the 20-year, 1-hour storm runoff volume will be required as a condition of project permitting for construction on the residential lots proposed in Alternative 4. Placer County requires drainage facilities, for purposes of collecting runoff from individual lots to be designed in accordance with the requirements of the County Storm Water Management Manual that are in effect at the time of submittal, and to comply with applicable stormwater quality standards, to the satisfaction of the

Engineering and Surveying Department (ESD). These facilities will be constructed with subdivision improvements and easements provided as required by ESD. Maintenance of these facilities will be provided by the Homeowners' and/or Property Owner's Association. No detention facility construction is permitted within any identified wetlands area, floodplain, or right-of-way, except as authorized by project approvals.

Existing Surface Water Drainage Patterns, Flooding, and Stream Bank Erosion. Land coverage will be required to conform to TRPA land coverage coefficients, including SEZ setbacks. Removal of the South Base area parking lot could cause direct and indirect effects to Homewood Creek from changes in site grades, land coverage, and land uses.

The existing impact to surface water drainage patterns and channel conditions of Homewood Creek is significant based on baseline conditions, which indicate degradation of streambanks and incised channel conditions downstream of the South Base portion of the Project area (Kleinfelder 2007). Under Alternative 4 existing impacts to Homewood Creek alignment and channel stability could persist and could be exacerbated by land use changes proposed in the South Base area. This is a significant impact based on criteria for Impact HYDRO-2.

Off-site Caltrans/Placer/HMR EIP Project. Alternative 4 is not a CEP compliant alternative and does not propose implementation of the off-site EIP project.

Mitigation: **HYDRO-2e. Implement the Homewood Creek SEZ Restoration Plan for Alternatives 4, 5 and 6**

Should Alternative 4, 5 or 6 be approved as the preferred project alternative, the Project Applicant shall design and submit an SEZ restoration plan to TRPA for review and approval. Because the culvert is associated with County ROW for Tahoe Ski Bowl Way, it is possible that Placer County would participate in a restoration plan. Alternative 4, 5 or 6 shall comply with TRPA (Code of Ordinance Chapter 37) and Placer County setback requirements (General Plan Section 6). The plan shall be based on the final configuration of the South Base area and provide for protection of Homewood Creek within and downstream of the Project area.

BIO-5a. Homewood Creek SEZ Restoration Plan

See description above for the Proposed Project (Alternative 1) and Alternative 3.

After Mitigation: *Less than Significant Impact; Alternative 4*

Implementation of HYDRO-2e and BIO-5a will assure that Project area contributions to downstream impacts along Homewood Creek will be reduced to a level of less than significant based on criteria for Impact HYDRO-2. Implementation of the mitigation measures will assure that the Project area is brought into compliance with TRPA and Placer County setbacks and that the impact to existing surface water patterns and stream bank erosion is less than significant.

Analysis: *Significant Impact; Alternatives 5 and 6*

For Alternatives 5 and 6, existing structures in the South Base area, with the exception of skier services, will be removed and uses relocated to the North Base area. The South Base area will be redeveloped as 16 residential lots and a small skier services building.

Stormwater Treatment Systems. Land coverage in the North Base area will increase to approximately 340,865 square feet under Alternatives 5 and 6 and stormwater treatment

systems will be designed similarly to those described for the Proposed Project (Alternative 1) and Alternative 3 to accommodate runoff from new impervious surfaces.

TRPA 20-yr, 1-hr Storm Volumetric Analysis (TRPA Code 25.5.A). Given that the impervious surfaces proposed for the South Base area under Alternatives 5 and 6 are less than those of Alternatives 1 and 3, stormwater treatment systems can be designed to adequately contain and treat the 20-year, 1-hour storm runoff volume on-site. Based on calculations in Table 15-9 for Alternatives 1 and 3, the proposed system capacities could exceed the 50-year, 1-hour storm runoff volume from the North Base area under Alternatives 5 and 6, assuring containment and treatment of stormwater runoff on-site. Mitigation measure HYDRO-2a described for the Propose Project (Alternative 1) and Alternative 3 is still necessary for North Base stormwater galleries to maintain 2 foot separation from bottom of infiltration galleries to the seasonal high groundwater table and to assure potential impacts to planned stormwater systems are reduced to a level of less than significant.

Placer County 10-year and 100-year Peak Flow Analysis. The SWMM post-development calculations, presented in Appendix X, show a cumulative reduction in peak flow from existing to proposed conditions for the 10 and 100-year storm events. Placer County staff review of the Preliminary Drainage Report indicates that the report adequately demonstrates that the proposed development has a less than significant impact on peak flow runoff leaving the Project area. Because Alternatives 5 and 6 propose less impervious surface than Alternatives 1 and 3, the conclusions of the Preliminary Drainage Report support that under Alternatives 5 and 6, the stormwater treatment systems for collection, conveyance and infiltration will comply with the Placer County SWMM dated September 1, 1990.

Although the Project will improve upon project area drainage, reduce post-project runoff volumes and maintain peak flows compared to existing conditions, implementation of standard mitigation measures HYDRO-2b, HYDRO-2c and HYDRO-2d assure compliance with Placer County codified regulations to reduce impacts from drainage and stormwater runoff to a level of less than significant. Implementation of these measures minimize potential impacts to down-gradient properties and existing drainage facilities by assuring that the rate or amount of surface runoff does not exceed existing conditions and does not significantly impact downstream properties or existing drainage facilities.

Existing Surface Water Drainage Patterns, Flooding, and Stream Bank Erosion. On-site containment of the 20-year, 1-hour storm runoff volume will be required as a condition of project approval and permitting for construction on the residential lots proposed in Alternatives 5 and 6. Land coverage will be required to conform to TRPA LCD coefficients, including SEZ setbacks. Removal of the South Base area parking lot could cause direct and indirect effects to Homewood Creek from changes in site grades, land coverage, and land uses. Alternatives 5 and 6 do not propose SEZ restoration along Homewood Creek under the County ROW for Tahoe Ski Bowl Way.

The existing impact to surface water drainage patterns of Homewood Creek is significant based on baseline conditions, which indicate some degradation of streambanks and incised channel conditions downstream of the South Base portion of the Project area (Kleinfelder 2007). Under Alternatives 5 and 6 existing impacts to Homewood Creek alignment and channel stability could persist and could be exacerbated by changes proposed in the South Base area. This is a significant impact based on the criteria for Impact HYDRO-2, requiring mitigation as proposed under mitigation measure HYDRO-2e. TRPA staff determines that the Preliminary Conceptual Revegetation and SEZ

Restoration Plan described in Appendix C is insufficient to allow for permitting and subsequent construction. Because the restoration effects have not adequately defined and minimized, mitigation measure BIO-5a will be necessary to assure that potential impacts to existing surface water drainage patterns and stream bank erosion are reduced to a level of less than significant.

Mitigation: **HYDRO-2a. Soil Hydrologic Approval Conditions**

See description above for the Proposed Project (Alternative 1) and Alternative 3.

HYDRO-2b. Submit Final Drainage Report to Placer County

See description above for the Proposed Project (Alternative 1) and Alternative 3.

HYDRO-2c. Drainage Facilities to Conform to Placer County Stormwater Management Manual

See description above for the Proposed Project (Alternative 1) and Alternative 3.

HYDRO-2d. Reduce Stormwater Runoff to Pre-Project Volumes

See description above for the Proposed Project (Alternative 1) and Alternative 3.

HYDRO-2e. Implement the Homewood Creek SEZ Restoration Plan for Alternatives 4, 5 and 6

See description above for Alternative 4.

BIO-5a. Homewood Creek Restoration Plan

See mitigation description provided above for the Proposed Project (Alternative 1) and Alternative 3.

GEO-4b. Conform to Provisions of Placer County Grading Ordinance

See impact GEO-4 in chapter 14, Soils, Geology and Seismicity.

GEO-4f. Satisfy the requirements of Section II of the Land Development Manual. (LDM).

See impact GEO-4 in chapter 14, Soils, Geology and Seismicity.

After Mitigation: *Less than Significant Impact; Alternatives 5 and 6*

Mitigation measure HYDRO-2e requires the Project Applicant to design and submit an SEZ restoration plan to reduce existing impacts to drainage patterns and channel stability of Homewood Creek to TRPA for review and approval based on the South Base configurations under Alternatives 5 and 6. Because the culvert is associated with County ROW for Tahoe Ski Bowl Way, it is possible that Placer County would participate in a restoration plan. Implementation of HYDRO-2e assures that Project area contribution to downstream impacts along Homewood Creek will be reduced to a level of less than significant based on criteria for Impact HYDRO-2. Implementation of the mitigation measure will assure that the Project area is brought into compliance with TRPA and Placer County setback requirements.

