4.3 HYDROLOGY AND WATER QUALITY

This section describes the existing hydrologic conditions of the project area and the potential impacts of the Project on hydrology, surface water quality and groundwater in the East Stateline Point watershed.

ENVIRONMENTAL SETTING

Lake Tahoe Basin

The Project area is located in the northern end of the Lake Tahoe Basin. In terms of geography, the Lake Tahoe Basin consists of a bowl-shaped watershed, characterized by steep mountain ranges to the east and west, which generally run in a north/south direction with Lake Tahoe occupying nearly 40 percent of the total Basin area. Basin elevations range from 6,223 feet at lake water level to over 10,000 feet in the mountain ranges. There are 63 individual watersheds within the basin that contribute their flow to Lake Tahoe, or 110 watersheds when including the intervening areas that flow directly to the lake. Climatic conditions 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 between June and September accounts for less than 20 percent of the annual total. The western portions of the basin receive between 35 and 80 inches of precipitation per year, while the eastern portions receive between 20 and 35 inches. Higher amounts of precipitation occur in the upper elevations and typically increases one inch of precipitation per 1,000 feet of increase in elevation (Murphy and Knopp 2000).

Lake Tahoe is one of the largest oligotrophic (low productivity) lakes in the world. Very low levels of plant nutrients, saturated oxygen conditions, and relatively small amounts of slowly decaying organic materials characterize the lake water. Water near the shoreline has shown increases in nutrient levels over the past decades because of increased urbanization. In addition, algae has become common in shallow waters as a result of the interdependent relationship between water, vegetation, and increased nutrients in urban runoff.

Natural drainage systems surrounding Lake Tahoe convey surface and subsurface runoff from rain and melting snow that slowly erodes the soil. 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. 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, which can stimulate algal growth and deplete the lake of oxygen in a natural process known as eutrophication (increasing biologic material and depletion of oxygen over time). Today significant portions of the Lake Tahoe Basin are urbanized. Many factors in the urban development process such as land disturbance, habitat destruction, air pollution, soil erosion, and road development add to the degradation of water quality in the Lake Tahoe Basin (Murphy and Knopp 2000).

East Stateline Point Watershed

The proposed project will be constructed within the East Stateline Point watershed, a TRPA priority one watershed and considered an intervening area with First Creek and Baldy Creeks in the Jorgenson et al (1978) and Cartier et al. (1995) mapping studies. The watershed area is approximately 1,216 acres or 1.90 square miles with an elevation range of approximately 7,362 ft above mean sea level (msl) to 6,229 ft msl

and a watershed perimeter of 7.62 miles (Cartier et al. 1995). The 16.26-acre project area comprises approximately 1.2 percent of the watershed.

The surface geology within the watershed is characterized by granite and very weathered grandiorite from the Cretaceous period that are part of the Sierra Nevada Batholith (Saucedo 2005). Locally, diorite and alaskite can be found. Project area soils include those in the Cagwin and Cassenai soil series. The surface geology and project area soils are discussed in more detail in Chapter 4.2, Geology and Earth Resources.

The average total (annual) precipitation in the vicinity of the project area is approximately 32 inches with an average total snowfall of 195 inches (Tahoe City SNOTEL Site 048758 – accessed 11/12/2008).

Historic Flooding

In cooperation with the Nevada Department of Transportation (NDOT), the United States Geological Survey (USGS) has estimated the flood frequencies of the streams that enter Lake Tahoe. The streams and Creeks located closest to the project area are discussed below. Information pertaining to potential flooding of these streams is used by NDOT in their design and construction of roads and highways in the Nevada 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 NDOT.

There are no flood records for the immediate project area, but USGS has monitoring sites at adjacent watersheds:

- First Creek near Crystal Bay (site 10336688);
- Second Creek at Lakeshore Drive near Crystal Bay (site 10336691);
- Third Creek near Crystal Bay (site 10336698); and
- Wood Creek at mouth near Crystal Bay, Nevada.

While neither of these Creeks impacts the project area, the flood data from these monitoring sites is presented in Table 4.3-1 and includes the largest recorded flood peak for the period of record.

Although not related to a delineated Creek, there is a historic and persisting drainage situation in the project area vicinity where runoff from the project area commingles with runoff from adjacent parcels and Washoe County and NDOT right-of-ways. This runoff flows across the Stateline into California to commingle with runoff from Placer County and Caltrans right-of-ways and can result in flooding in the Brockway neighborhood. The contributions towards flows across the Stateline are approximately 67 percent from the project area, 19 percent from NDOT right-of-ways and 14 percent from Washoe County right-of-ways.