Implementation of mitigation measure HYDRO-2a assures compliance with TRPA Soil Hydrologic Approval conditions that a separation of 2 feet from the bottom of stormwater infiltration galleries and seasonal high water table is maintained and soil treatment remains effective.

Mitigation measures HYDRO-2b, HYDRO-2c, HYDRO-2d, GEO-4b and Geo-4f are standard mitigation measures required by Placer County to assure compliance with codified regulations. HYDRO-2b requires a drainage report for each phase of the Project that identifies water quality protection features and methods to be used during construction and post-construction to reduce erosion, water quality degradation and prevent the discharge of pollutants to stormwater to the maximum extent practicable. HYDRO-2c assures that stormwater treatment facilities are designed in accordance with the requirements of the Placer County SWMM. HYDRO-2d assures that post-development runoff is reduced to at or below pre-project conditions. Compliance with codified regulations adequately reduces potential impacts to a level of less than significant. GEO-4b and GEO-4f satisfy the requirements of the Placer County Grading Ordinance and LDM for the protection of existing drainages.

Implementation of BIO-5a will improve the level of detail presented in the Preliminary Conceptual Revegetation and SEZ Restoration Plan to allow for TRPA permitting and subsequent construction. Through adequate site-specific restoration measures, the potential impacts to existing surface water drainage patterns and streambank erosion are reduced to a level of less than significant.

Impact: **HYDRO-3. Will Project construction activities or long-term operations result in a substantial degradation of groundwater or result in a substantial change in the quality, quantity, elevation, infiltration, or movement of groundwater?**

Analysis: *Less than Significant Impact; No Project (Alternative 2)*

Groundwater flows around and within the Project area have been previously modified by the construction of parking lots, SR 89 and Placer County Roads, affecting historic surface and groundwater conditions. No construction activities or changes in long-term ski area operations will occur for the No Project Alternative. Groundwater monitoring conducted over the period of record from 2006 to 2008 does not conclude that Project area and resort operations are causing substantial change in quality, quantity, elevation, infiltration or movement of groundwater. The groundwater data is referenced to Appendix D. Based on the evaluation criteria for HYDRO-3, the potential impacts to groundwater under the No Project (Alternative 2) is less than significant.

Mitigation: No mitigation is required.

Analysis: *Less than Significant Impact; Alternative 4*

Under Alternative 4, the ski resort will be closed and the Project area subdivided into 16 estate lots, with the North Base area sold for commercial use. Closure of the ski resort will eliminate the need for an underground parking structure and groundwater extractions for snowmaking. Alternative 4 will not result in construction of large buildings that require excavations for foundation footings. The construction of residential homes will be required to follow TRPA and Placer County Codes for development of residential parcels. Potential construction related impacts to groundwater are discussed in Chapter 14, Geology, Soils and Seismicity under impact GEO-3. Compliance with these development codes reduces potential impacts to groundwater to a level of less than significant.

Mitigation: No mitigation is required.

Analysis: *Significant Impact; Proposed Project (Alternative 1) and Alternatives 3, 5 and 6*

Construction of the Project as described under the Proposed Project (Alternatives 1) and Alternatives 3, 5 and 6 involves grading, excavation and fill activities. Excavation of earth below existing ground surfaces presents the potential to intercept or interfere with seasonal groundwater movement during construction activities and long-term operations of the Project area. Groundwater flows around and within the Project area have been previously modified by the construction of parking lots, mountain access roads, SR 89, and Placer County Roads, affecting historic surface and groundwater conditions.

Potential impact to groundwater movement during construction of the Proposed Project (Alternative 1) and Alternatives 3, 5 and 6 are analyzed in Chapter 14, Geology, Soils and Seismicity, in impact GEO-4. Long-term operational impacts to groundwater quality, quantity and movement are addressed below.

Groundwater Movement. To assure that no additional modifications to groundwater quantity and movement occur from proposed developments, TRPA requires that site-specific geotechnical investigations be completed for project permitting and approval.

TRPA Code of Ordinances Subsection 64.7.B prohibits excavations in excess of five feet in depth unless certain findings can be made to demonstrate that no interference or interception of groundwater will occur as a result of the excavation, no damage occurs to mature trees as a result of the excavation, and that the topography of the site is maintained. These findings are made in Chapter 14, Geology, Soils and Seismicity, for impact GEO-4 for the Proposed Project (Alternative 1) and Alternatives 3, 5 and 6.

TRPA may approve exceptions to the prohibition of groundwater interception or interference under Code Section 64.7.A.2(i) (*It is necessary to provide below grade parking for projects, qualifying for additional height under Subsection 22.4.D* ***or 22.4.G****, to achieve environmental goals including scenic improvements, land coverage reduction, and area-wide drainage systems; and measures are included in the project to prevent groundwater from leaving the Project area as surface flow and that groundwater flow to avoid adverse impacts to hydrologic conditions, SEZ vegetation, and mature trees*) if amended as proposed for the Project.

As reported in the Second Revised Soils Hydrologic Scoping and Final Report (Kleinfelder 2010) submitted to TRPA, the maximum proposed excavation at the North Base area ranges from 29 to 32 feet bgs. Maximum depths assume a two-foot deep foundation below the finished floor elevations. Interception could occur over a distance of 878 feet along the western retaining wall of the proposed underground parking structure. The maximum depth of excavation will be approximately 17 feet below seasonal high groundwater levels measured in this area.

The maximum depth of proposed excavation at the South Base area ranges from 19 to 21 feet bgs. The maximum estimated depth of groundwater interception ranges from 4 to 13 feet. Interception could occur over a distance of 376 feet along the western retaining wall of the proposed parking structure for the North Building, along 100 feet of the northwestern retaining wall of the South Building parking structure and along 110 feet of the southwestern retaining wall of the South Building parking structure. The maximum depth of excavation could be from 4 to 13 feet below seasonal high groundwater levels measured in this area.

The maximum depth of proposed excavation at the Mid-Mountain area ranges from 8 to 20.5 feet. Based on the presence of shallow bedrock and site topography, which is close

to a ridgeline, groundwater should not be encountered to the proposed depths of the retaining walls.

The conclusions are based upon the building and underground parking structure cross-sections prepared for the North Base, South Base and Mid-Mountain areas superimposed over modeled groundwater elevations, which were based on groundwater monitoring well observations during 2006, 2007 and 2008 (see Appendix D for groundwater data). The cross-sections are presented on Sheets C19, C20 and C21 of the Civil Plan set. Because groundwater movement will be intercepted, the impact is considered significant based on TRPA Code of Ordinances and requires mitigation to reduce and minimize impacts to groundwater.

Preliminary calculations are shown below for proposed groundwater reinjection galleries North-5, North-6, South-3 and South-4 identified in Figures 15-8 and 15-9. Note that the groundwater reinjection galleries are separate and distinct systems from the proposed stormwater treatment systems. Two soil infiltration values were used to estimate the range of flows, 1×10^{-3} centimeters per second (cm/sec) or 9 inches per hour and 4×10^{-4} cm/sec or 4 inches per hour. These values are typical for silty sand and silty sand with gravel materials that were logged in test pits by Holdrege and Kull Associates in the areas of the retaining walls (see Appendix D for data).

The assumptions for calculations detailed in Table 15-10 and summarized below are as follows:

- Depth of walls include the two foot foundation footings;
- Soil infiltration rate = four inch/hour or 0.33 feet/hour and nine inch/hour or 0.75 feet/hour; and
- The groundwater flow rate utilized in each calculation is the average between the potential high and low flow rate provided by the geotechnical engineer detailed in Table 15-10 below.