Table 4.3-1

Modeled and Historic Flood Data for USGS Monitoring Sites in Crystal Bay, Nevada

Monitoring Site	Period of Record	Drainage Area	50-year peak discharge	100-year peak discharge	Largest recorded flood peak (Date - Magnitude)
First Creek near Crystal Bay, Nevada	1970-74, 1991-2000)	1.07 mi^2	45 cfs*	57 cfs	09/26/1972 – 22 cfs
Second Creek near Crystal Bay, Nevada	1991-2000	1.33 mi^2	122 cfs	162 cfs	05/18/1970 – 16 cfs
Third Creek near Crystal Bay, Nevada	1970-1973, 1975, 1978-2000	6.02 mi^2	191 cfs	219 cfs	06/18/1982 – 52 cfs
Wood Creek at mouth near Crystal Bay, Nevada	1970-74, 1991-2000	1.97 mi^2	75 cfs	88 cfs	06/26/1995 – 43 cfs

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

Note: * cubic feet per second or cfs

Existing Snow Storage

During and following winter storms, snow from the existing parking lots and access roads is plowed to the northwest portion of the project area at the base of the 30 foot cut slope of the private drive at the terminus of Reservoir Drive. Snow melt from the snow storage area flows south towards SR 28, where runoff enters NDOT storm drains or flows along paved or compacted surfaces towards the California – Nevada North state line and into the Caltrans right of way or local neighborhood drainage systems.

Existing Commercial BMPs

No commercial BMPs are currently installed for structures and impervious areas within the project area. Precipitation and snow melt from buildings and impervious surfaces are not captured and treated on site, but rather drip and flow off surfaces, commingle and contribute towards peak flows from NDOT and Caltrans roadway drainage systems down gradient. The project area is currently in noncompliance with TRPA Code of Ordinances Chapter 25.

In October 2007 a plan for temporary and permanent BMPs for the project area was submitted to TRPA (Lumos and Associates 2007) to supplement the memorandum submitted in August 2007. An interim agreement between Boulder Bay and TRPA permitted the postponement of installation of permanent BMPs during site redevelopment planning. Under the agreement, existing facilities would receive regular maintenance included cleaning of all drop inlets on the project area and in the public ROWs and mulching, seeding, and restricting traffic (i.e. placement of boulders) on the California Parcel. Boulder Bay completed the BMP improvements on the California Parcel on October 17, 2007 and contributed

$10,000 towards the maintenance and cleaning of area storm drainages. Upkeep and maintenance are ongoing.

Existing Stormwater Treatment System

Washoe County constructed a stormwater treatment system that captures and treats a portion of urban runoff from Washoe County roads up gradient from the project area. Several NDOT installed and managed drop inlets exist along SR 28, the ROW of which is included in the project area. No stormwater treatment systems exist within the project area. Stormwater and snow melt from the project area commingle with road runoff and exit the site untreated.

Existing Surface Water and Stormwater Quality

Existing verified land coverage for the project area is estimated at 399,884 square feet for 56.4 percent of the total project area of 708,438 square feet, which contributes runoff from impervious surfaces to surface sheet flows and stormwater runoff. Of the existing verified land coverage, 351,813 square feet is located on land capability district (LCD) 4 lands and 80,083 square feet is located on LCD 1a, a lower capability soil. The East Stateline Point watershed is presently drained by surface sheet flows, roadway and impervious surfaces, and stormwater collection systems. There are no perennial stream channels in the watershed.

Pre-project stormwater monitoring began in October 2008. The objective of the monitoring program is to provide data for incorporation into the final design of BMPs and stormwater treatment systems for water quality improvement and load reduction and to establish pre-project, baseline conditions for comparison with post-construction stormwater quality and BMP effectiveness. The *Boulder Bay Existing Conditions Stormwater Quality Report, Crystal Bay, Nevada* by JBR Environmental Consultants, Inc. (September 11, 2009) is included in Appendix P as a reference for monitoring site locations, sampling and reporting methodologies and raw data. Figure 1 in Appendix P illustrates the location of the 14 sampling sites. Table 3 in Appendix P provides descriptions for the sampling sites.

Compliance with TRPA Discharge Standards

The project area is subject to TRPA surface water discharge limits listed in Chapter 81 of the Code of Ordinances and outlined in Table 4.3-2. Pollutant concentrations in surface water runoff shall not exceed the values in Table 4.3-2 at the 90th percentile. Surface water that is directed to infiltrate into the soil shall not exceed the maximum constituent levels for discharges to groundwater. Because surface runoff from the project area is currently a combination of discharges, both sets of limits are addressed.

JBR Environmental Consultants, Inc. sampled rain events on October 3 and November 3, 2008 and rain-on-snow precipitation events on January 2, January 22, February 22 and March 2, 2009. Grab sampling at up to 14 monitoring sites (at each site sampling is dependent on sufficient runoff to collect a representative grab sample) was performed as close to peak runoff occurrence as possible. Western Environmental Testing Laboratory analyzed the grab samples for total suspended solids (TSS), TSS less than 20 microns, turbidity, total nitrogen (TN), total phosphorus (TP), dissolved phosphorus (DP), Dissolved Inorganic Nitrogen (DIN), total iron, and oil and grease. Precipitation is based on real time, online readings from local rain gauges and the Quantitative Precipitation Forecast (QPF) for the area. The following paragraphs summarize the sampling results. For more detailed analysis refer to Appendix P.