<u>North-5 (Parking Garage)</u>

Projected Flow Rate: 13 gallons per minute = = 104 cubic feet/hour
Required Infiltration Basin Footprint Area: (104 cubic feet/hour) / (0.33feet/hour) = 315 square feet
Reinjection Gallery Size: 25 feet x 18 feet = 450 square feet

<u>North-6 (Parking Garage)</u>

Projected Flow Rate: 13 gallons per minute = =104 cubic feet/hour
Required Footprint Area: (104 cubic feet/hour) / (0.33feet/hour) = 315 square feet
Reinjection Gallery Size: 30 feet x 15 feet = 450 square feet

<u>South-3 (North Parking)</u>

Building B Parking -
Projected Flow Rate: 6.0 gallons per minute = 48.1 cubic feet/hour
Required Footprint Area: (48.1 cubic feet/hour) / (0.33feet/hour) = 146 square feet
Reinjection Gallery Size: 20 feet x 11 feet = 220 square feet

<u>South-4 (South Parking)</u>

Building A.1 Parking -

Projected Flow Rate: 1.0 gallons per minute = 8.0 cubic feet/hour
Required Footprint Area: (8.0 cubic feet/hour) / (0.33feet/hour) = 25 square feet

Building A.2 Parking -
Projected Flow Rate: 0.75 gallons per minute = 6 cubic feet/hour
Required Footprint Area: (6 cubic feet/hour) / (0.33feet/hour) = 18 square feet

Reinjection Gallery Combined Size for Buildings A.1 & A.2: 10 feet x 5 feet = 50 square feet

Table 15-10

Projected Groundwater Flows for Operational Mitigation of Intercepted Groundwater

Location	Finished Floor Elevation (ft)	Length of Retaining Wall (ft)	Depth of Retaining Wall (ft)	Maximum Depth of Groundwater Interception (ft)	Groundwater Gradient (ft)	Flow Rate of 4 in/hr (gpm)	Flow Rate of 9 in/hr (gpm)
North Base							
Parking Garage (Cross-Sections 1 through 4)	6,240	878	29 to 32	17	0.17	15	37
North Base Total						15	37
South Base							
North Building Parking (Cross-Section 5)	6,280	376	19	13	0.12	3	9
South Building Parking (Cross-Section 6)	6,270	100	19	4	0.2	0.5	1
South Building Parking (Cross-Section 7)	6,270	110	21	4	0.2	1	1
South Base Total						4	11
Mid-Mountain							
Retaining Walls (Cross-Section 8)	7,285		14				
	7,323		8				
	7,327		11.5				
Cut slopes for Water Tanks (Cross-Section 10)	7,480		20.5				

Source: Kleinfelder 2010

To determine the vertical and horizontal sphere of influence of the groundwater reinjection galleries, Kleinfelder staff modeled a 30-day period of reinjection of intercepted groundwater using the UCAM2 model (Unconfined or Confined Analytical Model authored by Brian J. Peck, PG, CHG of Schlumberger Water Services, Inc. Reno Nevada 89502). The maximum-modeled groundwater rise is 0.8-foot directly under the groundwater reinjection galleries with the extent of a 0.5-foot rise in groundwater extending up to 40 feet from the edge of gallery. The effect will extend radially because the background groundwater gradient is 0.02 foot/1.0 foot, an extremely shallow gradient. Soil-Hydrologic exhibits attached in Appendix D illustrate the spheres of influences modeled for the groundwater reinjection galleries. As depicted on the Soil-Hydrologic exhibits, the sphere of influence of the groundwater reinjection galleries will not extend beyond the Project area boundaries and will not cause effects to parcels adjacent to the North and South Base areas.

Because groundwater will be intercepted during long-term operations of the underground parking structures in the North and South Base areas, the level of impact is significant. Mitigation measure HYDRO-3a is necessary to assure that intercepted groundwater does not leave the Project area as surface flow and to assure that groundwater movement is not significantly altered.

Groundwater Quality. The existing groundwater quality within the Project area is not well characterized, but groundwater quality in the Lake Tahoe Basin is generally of high quality and used to supplies public drink supplies with minimal treatment for pollutants (California's Groundwater Bulletin 118 2004). The Project is not likely to violate potable water quality standards because it will be utilizing potable water from MCWC and the TCPUD. The Phase I Environmental Site Assessment (Robinson Engineering 2005). Reported a low-level MTBE in one of the existing groundwater monitoring wells in the North Base area. The assessment concluded that natural attenuation has reduced the MTBE concentration to levels near the California water quality objective and that additional natural attenuation will result in the groundwater reaching the water quality objective. Because the levels are low and the well is under standard monitoring by the Lahontan, this is not considered to be a significant impact.

The Proposed Project (Alternative 1) and Alternatives 3, 5 and 6 propose underground infiltration galleries for stormwater treatment in areas of seasonal high groundwater. TRPA Code of Ordinances Subsection 25.5.A(1) requires that the bottom of infiltration facilities, which would include underground infiltration galleries, be a minimum of one foot (12 inches) above the seasonal high groundwater table. Underground infiltration galleries in the North and South Base areas are designed to maximize this separation. Galleries North-2, North-3, and North-4 will have separations of two feet (24 inches), Galleries North-1 and South-1 will have separations of 1.5 feet (18 inches) and Gallery South-2 will have a separation of 6.5 feet (78 inches). Although the galleries maintain the separations required by TRPA Code, fluctuations in the seasonal high water table are likely and the potential for degradation of groundwater quality exists if the separation between the bottom of the galleries and the seasonal high water table intersect to negate soil treatment necessary for stormwater treatment. Mitigation is necessary to reduce this potential impact to a level of less than significant. A post-project groundwater monitoring program will also be necessary.

Due to the increase in landscaped area within the North and South Base areas, nitrogen and phosphorus inputs or loading in the Project area could increase if components of fertilizer leach past the root uptake zone towards seasonal high groundwater. To minimize potential impacts to groundwater quality the Project proposes the use of slow-

growing turf grass in high pedestrian traffic areas and has replaced much of the higher water demand landscape areas with bioretention areas, which serve to both infiltrate stormwater and uptake pollutants and nutrients.

The Project proposes the following measures to minimize the potential for nutrients to escape the root zone and be delivered to groundwater:

- Use of non-mowed or slow-growing turf grass species, preferably local native or naturalized species with annual fertilizer requirements that do not exceed 1.5 pounds per 1,000 square feet;
- Implementation of a Fertilizer Management Plan that meets the requirements of Section 81.7 of TRPA Code or Ordinances;
- Determination of appropriate fertilizer rates by a soil-revegetation specialist and based on the results of soil nutrient testing;
- Incorporation of fertilizer into soils prior to seed application to prevent burning and low germination rates;
- Use of Biosol or other organic, slow-release fertilizers that do not contain nitrate or ammonium with careful application to avoid application on hardscape;
- Prohibit fertilizer use on bioretention areas for stormwater treatment after initial establishment; and
- Installation of a highly controlled spray irrigation system to avoid over irrigation and overspray onto hardscape.

Implementation of these project measures will reduce potential impacts to groundwater quality from landscaped areas. However, to assure long-term protection of groundwater quality, a post-project groundwater monitoring program will be necessary.

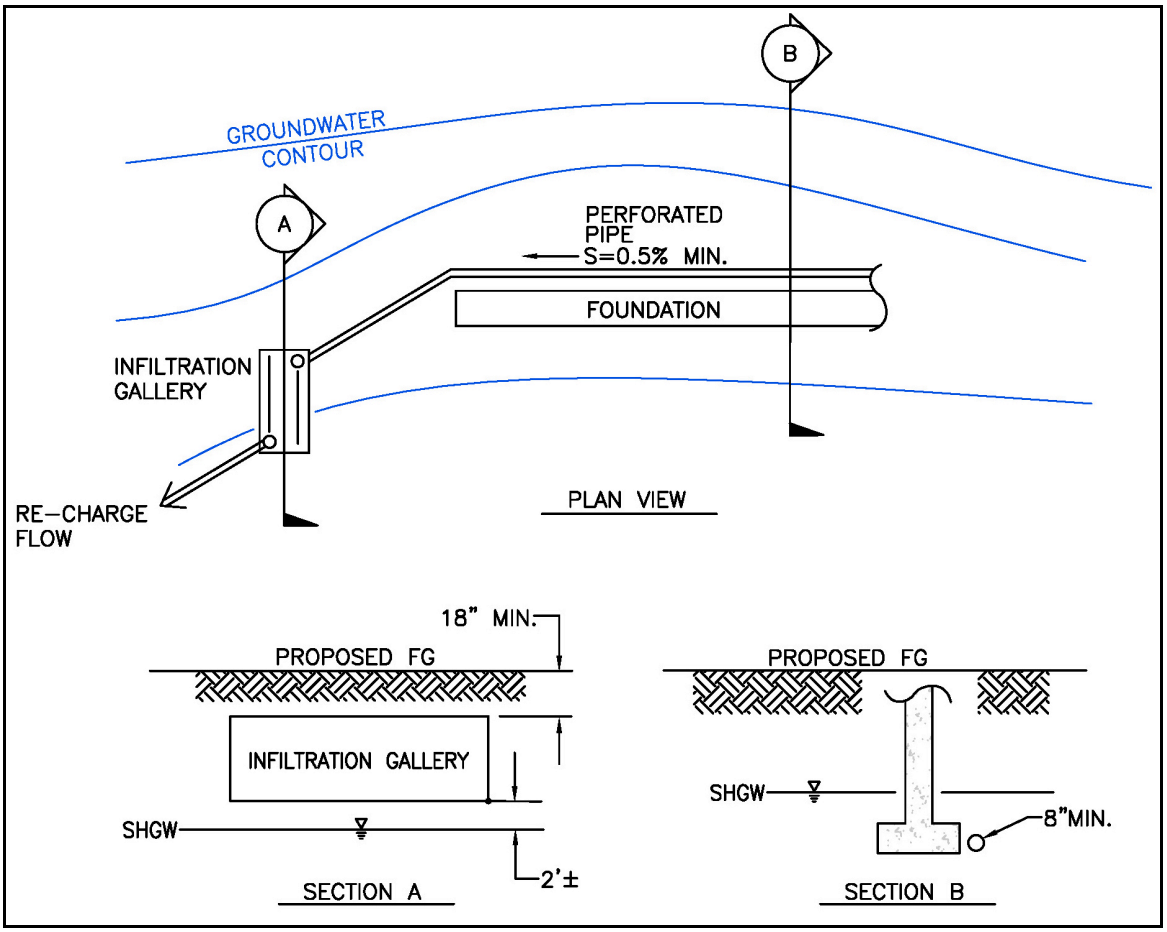
Groundwater Quantity. The Project could substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lessening of local groundwater supplies (i.e. the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted). Groundwater recharge will not be affected by changes in impervious surfaces because land coverage will decrease in the watersheds comprising the Project area and stormwater systems will capture treat and infiltrate stormwater runoff from impervious surfaces. However, groundwater quantity could be impacted by increased diversions of groundwater for use in existing and proposed snowmaking systems under the Proposed Project (Alternative 1) and Alternatives 3, 5 and 6.

The North Base well has an estimated 500 gallons per minute pumping rate and the McKinney well has a rate of around 1,000 gallons per minute. HMR proposes to use these wells for a portion of the 60.8 million gallons per year of snowmaking water needed with the proposed snowmaking system expansion. Because the recharge, recovery and storage capacities of the Project area wells and the proposed TCPUD McKinney well are unknown, the potential impact to groundwater quality is considered significant. The potential impacts to groundwater quantity as related to source water protection are analyzed in impact HYDRO-5 below.

Mitigation: **HYDRO-3a. Implement Operation Dewatering Plan/ Implement Engineered Groundwater Mitigations**

The operational mitigation measures for groundwater interception for the underground parking foundations shall include foundation drains conveying intercepted groundwater to underground galleries for reinjection back into groundwater flows towards Lake Tahoe. Each groundwater reinjection gallery shall be designed to serve a specific area of each underground parking structure that could intercept groundwater and shall be sized to adequately infiltrate no less than 208.5 cubic feet/hour (North-5 and North -6), 48.1 cubic feet/hour (South-3) and 14 cubic feet/hour (South-4). Intercepted groundwater shall be conveyed away from the foundation via stormdrain pipe to the corresponding underground reinjection gallery serving that area of the building. Figure 15-16 illustrates the mitigation approach. The reinjection galleries for intercepted groundwater shall be separate entities from the stormwater treatment infiltration galleries and the distance between the groundwater and stormwater infiltration galleries shall be maximized to minimize potential for mixing.

Figure 15-16. Schematic for Operational Groundwater Interception Mitigation



Source: Nichols Consulting Engineers 2010

HYDRO-3b. Inspection, Maintenance and Monitoring Plan Groundwater Infiltration Systems for Underground Parking Structures

The Project Applicant shall prepare an Inspection, Operation, Maintenance and Monitoring Plan for the groundwater infiltration systems for the underground parking structures. TRPA, Lahontan, and Placer County shall review the plan prior to issuance of final Project approval.

The Plan shall include, but is not limited to the following components:

- Introduction; planning and design, sampling objectives and water quality objectives;
- Well construction details and/or system sampling access points;
- Water level data for existing and new wells;
- Groundwater sampling and analysis, sample collection methods, decontamination, sampling frequency, sampling handling, field analysis, laboratory analysis;
- Maintenance scheduling; and
- Quarterly reporting.

Sample results shall be provided to the TRPA on a quarterly basis. The report shall present site conditions, physical observations of groundwater quality and the degrees of sedimentation observed within the underground groundwater infiltration galleries, and include three months worth of observations and corresponding field measurements and laboratory analytical results.

Single samples of groundwater shall not exceed the discharge to land treatment water quality objectives at the following concentrations: Total Nitrogen as N of 5 mg/L; Total Phosphorus as P of 1 mg/L; Total Iron as Fe at 4 mg/L; Turbidity at 200 ntu; and Oil and Grease at 40 mg/L.

HYDRO-3c. Complete a Water Balance Analysis for the HMR-Operated Well and the TCPUD McKinney Well

The Project Applicant shall prepare a hydrogeologic report for the HMR-operated wells and the TCPUD McKinney well to determine recharge, recovery and storage capacities of the aquifers. The report shall:

- Characterize the cone of depression that will result based on maximum proposed consumption, determine if this will result in a gross adjustment of the near static deep groundwater level for this aquifer,
- Characterize the zone of influence and determine if the proposed extractions will negatively other source waters;

- Identify or characterize the hydrogeologic conditions that impose constraints on Time and Drawdown;
- Identify the well efficiency and the expected lifetime;
- Determine and disclose what water rights could be potentially influenced; and
- Determine the potential impacts towards the Truckee River Operating Agreement (TROA) allocations to the State of California.

Lahontan may require the characterization of the subsurface water chemistry to meet the general requirement for drinking water wells even though the water will be used for snowmaking. Should a decline in groundwater levels occur that exceeds seasonal fluctuations and that is attributable to the Project, pumping from the groundwater source shall cease and other supplies of water shall be utilized until groundwater levels return to historic levels.

After Mitigation: *Less than Significant Impact; Proposed Project (Alternative 1) and Alts 3, 5 and 6*

Implementation of HYDRO-3a, 3b, and 3c will assure that Project area contribution to groundwater impacts will be reduced to a level of less than significant based on criteria for Impact HYDRO-3. Implementation of the mitigation measures will assure that the Project is brought into compliance with TRPA groundwater protection measures.

Impact: HYDRO-4. Will the Project alter the course or flow of the 100-year floodwaters or expose people or structures to water related hazards such as flooding and/or wave action from 100-year storm occurrence or seiches?

Analysis: *Significant Impact; No Project (Alternative 2)*

According to the U.S. Geological Survey, a seiche is a standing wave in an enclosed or partly enclosed body of water. Seiches are normally caused by an earthquake or high wind activity, and can affect harbors, bays, lakes, rivers and canals. See Chapter 14, Geology, Soils and Seismicity for details on geologic hazards associated with the Project area.

The *Geologic Hazards and Preliminary Geotechnical Evaluation* (Kleinfelder 2007) reports that the existing development in the North and South Base areas could be inundated by waves with maximum amplitudes of approximately six meters from a lake seiche resulting from magnitude 7.2 earthquake modeled on the West Tahoe-Dollar Point Fault. This fault, as well as the Genoa Fault, is capable of producing earthquakes of this magnitude (Holdrege and Kull 2010). The North Tahoe and Incline Faults have estimated maximum momentum magnitudes of around 7.0 and 6.6, respectively. Due to the proximity of the Project area to active faults and to the shorezone of Lake Tahoe, the risk of inundation from a lake seiche is considered potentially significant.

The FEMA FIRM for the Project area indicates a Zone A area located along the lower reach of Homewood Creek, which flows through the South Base area. The lower reach of Madden Creek is also mapped Zone A, but is to the north and outside of the Project area.

Placer County requires evaluation of potential flood hazards prior to approval of development projects and requires the Project Applicant to submit accurate topographic and flow characteristics information and depiction of the 100-year floodplain boundaries under fully developed, unmitigated runoff conditions. Figures 15-7, 15-8 and 15-9 depict the existing (pre-project), unmitigated 100-year floodplain as defined by the Placer County LDM. Under the No Project alternative the existing culvert and road crossing remains and no change to downstream effects occurs.

The Kleinfelder evaluation states that debris flows are not mapped within the Project area but may exist in the Madden Creek, Homewood Creek, Quail Lake Creek and the unnamed creek drainages. The risk is considered low based on the absence of mapped debris flow areas.