Table 4.3-2

TRPA Surface Water Discharge Limits

Parameter	Unit	Tahoe Surface Runoff Limits	
		Surface Discharge	Discharges to Groundwater
Turbidity	NTU	--	200
SSC*	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. Because of the urban stormwater characteristics of the project area, pre-project monitoring measured Total Suspended Sediment (TSS), which is is more appropriate for stormwater characterization. TRPA project permitting could require the addition of SSC to monitoring parameters.

October 3, 2008: Grab samples were collected at nine of the 14 samples sites during the precipitation event that yielded 0.62 inches of rain. Concentrations exceeded the TRPA surface water discharge limits for DIN (9 of 9 sites), Oil and Grease (7 of 9 sites) and DP (8 of 9 sites). SSC and Dissolved Iron were not analyzed.

Concentrations exceeded discharge limits to groundwater for TN (8 of 9 sites), TP (4 of 9 sites), and Turbidity (3 of 9 sites). Oil and Grease discharge limits to groundwater were not exceeded at any site. Total Iron was not analyzed.

November 1, 2008: Grab samples were collected at 10 of the 14 monitoring sites during the precipitation event that yielded 1.05 inches of rain. Concentrations often exceeded the TRPA discharge limits for DP (10 of 10 sites), DIN (9 of 10 sites), and Oil and Grease (10 of 10 sites). SSC and Dissolved Iron were not analyzed.

Discharge limits to groundwater were met more often. Oil and grease limits were met at all sites. Turbidity was exceeded at 1 of 10 sites (sites #9), TN was exceeded at 2 of 10 sites (sites #5 and 6), and TP was exceeded at 6 of 10 sites (sites # 2, 3, 4, 5, 6 and 9). Total Iron was not analyzed.

January 2, 2009: Grab samples were collected at nine of the 14 monitoring sites during the precipitation event that yielded 0.08 inches of rain and snow. Oil and Grease surface water discharge limits were exceeded at eight of the nine sites. DIN and DP discharge limits were

exceeded at three (sites# 2, 4 and 6) and two (sites # 2 and 6) of the nine sites respectively. Dissolved Iron and SSC were not analyzed.

Discharge limits to groundwater for TN, TP and Oil and Grease were met for all nine sampling sites. Total Iron was exceeded at one site (site #4) and Turbidity was exceeded at eight of the nine sites.

January 22, 2009: Grab samples were collected at 11 of the 14 monitoring sites during the precipitation event that yielded 0.72 inches of precipitation in the from of rain on snow. Snowmelt resulted in runoff. Concentrations of Oil and Grease exceeded discharge to surface water limits at all sites and DP exceeded limits at 10 of the 11 sites. DIN limits were met more often with only two sites (sites #1 and 2) exceeding surface water limits. Dissolved Iron and SSC were not analyzed.

Discharge limits to groundwater were met at all 11 sites for Oil ands Grease and TN. TP limits were met at all but one site (site #6). Limits for Turbidity and Total Iron were exceeded at eight and 10 of the sites, respectively.

The January 22, 2009 event produced snowmelt runoff. Water quality degradation is contributable to salting and sanding of roads around the project area and snowmelt originating from snow storage areas within the project area. Sediment and oil and grease become concentrated in snow storage areas containing snow plowed from and stored within the parking lot (JBR Environmental Consultants, INC. 2009).

February 22, 2009: Grab samples were collected at 11 of the 14 monitoring sites during a precipitation event that yielded 0.67 inches of precipitation. Oil and Grease discharge to surface water limits were exceeded at 10 of the 11 sites and DP was exceeded at 3 (sites # 2, 3 and 11) of the 11 sites. Concentrations at all 11 sites met Dissolved Iron and DIN discharge limits. SSC was not analyzed.

Concentrations of Oil and Grease, TN and TP met discharge limits to groundwater at all 11 sites. However, Turbidity was exceeded at five sites (site #1, 4, 7, 8 and 9) and Total Iron was exceeded at three sites (site # 4, 8 and 9).

March 2, 2009: Grab samples were collected at 13 of the 14 monitoring sites during a precipitation event that yielded 1.23 inches of precipitation. Oil and Grease and DP surface water discharge limits were exceeded at 12 of the 13 sites and four of the 13 sites, respectively. Limits for DIN and Dissolved Iron were met at all 13 sites, however. SSC was not analyzed.

None of the 13 sites that were sampled exceeded Turbidity, Oil and Grease, TN and TP discharge to groundwater limits. Total Iron, however, was exceeded at seven of the 13 sites.

In summary, pre-project monitoring results represent concentrations of pollutants in untreated runoff from the project area and adjacent roadways. No trends are reported at this time because of the small sample size, but single event compliance can be reported and stormwater quality can be characterized for design of best management practices (BMPs) and stormwater treatment systems. Pre-project monitoring results report that the project area stormwater runoff (not including runoff from SR 28) 90^{th} percentile concentrations for the pollutant parameters are between two and forty times higher than the surface discharge limits (DP, DIN, oil and grease and Fe). The run-on (surface water entering the project area from up-gradient Washoe County roadways and Crystal Bay neighborhoods) 90^{th} percentile concentrations for DP, oil and grease and Fe are three to nine

times higher than the surface discharge limits. The difference between the run-on and runoff water quality, an approximately 40 to 200 percent range of increase in concentrations, indicates degradation of surface water quality from the project area, most likely from the parking lots. Monitoring sample sites that reflect runoff from SR 28 measure the poorest water quality for the project area. Comparison of monitoring results to TRPA discharge limits indicates that the quality of the untreated runoff often exceeds these limits. Sample sites 2, 5 and 9, which represent runoff from State Route 28, have the poorest water quality.

Event Mean Concentrations (EMC) for Comparison with TMDL Load Reduction Targets

The application of total maximum daily loads (TMDLs) is in the process of being developed for the Tahoe Basin. The TMDL methodology, in addition to the current TRPA BMP guidelines, is proposed to be used to develop the Boulder Bay water quality program and performance targets. The existing water quality monitoring results are reported as event mean concentrations (EMCs) for general comparison with proposed Lake Tahoe TMDL Treatment Tier 2 load reduction targets. EMCs represent the flow-weighted average concentration of a specific pollutant. Tier 2 treatments are a set of pollutant control options (PCOs) that are deemed physically effective but more particularly cost effective, consisting typically of a mix of Tier 1 and Tier 3 treatments. Tier 2 treatments for urban and groundwater source categories for the TMDL analysis are defined on page 18 of the Lake Tahoe Pollutant Load Reduction Report as "significantly higher-use, advanced, gravity-driven treatment technologies applied more aggressively within the treatment area." Please reference the Lake Tahoe TMDL Pollutant Reduction Opportunity Report – March 2.0 Version (Praul and Sokolsky 2008) for a complete listing of Tier 2 treatments identified for atmospheric, forested uplands, urban and groundwater and stream channel source loads. The targets are based upon land use and the land use types that currently exist at the project area include Primary Roads, Secondary Roads and Commercial/Institutional/Communications/Utilities (CICU).

Urban and groundwater pollutant load reduction strategies are the most applicable Tier 2 treatments to the project area. The Executive Summary of this report is attached in Appendix Q as a reference for project area pollutant load reduction strategies.

For purposes of comparing existing conditions of the project area against the Lake Tahoe TMDL pollutant load reduction targets (Tier 2, as explained above), which are calculated in event mean concentrations or EMCs, JBR calculated the EMCs for each sampled storm. EMCs represent the flow-weighted average concentration of a specific pollutant contained in stormwater runoff from a particular land use type and is typically evaluated through use of an automated flow-weighted composite sampler, collecting stormwater from a single sample site (and land use type) over the course of a storm hydrograph. Because of high pedestrian and vehicular traffic in the project area, automated sampling is not feasible and JBR scientists collected grab samples. The typical approach to calculating the EMC is not applicable because a single grab sample was collected at different locations within the project area at a single time in the storm hydrograph.

In an effort to evaluate a flow-weighted average of constituent concentrations, EMCs for the project area are calculated using the following equation:

$$EMC = \frac{(C_{north}Q_{north}+C_{south}Q_{south})}{(Q_{north}+Q_{south})}$$

C_{north} represents the average concentration of the grab samples collected from the north basin of the project area and C_{south} represents the average concentration from the south basin. Q is the discharge at the north and south basin outfalls and is based upon rainfall intensity at the time of sampling, the impervious area and basin boundaries delineated by Lumos and Associates during field evaluations for design of stormwater treatment systems.

Table 4.3-3 presents the TMDL Tier 2 targets based upon land uses of the project area as compared to EMC results from pre-project runoff monitoring. These data serve as the baseline for existing water quality conditions for the project area and represent EMCs for untreated runoff from the project area and adjacent roadways and includes run-on from up-gradient slopes and roadways.