Mitigation: No mitigation is available.

After Mitigation: *Significant and Unavoidable Impact; No Project (Alternative 2)*

Under the No Project alternative, the Project area continues to operate under current conditions and no discretionary action would be taken that would require mitigation to reduce the risk of inundation from a lake seiche. Regardless, the Project Applicant may choose to prepare this plan with respect for public safety. Because no mitigation is required under the No Project (Alternative 2), the risk of people or structures to inundation by seiche would not be avoided, minimized, reduced or otherwise mitigated. The level of impact remains potentially significant based on the evaluation criteria for impact HYDRO-4 and therefore is considered a significant and unavoidable impact.

Analysis: *Significant Impact; Proposed Project (Alternative 1) and Alternatives 3, 4, 5 and 6*

According the U.S. Geological Survey, a seiche is a standing wave in an enclosed or partly enclosed body of water. Seiches are normally caused by an earthquake or high wind activity, and can affect harbors, bays, lakes, rivers and canals. See Chapter 14, Geology, Soils and Seismicity for details on geologic hazards associated with the Project area.

The *Geologic Hazards and Preliminary Geotechnical Evaluation* (Kleinfelder 2007) reports that the existing development in the North and South Base areas could be inundated by waves with maximum amplitudes of approximately six meters from a lake seiche resulting from magnitude 7.2 earthquake modeled on the West Tahoe-Dollar Point Fault. Due to the proximity of the Project area to active faults and to the shorezone of Lake Tahoe, the risk of inundation from a lake seiche is considered potentially significant. The preparation of an emergency response and evacuation plan, as outlined in mitigation measures HYDRO-4a, is necessary to mitigate disaster damages and avoid potential loss of life from inundation by seiche.

An alteration of the course or flow of the 100-year floodwaters constitutes a significant impact. The FEMA FIRM indicates a Zone A area located along the lower reach of Homewood Creek, which flows through the South Base area. The lower reach of Madden Creek is also mapped Zone A, but is to the north and outside of the Project area. A FEMA Zone A corresponds to the 100-year floodplain with undetermined base flood elevations.

The Proposed Project (Alternative 1) and Alternative 3 will remove existing structures in the South Base area from the FEMA 100-year floodplain, conform to TRPA and Placer County setbacks and will replace the existing culvert crossing with a bridge span across

Homewood Creek to reduce the potential for flood flows to be impeded or redirected. Alternatives 4, 5 and 6 will remove existing structures from the floodplain and conform to TRPA and Placer County setbacks but will not replace the culvert crossing with a bridge span, as proposed. Mitigation HYDRO-2e would require implementation of the Homewood Creek SEZ Restoration Plan for these alternatives, however, and the effects would be comparable to those of Alternatives 1 and 3.

The Placer County FCWCD requires the submittal of a detailed pre- and post-project hydraulic analysis of Homewood Creek for project permitting. The analysis identifies increases in runoff leaving the Project area as a result of the 10-year and 100-year storm events and a determination of the Project's effects on the 100-year water surface elevations. The Preliminary Drainage Report identifies no significant increase in runoff leaving the Project area or increase in the 100-year water surface elevations as a result of the Proposed Project (Alternative 1). No alternative results in placement of housing or habitable structures within the 100-year flood hazard area as mapped on the FIRM and no structures are proposed in the 100-yr future, unmitigated, fully developed floodplain, as defined by Placer County's LDM.

The bridge span is designed to comply with Placer County Flood Damage Prevention Ordinance. As a result, the 100-year floodwaters will not be impeded or redirected and people or structures will not be exposed to significant risk or loss, injury or death from flooding.

The potential impact is further reduced through compliance with Placer County codified regulations. Standard Placer County mitigation measures HYDRO-4b and HYDRO-4c reduce the potential impact to 100-yr floodwaters to a level of less than significant through delineation of adequate setbacks from and establishment of building pad elevations above the 100-year floodwater elevations.

The Kleinfelder evaluation (2007) states that debris flows are not mapped within the Project area but may exist in the Madden Creek, Homewood Creek, Quail Lake Creek and the unnamed creek drainages. The Proposed Project (Alternative 1) and Alternatives, 3, 4, 5 and 6 do not propose changes to the Project area that would increase the potential for debris flows. The risk of debris flows is considered to be less than significant based on the existing conditions of the Project area and the absence of mapped debris flow areas.

Mitigation: **HYDRO-4a. Emergency Response and Evacuation Plan**

The Project Applicant shall prepare and submit an emergency response and evacuation plan to TRPA, Placer County ESD and the North Tahoe Fire Protection District (NTFPD) for review and approval before construction permits are issued. The plan shall include detailed descriptions of how emergency response and evacuation will occur in the case of a large earthquake and potential seiche or the 100-yr event. Emergency response and evacuation measures shall address the requirement of Placer County Local Hazard Mitigation Plan and at a minimum identifies steps that help avoid, reduce, alleviate, and mitigate disaster damages and potential loss of life.

HYDRO-4b: Comply with Placer County Stormwater Management Manual Section VI

The Project Applicant shall show the limits of the future, unmitigated, fully developed, 100-year flood plain (after grading) for Homewood Creek on the Improvement Plans and designate same as a building setback line unless greater setbacks are required by other project conditions.

HYDRO-4c: Comply with Placer County Flood Damage Prevention Ordinance

To comply with Placer County Flood Damage Prevention Ordinance, Article 15.52, specifically 15.52.170 C.1 Elevation and Floodproofing, the Project Applicant shall show finished structure pad elevations 2 feet above the 100-year flood plain line for South Base buildings A and B on the Improvement Plans and Informational Sheet filed with the Final Map. Pad elevations shall be certified by a California registered civil engineer or licensed land surveyor and submitted to the Engineering and Surveying Department. This certification shall be completed prior to construction of the foundation or at the completion of final grading, whichever comes first. No construction is allowed until this certification has been received by the ESD and approved by the Flood Plain Manager. Benchmark elevation and location shall be shown on the Improvement Plans and Informational Sheet to the satisfaction of DRC.

After Mitigation: *Less than Significant Impact; Proposed Project (Alternative 1) and Alts 3, 4, 5 and 6*

The Project area cannot be relocated out of the potential inundation area of a seiche from Lake Tahoe, but the risk of inundation can be minimized through the proper and timely execution of an Emergency Response and Evacuation Plan. Compliance with Placer County SWMM Section VI and the Flood Damage Prevention Ordinance results in the avoidance of alteration of the course or flow of the 100-year floodwaters and minimizes exposure to significant risk or loss, injury or death from flooding.

Impact: HYDRO-5. Will the Project change the amount of surface water in any water body, substantially reduce the amount of water otherwise available for public water supplies, or be located within 600 feet of a drinking water source?

Analysis: *Less than Significant Impact; No Project (Alternative 2)*

The No Project Alternative (Alternative 2) will not change the existing public water demand within the TCPUD McKinney-Quail Water Service Area or the Madden Creek Water Service Area. Source water 09719101/11, operated by TCPUD and source water 08502048W11, operated by Agate Bay Water Company are located in the vicinity of the Project area. However, TRPA Source Water Assessment maps indicate that no source waters are located within 600 feet of the Project area. Additionally, no contaminating land uses are identified within 600 feet of a drinking water source as identified on TRPA Source Water Assessment Maps.

Existing snowmaking operations at the South Base are supplied by domestic water from the TCPUD. The HMR-owned North Base well supplies snowmaking operations at the North Base along with potable water from the MCWC. Snowmaking demand will not change under the No Project (Alternative 2).

Homewood Creek instream flows are not currently degraded by withdrawals from the South Base well. Existing wells prove to be of sufficient distance from active creek channels so as to not impact instream flows.

The forthcoming requirements of the TROA will require metering and reporting of all surface water diversions, including the use of waters for snowmaking within the Lake Tahoe Basin to be reported at a 16 percent consumptive use under the TROA. The existing snowmaking system applies approximately 43.6 acre-feet/year of water over 23.8 acres in the form of snow (Snowmakers Inc. 2010). The existing snowmaking system includes metering of the application of water to cover existing ski trails.

Because the No Project Alternative will not result in a change to the Project area facilities or alter the ability of the TCPUD or MCWC to meet the demands of their service areas, the level of impact to public water supplies is less than significant for Alternative 2.

Mitigation: No mitigation is required.