Table 4.3-3

Lake Tahoe TMDL Tier 2 Event Mean Concentrations for Project Area Land Uses

Pollutant of Concern	Unit	10/3/2008 Boulder Bay EMC	11/1/2008 Boulder Bay EMC	1/2/2009 Boulder Bay EMC	1/22/2009 Boulder Bay EMC	2/22/2009 Boulder Bay EMC	3/2/2009 Boulder Bay EMC	Primary Roads Tier 2 EMC	Secondary Roads Tier 2 EMC	CICU* Tier 2 EMC
Total Nitrogen	mg/L	**7.29**	4.30	1.23	0.64	1.0	0.21	2.00	1.80	1.80
Dissolved Nitrogen	mg/L	NA	NA	NA	NA	NA	NA	0.600	0.378	0.096
Total Phosphorus	mg/L	0.97	**1.94**	0.19	**1.08**	0.35	0.41	0.367	0.225	0.370
Dissolved Phosphorus	mg/L	**0.579**	**0.484**	**0.109**	**0.162**	0.049	**0.103**	0.021	0.096	0.022
Total Suspended Solids (TSS)	mg/L	463	157	267	959	175	227	124	50	112

Source: Boulder Bay Existing Conditions Stormwater Quality Report Crystal Bay, Nevada (September 11, 2009)— JBR Environmental Consultants

Notes:

* CICU = Commercial/Institutional/Communications/Utilities

NA = Not Available

Comparison of the EMCs to the established TRPA stormwater discharge limits, established in Chapter 81 and listed in Table 4.3-2, indicates the quality of stormwater runoff often exceeds surface water discharge limits for DP and at times exceeds groundwater discharge limits for TN and TP. The bold and underline concentrations indicate EMCs that exceed TRPA discharge limits. Sample sites that reflect runoff from SR 28 measure the poorest water quality for the project area. As stated above, runoff from adjacent and up-gradient roads and from untreated snowmelt from the existing snow storage area and parking lot contribute to water quality degradation from the project area.

The reduction percentages below are estimated by comparing project area EMCs against the TMDL Tier 2 EMC targets listed in Table 4.3-3. The proposed BMPs and stormwater treatment systems will need to perform to the following reduction percentages to meet TMDL Tier 2 targets for load reductions listed in Table 4.3-3.

Event Date	Event Type	Pollutant of Concern	Minimum Percent Reduction Needed to Meet TMDL Tier 2 Targets
October 3, 2008	Rain event	TN	75
		TP	62
		DP	96
		TSS	76
November 1, 2008	Rain event	TN	58
		TP	81
		DP	95
		TSS	29
January 2, 20009	Rain on snow event	DP	80
		TSS	58
January 22, 2009	Rain on snow event	TP	66
		DP	86
		TSS	88
February 22, 2009	Rain on snow event	DP	55
		TSS	36
March 2, 2009	Rain on snow event	TP	11
		DP	79
		TSS	51

Pre-Project Estimated Pollutant Loading

To estimate the potential pollutant load reductions for the project area, loading rates were calculated based on the six pre-project sampling events discussed above. All flow rates are estimates of surface flows over pavement and curb and gutter capture, which are calibrated with the Tahoe Vista KCATAHOE1 weather stations. The flows are noted as extremely variable and peak flows are calculated for each of the six events using the Rational Equation based on rainfall intensities during the period of sampling, estimates of runoff coefficients for impervious area and basin boundaries developed by Lumos and Associates. The grab sample concentrations are calculated with the estimated discharge at the time of sampling (not over the whole sampling event) to give a point in time loading rate to represent the loading rating for the storm event, and thus concentrations are assumed to be constant during the entire precipitation event.

The project area runoff TSS loading, based on the six sampling events, ranged between 253 and 9,947 lbs/day. TP loading from the project area is estimated to range between 0.5 and 7 lbs/day, and TN is estimated to range between 1 and 32 lbs/day. Oil and Grease is estimated to range between 9 and 85 lbs/day. These loading estimates are based on a relatively small sample size and estimated flow rates and thus have a degree of error associated with calculations. The results

are presented for purposes of comparison with post-project load reduction targets. Calculations for the annual loading estimates using the Simple Methods are found in Tables 19, 20, and 21 of Appendix P. In total, the existing project area contributes an estimated 34,450 lbs of TSS per year.

Existing Groundwater Conditions

TRPA Code Section 64.7.A sets excavation limits related to groundwater interception and interference. Groundwater was not encountered during investigations of exploratory borings or test pits. Kleinfelder (February 5th, 2007 Memo to TRPA) drilled borings on January 17, 2007 and concluded that excavations to the proposed depths of 20 feet below ground surface (bgs) should not encounter seasonal groundwater. Lumos and Associates completed investigations and borings to a maximum of 55 feet (bgs) in August of 2008 and concluded that groundwater is not expected to impact development of the project area, as final grades at the site will be from zero to 47 feet below existing grades. TRPA reviewed the investigations and conclusions and granted approval in the Soils Hydrologic Letter dated February 24, 2009 (Appendix I).

Seasonal groundwater is not expected to be encountered during excavations. If seasonal groundwater is encountered, a comprehensive dewatering plan will be implemented. The Dewatering Plan is shown in Appendix I.

REGULATORY SETTING

Regulatory agencies charged with the protection of or authority over hydrology, surface water quality and groundwater in the project area include:

- Tahoe Regional Planning Agency (TRPA) is the United States Environmental Protection Agency (USEPA) designated water quality planning agency in the region;
- Nevada Division of Environmental Protection (NDEP) is responsible for water resources in the State of Nevada; and
- Washoe County adopted the Washoe County Comprehensive Plan as the official master plan for the county. The plan includes countywide elements for the protection and conservation of water resources with special policies spelled out in the Tahoe Area Plan.

Tahoe Regional Planning Agency

Surface Water Standards

In 1988 the states of California and Nevada and the United States Environmental Protection Agency (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 establish water quality standards for Lake Tahoe and its tributaries. The thresholds address algal growth potential, plankton count, clarity, turbidity, phytoplankton productivity, phytoplankton biomass, zooplankton biomass, periphyton biomass, dissolved inorganic nitrogen loading, nutrient loading in general, tributary water quality, surface runoff quality, and the quality of other lakes in the Lake Tahoe Basin. Water quality thresholds WQ-4 (tributaries), WQ-5 (stormwater runoff, surface water) and WQ-6 (Stormwater runoff, land infiltration to protect groundwater) are applicable to the project area.

Regional water quality standards are outlined in the TRPA Code of Ordinances in 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 ground waters.

Pollutant concentrations in surface runoff shall not exceed the values as stated in Table 4.3-2 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 2010. Integration of research, conducted as part of the water quality restoration plan being undertaken by the Lahontan Regional Water Quality Control Board (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 analysis. The TMDL recommended implementation strategies 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 could begin to focus on load reduction rather than site design standards and infiltration only.

The Project addresses water quality treatment through "advanced treatment and technology" pollution control treatment category identified for the Lake Tahoe TMDL. The Lake Tahoe TMDL, however, does not currently guide the TRPA water quality findings required for project permitting and does not replace the standards set by current regulations in Code of Ordinances Chapters 25, 64 and 81. The "above and beyond" approach of the Project is discussed in the impact analyses below.

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 stream environment zone (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 shall be permitted in SEZs unless an exception is made.

There are no mapped and verified SEZs in the project area. However, a SEZ is mapped downslope of the project area, and therefore, potential impacts to SEZs are considered. Potential impacts to SEZs are addressed in Chapter 4.4, Biological Resources.

Groundwater

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 unless the specific findings can be made. These findings are discussed in the analysis for impact HYDRO-4.

The North Stateline Community Plan

The majority of the project area, 12.20 acres, is located within the North Stateline Community Plan (NSCP) with the remainder of the project area in plan area statement (PAS) 031. The NSCP sets forth goal NSCP.10.3 for environmental improvement, including restoration and water quality improvement projects. The Community Plan Target is to Restore and revegetate 1.6 acres of existing disturbed lands at the Tahoe Mariner site. The Tahoe Mariner site comprises 6.11 acres of the project area. Another Community Plan Target is to install BMPs on all properties and public rights-of-way. The NSCP supports the implementation of water quality improvements projects as shown on the Water Quality Improvements Map, including projects from Volume IV, TRPA Water Quality Management Plan Capital Improvement Program for Erosion and Runoff Control. All projects and parcels are eligible to participate. Projects contributing to the construction or installation of water quality improvements, which are contained in the NSCP area, are considered to have met their obligation in an amount equal to their contribution as permitted by the water quality mitigation program established in Chapter 82 of the TRPA Code of Ordinances.

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 maintenance.

CEP participation requires the Project to complete three EIP projects in the NSCP area: Nevada Utility Undergrounding – Phase I, Brockway Residential water Quality Improvement Project and the NSCP Lake Vista Mini-Park. The CEP also requires the implementation of regional stormwater treatment systems.

State of Nevada

Nevada State Division of Environmental Protection

The NDEP is a division of the State of Nevada Department of Conservation and Natural Resources. NDEP's mission is to protect and enhance the environment of the state, consistent with the public health and enjoyment, the propagation and protection of terrestrial and aquatic life, the operation of existing industries, the pursuit of agriculture, and economic development of the state." For surface water resources, NDEP sets water quality standards, determines total maximum daily loads (TMDLs), promotes control of non-point sources, monitors ambient water quality and runs a laboratory certification program.

Groundwater and surface water quality regulations are administered by NDEP and adopted by the State Environmental Commission. NDEP updated the State of Nevada Comprehensive State Ground Water Protection Program (CSGWPP) in March 1998. Regulations typically require preventative measures, such as leak containment, discharge permitting, and stormwater management.