Analysis: *Less than Significant Impact; Alternative 4*

Under Alternative 4 the Project area will cease to operate as a ski area and the need to use groundwater diversions or public water supply for snowmaking will be eliminated. The future property owners of the 16 residential properties and the commercial area in the North Base area will to required to coordinate with TCPUD and MCWC, depending on the location of the parcel, to establish domestic water supply. Compared to existing conditions, Alternative 4 will not increase demands on public water supplies, affect TRPA instream flows, create contaminating land uses within 600 feet of a drinking water source as identified on TRPA Source Water Assessment Maps or require the metering and reporting of the consumptive use of water for snowmaking operations. Based on the evaluation criteria for HYDRO-5, the level of impact to public water supply is less than significant for Alternative 4.

Mitigation: No mitigation is required.

Analysis: *Significant Impact; Proposed Project (Alternative 1) and Alternatives 3, 5 and 6*

Source Water Protection. TRPA Code of Ordinance Chapter 83 sets forth regulations pertaining to recognition of source water, prevention of contamination to source water and protection of public health relating to drinking water. Source water is defined as water drawn to supply drinking water from an aquifer, or a well or from a surface water body by an intake, regardless of whether such water is treated before distribution.

Source water 09719101/11, operated by TCPUD and source water 08502048W11, operated by Agate Bay Water Company are located in the vicinity of the Project area. However, TRPA Source Water Assessment maps indicate that no source waters are located within the boundary or within 600 feet of the Project area. The potential impact from the Proposed Project (Alternative 1) and Alternatives 3, 5 and 6 to source waters is less than significant.

Public Water Supply. The *Draft HMR Water Supply Assessment* (NCE 2010) was prepared for the Project area, which is attached in Appendix AA. The demand of the Proposed Project and Alternatives 3, 5 and 6 on TCPUD and MCWC public water supplies are referenced to Impact PSU-1 in Chapter 16, Public Services and Utilities. The annual demand is communicated in acre-feet/year for discussions concerning the TROA and source water protection. The potential effects of the Project on the ability of the water purveyors (i.e. TCPUD and MCWC) to meet the public water supply needs are analyzed in Chapter 16, Public Services and Utilities.

Table 16-3 presents estimated domestic and snowmaking demand rounded to the nearest acre-foot. Estimated annual domestic water consumption for residential, commercial, and irrigation uses for the Proposed Project (Alternative 1) and Alternative 3 is 64 acre-feet, 17 acre-feet for Alternative 4, 80 acre-feet for Alternative 5, and 68 acre-feet for Alternative 6 (Table 16-3). Snowmaking is estimated to require 187 acre-feet per year (Snow Machines, Inc. 2010) under Alternatives 1, 3, 5 and 6.

Snowmaking. Build out of the Project area under the Proposed Project (Alternative 1) and Alternatives 3, 5 and 6 will increase the use of surface water and groundwater for snowmaking from a current annual use of 43.6 acre-feet/year to cover 23.8 acres of ski

trail to approximately 187 acre-feet/year to cover 102.3 acres of ski trail (SnowMakers Inc. 2010).

The potential water supplies identified for snowmaking operation total between 2,100 and 2,400 gallons per minute and include: 1,000 gallons per minute from the TCPUD McKinney well (non-potable supply); 800 gallons per minute from the HMR-owned North Base well (non-potable supply); 300 gallons per minute from TCPUD domestic supplies that are available from 6 am to 6 pm; and 300 gallons per minute from MCWC domestic supplies that are available from 6 am to 6 pm and would serve only as a supplemental supply source (Snowmakers Inc. 2010). Snowmaking operations intend to use the 1,800 gallons per minute non-potable supply as the primary water sources. Maximum pumping requirements are identified as 2,000 gallons per minute on the North Side and 1,300 gallons per minute on the South side of the Project area. The opening and continued maintenance of ski trails with snowmaking can be phased as to minimize the use of water from the TCPUD and MCWC supplies, but under a worst case scenario these supplies would be utilized. As concluded for impact PSU-1, the current rate of flow is not sufficient to meet peak demand for snowmaking under the Proposed Project (Alternative 1) and Alternatives 3, 5, and 6. HMR and the TCPUD McKinney-Quail Water Service Area would require upgraded extraction, pumping, treatment, conveyance, and storage capacity to serve the new demand of the Project area. This is considered a significant impact on public water supply and mitigation is required.

Under the TROA, the total annual gross diversions for use within the Lake Tahoe Basin from all natural sources, including groundwater, and under all water rights in the Basin cannot exceed 34,000 acre-feet/year. From this total, 23,000 acre-feet/year are allocated to the State of California and 11,000 acre-feet/year are allocated to the State of Nevada for use within the Lake Tahoe Basin. The first 600 acre-feet/year diverted for snowmaking uses in California each year will not be charged to the gross diversion allocation of the State. Where water (surface and groundwater) from the Lake Tahoe Basin is diverted and used to make snow in excess of this first 600 acre-feet/year, the percentage of such diversions chargeable to the gross diversion allocations of each State will be specified in the TROA once executed (TROA 2009). The consumptive use for snowmaking will be charged at 16 percent of the total diversion in excess of this first 600 acre-feet/year.

Based on the estimates reported in the snowmaking plan (SnowMakers, Inc. 2010) 16 percent of up to 187 acre-feet/year would be chargeable to the gross diversion allocation of California if Project area snowmaking diversions are not a portion of the first 600 acre-feet/year reserved for snowmaking. HMR and portions of Heavenly Mountain Resort and Alpine Meadows are within the California-side of the Lake Tahoe Basin. Heavenly Mountain Resort has applied for 592 acre-feet/year with the State Board (personal communications with Heavenly Staff Andrew Strain and TRPA Staff Rita Whitney, November 24, 2009). To date, HMR and Alpine Meadows have not submitted applications to the State Board for diversion allocations for snowmaking uses (personal communication with DWR Staff, John Headless, November 23, 2009).

The DWR submitted a letter dated April 3, 2009 on the Project Notice of Preparation (NOP). The letter recommends that Placer County review the terms of the TROA for applicability in connection with the Project. Discussions with TRPA and State Board staff and John P Headless, P.E. with DWR determine that there is a situation where snowmaking interests could find themselves pushed up through the interstate allocation of 23,000 acre-feet/year in the Tahoe Basin by holders of senior water rights. Notably if there are water rights that are only partially exercised and therefore not known to DWR,

that are senior to those obtained by the snowmakers and if those rights were to be fully exercised at some later date, then the snowmaking use which appears to be at or above the first 600acre-feet/year could be diminished because of their junior status. Given the state of knowledge about the number and quantity of under used water rights in the Lake Tahoe Basin, there is no assurance that increases in snowmaking might not at some point cause an exceedence of the Tahoe Basin allocation for California (communications with John T Headlee, P.E., November 23, 2009).

Based on the information provided in the HMR Water Supply Assessment (Nichols 2010) and the Snowmaking Planning document (Snowmakers 2009) and the HMR Master Plan (JMR 2010) the impacts of expanding snowmaking operations on domestic water supplies of TCPUD and MCWC service districts are unclear. Given the uncertainty associated with the snowmaking demand with the forthcoming diversion allocations for the TROA, the impact is potentially significant based on the evaluation criteria for HYDRO-5.

Irrigation. Landscaping proposed for the Project area has been designed to reduce total irrigation demand through the use of low-water use vegetation and incorporation of LID measures such as cisterns for storage of roof runoff and bioretention areas for stormwater treatment. The approach for calculating landscape water uses for the Project area is from a landscape rehabilitation focus because the Project needs to achieve revegetation, erosion control, fire safety, water quality and water conservation in concert with scenic improvements for the North and South Base areas. Based on the DWR's Water Budget Workbook, which calculates the maximum applied water allowance and estimated total water use, the following irrigation demand is estimated for the Project area (L+P Design Works 2010):

- North Base Area – 8.32 acre-feet/year;
- South Base Area – 2.12 acre-feet/year; and
- Mid-Mountain Area – 0.36 acre-feet/year.

For the Proposed Project (Alternative 1) the total maximum irrigation demand for the Project area is estimated at 10.8 acre-feet/year based on calculations presented in Appendix CC. Once landscaping has been established this irrigation demand is expected to decrease substantially.

Alternative 3 proposes an irrigation regime comparable to the Proposed Project (Alternative 1), as discussed above. Irrigation water demand would be less than the Proposed Project because the North and South Base areas will be comprised of more impervious coverage to accommodate large building footprints because of reduced heights.