Nevada State Bureau of Water Quality Planning

Bureau of Water Quality Planning (BWQP) within the NDEP is responsible for several water quality protection functions which include collecting and analyzing water data, developing standards for surface waters (which are listed in Chapter 445a of the Nevada Administrative Code), publishing informational reports, providing water quality education and implementing programs to address surface water quality. BWQP is divided into three branches: water quality standards, monitoring and non-point source and groundwater protection.

Nevada State Bureau of Water Pollution Control

The Bureau of Water Pollution Control (BWPC) within the NDEP is responsible for regulating discharges into the waters of the State. This is accomplished by issuing discharge permits, enforcing the State's water pollution control laws and regulations, and by providing technical and financial assistance to dischargers.

The BWPC issues National Pollutant Discharge Elimination Systems (NPDES) permits for discharge to surface waters, ground water permits for discharges that may impact subsurface waters, Underground Injection Control (UIC) permits for injection through wells, and stormwater permits.

As part of the NPDES permit for the Project, Boulder Bay LLC is required to develop and implement a site-specific Storm Water Pollution Prevention Plan (SWPPP) to prevent stormwater and groundwater pollution caused by construction activities. At a minimum, the SWPPP is to 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 streams and adjacent wetlands and SEZ.

The SWPPP outlines erosion control measures to be taken as well as Best Management Practices (BMPs) to be implemented to control and prevent to the maximum extent practicable the discharge of pollutants to surface waters and groundwater. All ground disturbing activities that occur in creeks or in upland areas that could cause soil erosion into creeks shall be conducted during the dry season to minimize siltation. In addition, the SWPPP contains a plan for

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

Nevada Department of Transportation

The State of Nevada Department of Transportation (NDOT) promotes a comprehensive statewide effort to prevent pollution in stormwater runoff from NDOT projects. Contractors are required to prepare and implement a plan to control water pollution effectively during the construction of projects. Projects resulting in one acre or more of soil disturbance or that discharge to a Waters of the United States are subject to the State of Nevada Storm Water General Permit NVR100000 and are required to prepare a SWPPP. NDOT projects in the Lake Tahoe area are under the jurisdiction of the TRPA. There are differences between typical TRPA construction permit conditions and those in the General Permit. The TRPA permits are issued individually and generally have more stringent environmental requirements than those mandated under the General Permit. Contractors are subject to the following requirements for all TRPA approved projects:

- Comply with all conditions of the TRPA permit and the General Permit;
- The contractor's engineer must attend the pre-grade meeting with TRPA and their contract compliance officer to identify all other BMP items required by TRPA; and
- Include any additional BMP requirements in the contractor's SWPPP (http://www.nevadadot.com).

A portion of the project area, approximately 17,000 square feet, is sited in the NDOT rights-of-way for State Route 28. The *Storm Water Quality Handbooks - Construction Site Best Management Practices* Manual (NDOT 2006) details information for compliance with NDEP permit requirements through the implementation of construction site BMPs.

Washoe County

The Washoe County Department of Water Resources (DWR) provides integrated water resource services for water supply, wastewater treatment, effluent reuse, flood management, flood early warning, groundwater remediation and water resource planning. DWR's mission is to provide quality product and service to the Washoe County community through teamwork, accountability and professionalism. The four divisions include: Sewer, Water, and Reclaimed Water Utility Operations and Maintenance; Engineering; Water Resource Planning; and Finance and Customer Service.

The Conservation Element of the Washoe County Comprehensive Plan (1991) puts forth the following policies and action programs for the protection of water resources that are applicable to the Project:

C.2.3 Regulate development in hillside and mountainous areas in order to mitigate drainage, erosion, siltation and landslide problems.

C.2.3.1 The Washoe County Department of Community Development, together with the Washoe County Department of Public Works, will develop hillside development and grading regulations for inclusion in the Washoe County Development Code. The regulations will protect public

health and safety, protect property, and conserve the visual character of the land. These regulations should include, but not be limited to:

a. Integration of development with the existing topography, soils and vegetation to the degree possible.

b. Minimization of soil exposure during the heavier runoff period by proper timing of grading and construction.

c. Retention of natural vegetation whenever feasible.

d. Vegetation of and mulching of denuded areas to protect them from winter precipitation and erosion caused by wind and water.

e. Diversion of runoff away from steep denuded slopes or other critical areas with barriers or ditches.

f. Preparation of drainage ways to handle concentrated or increased runoff from disturbed areas by using riprap or other lining materials.

g. Trapping of sediment-laden runoff in basins to allow soil particles to settle out before flows are released to receiving waters.

h. Inspection of sites to ensure control measures are working properly, and correction of problems as needed.

i. Minimization of erosion and slippage on man-made slopes by requiring appropriate planting or mechanical means to maintain and stabilize cut and fill slopes, and limitation of cut and fill slopes to the maximum that is feasible for the planned stabilization method.

j. Development of appropriate guidelines on the size of areas to be graded or used for building.

k. Development of guidelines for prevention of wind erosion.

l. Development of guidelines for temporary measures to minimize erosion during construction (e.g. straw bales, etc.).