Alternatives 5 and 6 propose an irrigation regime comparable to the Proposed Project (Alternative 1) for the North Base Area, as discussed above. However, irrigation water demand under Alternatives 5 and 6 could be up to 25 percent more than the Proposed Project because the North and South Base areas will be comprised of more landscaped area and less impervious coverage. Total maximum irrigation demand for Alternatives 5 and 6 is estimated around 13.5 acre-feet/year.

Given that TCPUD's existing McKinney/Quail supply system is inadequate to meet current peak demands during the summer and must be supplemented by interim intake from Lake Tahoe, the use of potable water for irrigation during summer months poses a potentially significant impact to public water supplies.

In-Stream Flows. The Proposed Project (alternative 1) and Alternatives 3, 5 and 6 do not propose development of existing points of diversion located within the Project area. The Proposed Project (Alternative 1), and Alternatives 3, 5 and 6 will not significantly impact the instream flows in Quail Lake, Homewood, and Madden Creeks. New wells are not proposed as part of the Project, and the existing wells that supply the Project area are not located near perennial stream channels (North Base well) or are of sufficient distance from streams and are not directly connected to surface flows.

The TCPUD-owned McKinney No. 1 well is located approximately 2,500 feet south of the South Base area on TCPUD property as shown in topographic maps. The well is an artesian flowing well that discharges at a rate of over 100 gallons per minute without a pump. It has a 60-foot cement seal and is completed in glacial moraine deposits to a depth of 800 feet. Because it is an artesian well with the measured water level about 20 feet above ground, it could not be connected to Quail Creek and will not affect the flow in Quail Creek during pumping as the source of water is much deeper than the creek. Quail Creek is located approximately 300 feet south of the well (personal communications with Dave Herzog of Kleinfelder, November 25, 2009).

The HMR-owned North Base well is located within the gravel parking lot, proposed parking structure area about 30 feet west of the small structure. It is about 1,800 feet north of Homewood Creek. This well also has a 60-foot cement seal and is completed in lake deposits. The estatic level in this well is approximately 5 to 13 feet below ground surface. The source of groundwater for this well is annual snowmelt from the mountain (personal communications with Dave Herzog of Kleinfelder, November 25, 2009).

Based on available information and locations of the wells as described in the Environmental Settings section, the level of impact from the Proposed Project (Alternative 1), Alternative 3, 5 and 6 to TRPA instream flow thresholds is less than significant.

Mitigation: **HYDRO-5. Water Use/Water Rights Monitoring Program/Install meters at Points of Diversions and Application or Use**

To ensure that water from HMR's various supplies is used in appropriate quantities and locations, a Water Use/Water Rights monitoring program shall be implemented. The goal of the program shall be to measure or estimate the quantity of water supplied by each source and document the location at which the water is used or applied. Meters shall be installed to monitor the monthly pumpage from individual wells. Additionally, the monitoring shall include monthly measurements of groundwater levels in the existing and proposed wells.

With the existing and proposed water supply monitoring facilities, determination of the quantity of water supplied to Homewood from each water supply source and the points of application or use of this water shall occur. By knowing the use restrictions on water from each source, the maximum water use permitted in any area shall be known, and thus water uses shall be limited to the maximum permitted.

The Project Applicant shall prepare an annual report indicating the quantity of water used from each of its sources and the maximum entitlement from each of its sources. The report shall be provided to TRPA and Placer County for use in ensuring compliance with existing regulations.

HYDRO-3c. Complete a Water Balance Analysis for the HMR-Operated Well and the TCPUD McKinney Well

See Impact HYDRO-3 above for language for the mitigation measure HYRO-3c.

PSU-1a. Water Supply Assessment and Infrastructure

See Impact PSU-1 in Chapter 16, Public Services and Utilities for mitigation measure PSU-1a.

After Mitigation: *Less than Significant Impact; Proposed Project (Alternative 1) and Alts 3, 5* and 6

Implementation of mitigation measures HYDRO-5, HYDRO-3c, and PSU-1a will assure compliance with the forthcoming TROA regulations for the State of California allocations. The payment of connection and service fees approved by TCPUD and MCWC will ensure sufficient water to meet peak demand in the Project area. The preparation of a final WSA to identify the quantity and source of potable and non-potable water to serve the Project must demonstrate that water source(s) are adequate and meet State and Federal requirements for quality and quantity.

15.5 CUMULATIVE IMPACTS AND MITIGATION MEASURES

Impact: HYDRO-C1: Will the Project have significant cumulative impacts to water resources?

Analysis: *Significant Impact; No Project (Alternative 2)*

The No Project (Alternative 2) has significant and unavoidable impacts identified for Impacts HYDRO-1, HYDRO-2 and HYDRO-4. The impacts are significant in that existing Project area conditions present some level of non-compliance with provisions of federal, TRPA, State and local codified regulations or regulatory prescriptions. The impacts are unavoidable because under the No Project Alternative no discretionary decision or action occurs to mandate mitigation of impacts to hydrology, surface water quality, groundwater or water rights.

The HMR CWE analysis estimates existing sediment yields that exceed Project Area TOCs for Madden Creek, Quail Lake Creek and Intervening Zone 7000. When considering the existing conditions of the Project area cumulatively within the context of the total watersheds, the combined sediment yields do not exceed Total Watershed TOCs, with the exception of Intervening Zone 7000 (see Table 15-2), which could exceed the TOC by 5 T/yr.

The existing impact to surface water drainage patterns is significant based on evidence of streambank degradation along Homewood Creek downstream of the Project area.

The Project area is at risk of inundation by a lake seiche, with existing conditions offering inadequate measures for public safety and evacuation.

Under the No Project Alternative 2), the existing impacts would not be avoided, reduced or minimized to levels of less than significant. Therefore, the Project could contribute to incremental effects that are cumulatively significant under Alternative 2.

Mitigation: No mitigation is available.

After Mitigation: *Cumulatively Significant and Unavoidable, No Project (Alternative 2)*

Existing BMPs, stormwater systems, and restoration areas will be maintained under the No Project (Alternative 2). However, compliance with Project area TOCs (for Quail Lake Creek, Madden Creek and Intervening Zone 7000) will not be achieved because the No Project (Alternative 2) does not allow for redevelopment of the North and South Base areas, the installation of expanded stormwater treatment systems or extensive land coverage removal. Under Alternative 2, the Project area continues to operate as a ski area and no Ski Area Master Plan approval results. TRPA, Lahontan and Placer County could require restoration projects and BMP retrofitting for adequate maintenance of the Project area, but it is the discretionary action of Ski Area Master Plan approval that requires conformance with Project Area TOCs as discussed in the Ski Area Master Plan Guidelines (TRPA 1990). Because sediment yields in Madden Creek, Quail Lake Creek and Intervening Zone 7000 currently exceed the Project Area TOCs and the No Project does not propose specific actions to reduce sediment yields or reduce downstream effects to Homewood Creek, the impact remains significant and is therefore considered cumulatively significant.

Analysis: *Less than Significant Impact; Proposed Project (Alternative 1) and Alternatives 3, 4, 5 and 6*

The geographic context for this cumulative analysis is the Homewood, California watersheds, which are tributary to Lake Tahoe through Madden, Homewood and Quail Lake Creeks and stormwater flows through Caltrans and Placer County roadways and neighborhood drainage systems. The analysis considers current and foreseeable development in the entirety of the Project area watersheds and evaluates whether the Project, together with the potential effects of cumulative development, will result in a significant impact that will remain and potentially increase over time, and if so, whether the contributions of the Project will be considerable. Both conditions must apply in order for the Project's cumulative impacts to rise to the level of significant.

Construction of the Project, other projects in the Homewood, California watersheds and projects in the western and northwestern portions of Lake Tahoe could occur concurrently and has the potential to disturb soils and create unstable slopes, which could result in sedimentation and erosion or otherwise mobilize pollutants. Excavations associated with future projects could intercept the water table and introduce pollutants into groundwater sources. The operations of future projects could increase long-term pollutant loads in urban and upland runoff. Increased impervious areas or changes in land use associated with future projects could alter drainage patterns and increase the likelihood of flooding. Combined water demands associated with future development and permissible uses could impact public water supplies.

<u>Effective, Reasonable and Appropriate Measures to Project Surface Water Quality and Beneficial Uses.</u> TRPA, federal, State and local policies and programs are in place to avoid, minimize and mitigate known potential impacts to surface and ground water resources at the project, State, federal and regional scales. Project-level permit conditions and Placer County standard mitigations, such as compliance with grading and erosion control ordinance, requirements to implement water quality protection measures, BMPs, and stormwater treatment systems, and minimization of disturbance areas and adequate revegetation of those areas, serve to avoid and minimize potential impacts from individual projects to a level of less than significant so that effects from individual projects do not persist and potentially increase over time. Regional-level regulations, programs and mitigations, such as implementation of regional stormwater treatment systems, Lake Tahoe TMDL pollutant load reduction goals, and the CEP serve to

integrate the goals and objectives of individual projects for the expansion of water quality improvement capabilities and connectivity of communities and associated services. State-level programs often serve to balance the needs of local jurisdictions with statewide goals and initiatives and policies.

TRPA 20-year, 1-hour Design Storm/Placer County 10-year and 100-year Design Storms.

The Preliminary Drainage Report (NCE 2010) reports no significant increase in post-project peak flows resulting from the 10-year and 100-year events compared to pre-project flows. Under the Proposed Project (Alternative 1) stormwater treatment systems will effectively remove over 61,000 cubic feet of stormwater runoff from leaving the Project area and entering existing downstream drainage facilities along SR 89 and Homewood Creek, with LID measures sized to remove an additional 111,000 cubic feet per storm event. As detailed in Table 15-9, the system capacities are over and above the TRPA 20-year/1-hour design storm volumes.

Groundwater. The Project creates no impacts to groundwater quality or quantity. Groundwater will be intercepted by underground parking structures that are necessary to reduce surface parking impacts but will be captured and conveyed around these structures for reinjection into the same groundwater basin. Groundwater modeling determines that the mitigation measures for the reinjection of intercepted groundwater will create localized effects (i.e., discussed as a sphere of influence that creates a 0.8-foot increase directly beneath reinjection galleries with a 0.5-foot rise in the seasonal high water table that extends up to 40 feet radially from the edge of gallery) that will not affect stormwater treatment gallery capacities or effectiveness. The sphere of influence would not extend past the Project area boundary and combine with potential effects from other projects in the area that intercept groundwater.

Surface Water Drainage Patterns and Flooding. The Proposed Project (Alternative 1) and Alternative 3, 4, 5 and 6 (Note that HYDRO-2e requires implementation of the Homewood Creek SEZ Restoration Plan for Alternatives 4, 5 and 6 and the effects would be comparable to those of Alternatives 1 and 3) will remove existing structures in the South Base area from the FEMA 100-year floodplain conform to TRPA and Placer County setbacks and will replace the existing culvert crossing with a bridge span across Homewood Creek to reduce the potential for flood flows to be impeded or redirected. No alternative results in placement of housing or habitable structures within the 100-year flood hazard area as mapped on the FIRM and no structures are proposed in the 100-yr future, unmitigated, fully developed floodplain, as defined by Placer County's LDM. The bridge span is designed to accommodate the FEMA Zone A base flood elevation and comply with Placer County Flood Damage Prevent Ordinance. As a result, the 100-year floodwaters will not be impeded or redirected and people or structures will not be exposed to significant risk or loss, injury or death from flooding. The Project intends to alleviate downstream effects to surface water drainage patterns through implementation of the Homewood Creek SEZ Restoration Plan effectively minimizing the Project area contribution to downstream effects to drainage patterns and flooding.

Water Rights/Source Water Protection. The Project proposes no development of existing surface water rights. Groundwater diversions for snowmaking will be metered and reported as determined by the forthcoming TROA. The Project, along with other future projects in the TCPUD and MCWC service districts will be required to pay the connection and service fees approved by TCPUD and MCWC to support infrastructure that is necessary to ensure sufficient water delivery to meet peak demand in the Project area. SB 210 requires the preparation of WSAs to identify the quantity and source of

potable and non-potable water to serve project areas to demonstrate that water source(s) are adequate and assure that they meet State and Federal requirements for quality and quantity to that cumulatively significant impacts to public water supply do not occur.

Combined Cumulative Impacts. No significant project-level impacts to hydrology or surface water or groundwater resources from construction or long-term operation of the Project are identified that would persist after implementation of compliance measures, Placer County standard mitigation measures and impact specific mitigation measures. At present, there are no other known projects in the Madden, Homewood, and Quail Lake Creek watersheds or Intervening Zone 7000 with direct or indirect impacts to water resources with the exception of roadway improvement projects in planning by Placer County and Caltrans.

Improvement upon existing channel conditions, surface water quality and stormwater quality will result from implementation of the Project, and as such, potential incremental effects will not result in cumulatively considerable impacts to hydrology and water resources. Cumulatively the Project is expected to provide direct beneficial effects to beneficial uses and surface water quality in the Homewood, California area through reductions in impervious surfaces and resultant runoff quantity and the active treatment of stromwater prior to infiltration to groundwater. The Project will participate in TRPA EIP Project No. 996 in cooperation with Caltrans to install an off-site stormwater treatment system. Other benefits of the Project include: reduced effects from surface parking and snowmelt from parking lots, landscaping with goals of water conservation and bioretention for stormwater treatment, along with indirect effects from improved site management that reduces airborne contaminants.

Land use changes will occur both inside and outside of the Project area in each of the four watersheds. Four actions are assumed to occur outside of the Project area and these actions are incorporated into the No Project (Alternative 2), the Proposed Project (Alternative 1) and the alternatives. The land coverage changes within the Project area are detailed in Chapter 14, Geology, Soils and Seismicity. The four actions assumed for outside of the Project area include: new homes will be built, existing homes will have water quality BMP retrofits (BMP), existing commercial buildings will have water quality BMP retrofits, and environmental improvement projects will be completed by Placer County and Caltrans. Land coverage will be maintained under Alternative 2 and reduced under the Proposed Project (Alternative 1) and Alternatives 3, 4, 5 and 6.

The HMR CWE analysis modeled proposed reductions in existing land coverage to result in decreases in sediment yield from the Madden Creek, Homewood Creek and Quail Lake Creek watersheds and Intervening Zone 7000. Figure 15-17 illustrates the sediment yields for whole watersheds as compared to the Total Watershed TOCs. As displayed in Figure 15-17, the Proposed Project (Alternative 1) and Alternatives 3, 4, 5 and 6 will reduce Total Watershed sediment yields from the four watersheds as compared to existing conditions. As compared to the Total Watershed TOCs, sediment yields modeled for conditions of the Proposed Project (Alternative 1) and Alternatives 3, 4, 5 and 6 will not exceed Total Watershed TOCs for Madden Creek, Homewood Creek or Quail Lake Creek watersheds and Intervening Zone 7000, noting that the modeled sediment yield in Intervening Zone 7000 approaches the TOC and is within the expected range of error for the HMR CWE analysis. The development and redevelopment actions defined by the Proposed Project (Alternative 1) and Alternatives 3, 4, 5 and 6 could reduce combined sediment yields to Lake Tahoe by approximately 69 T/yr for cumulatively beneficial effects to surface water quality and beneficial uses.

As further explained in Appendix W, the HMR CWE analysis also modeled the range of proposed conditions that would be reflected under build-out of maximum allowable base land coverage as permitted under a Bailey Classification System revised by the 2007 Soil Survey (NRCS 2007). Exceedance of the TOC for Intervening Zone 7000 is not measured under forthcoming TRPA allowable base land coverage limitations.

Figure 15-17. Sediment Yields (T/yr) for Total Watershed vs. Total Watershed TOCs

	Baseline	TOC	Project	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6
INT 7000	361	355	356	361	357	348	355	355
Madden	1036	1085	1002	1036	1002	957	1002	1002
Homewood	906	955	877	906	855	892	862	862
Quail	409	462	407	409	406	393	406	406
Combined	2712	2857	2642	2712	2620	2590	2625	2626

Source: IERS 2010

Note: Existing condition is termed "baseline" in Figure 15-17. The terms are used interchangeably.

Cumulative impacts to water resources are measured at a level of less than significant. Based on proposed phasing, future projects will be implemented over a number of years, minimizing the possibility for overlapping effects. Other projects in the Homewood, California watersheds and the Lake Tahoe Basin will be subject to similar programmatic requirements (TRPA and NPDES permit regulations, SWPPPs, regional and community stormwater treatment initiatives, pre- and post-project water quality and BMP effectiveness monitoring) and performance standards (revegetation success criteria, TMDL load reductions and stormwater treatment performance and BMP effectiveness) and thereby avoid, reduce and minimize the potential for cumulative adverse impacts. Mitigation measure HYDRO-1a requires post-project monitoring of BMP effectiveness, revegetation success and storm water treatment system performance. Should monitoring results measure impacts to surface or ground water resources from the Project, remedial

actions have been identified to avoid, reduce or further mitigate incremental contributions to cumulative effects.

Mitigation: No additional mitigation is required.

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