C.3.3 Protect key recharge and discharge areas from activities or structures that may impair water quality or reduce the amount of groundwater recharge.

The Tahoe Area Plan of the Washoe County Comprehensive Plan outlines land policies and action programs that apply to the project area. Those most applicable to hydrology, surface water quality and groundwater are contained in T.2.1, T.2.3, T.2.4, and T.3.1.

EVALUATION CRITERIA WITH POINTS OF SIGNIFICANCE

The evaluation criteria for impacts to hydrology and water quality are presented in Table 4.3-4. These criteria are drawn from a review of the relevant literature on hydrology, groundwater and surface water resources, including a review of TRPA policies and procedures and Washoe County regulations.

Table 4.3-4

Evaluation Criteria with Points of Significance – Hydrology and Water Quality

Evaluation Criteria	As Measured by	Point of Significance	Justification
HYDRO-1. Will Project construction or long term operations degrade surface water quality in the East Stateline Point watershed?	Increased discharges of sediment, algal nutrients and other pollutants to Lake Tahoe and its tributaries TRPA Threshold WQ-4 TRPA Threshold WQ-5 TRPA Threshold WQ-6	Exceedance of established surface water standards for sediment and nutrients	TRPA Environmental Thresholds (WQ-4 Tributary Water Quality; WQ-5 Stormwater Runoff to Surface Water, WQ-6 Stormwater Runoff, Land Infiltration to Groundwater) TRPA Code of Ordinances, Chapter 25 (BMP Standards) TRPA Code of Ordinances, Chapter 64 (Grading Standards) TRPA Code of Ordinances, Chapter 81 (Water Quality Standards) TRPA Initial Environmental Checklist (3e) Washoe County Comprehensive Plan C.3.3
HYDRO-2. Will Project construction or operations degrade groundwater quality in the East Stateline Point watershed?	Increased discharges of pollutants to receiving waters or interception of groundwater during construction activities or long-term operations	Exceedance of TRPA discharge standards for nutrients	TRPA Initial Environmental Checklist (3j) TRPA Code of Ordinances, Chapter 25 (BMP Standards) TRPA Code of Ordinances, Chapter 64 (Grading Standards) TRPA Code of Ordinances, Chapter 81 (Water Quality Standards) Washoe County Comprehensive Plan C.3.3
HYDRO-3. Will Project construction or operations alter the existing surface water drainage patterns, or the rate and amount of surface water runoff so that a 20-year, 1-hour storm runoff cannot be contained on the site?	Changes in existing watercourse alignment caused by project construction or increased runoff from disturbed areas	Change in watercourse alignment or capacity or any increase in runoff	TRPA Initial Environmental Checklist (3a and 3b) TRPA Code of Ordinances, Chapter 25 (BMP Standards) TRPA Code of Ordinances, Chapter 64 (Grading Standards) TRPA Code of Ordinances, Chapter 81 (Water Quality Standards) Washoe County Comprehensive Plan C.2.3

Table 4.3-4

Evaluation Criteria with Points of Significance – Hydrology and Water Quality

Evaluation Criteria	As Measured by	Point of Significance	Justification
HYDRO-4. Will Project construction or operation interfere with groundwater movement or change the quantity of groundwater, either through direct additions or withdrawals, or through interception of an aquifer by cuts or excavations?	Changes in the direction, rate of flow of groundwater, or raising or lowering of the groundwater table	Installation of improvements that intercept groundwater or otherwise cause changes in the existing groundwater table	TRPA Code of Ordinances, Chapter 64 (Grading Standards) TRPA Initial Environmental Checklist (3g) Washoe County Comprehensive Plan C.3.3
HYDRO-5. Will the Project alter the course or flow of the 100-year floodwaters or expose people or property to water related hazards such as flooding and/or wave action from 100-year storm occurrence or seiches?	FEMA or USACE Flood Insurance Map delineations or 100-year storm occurrence	Alteration of the course or flow of the 100-year floodwaters	TRPA Code of Ordinances, Chapter 28 (Natural Hazard Standards) TRPA Code, Chapter 64 (Grading Standards) TRPA Initial Environmental Checklist (3c and 3i)
HYDRO-6. 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?	Greater than 1 gallon reduction in the amount of surface water in a water body; A demand that exceeds available public water supplies; and/or Facilities located within 600 feet of a drinking water source as delineated on TRPA Source Water Assessment Maps	Water supply demand Structures constructed within 600 feet of a Public Water Supply	TRPA Code, Chapter 64 (Grading Standards) TRPA Code of Ordinances, Chapter 83 (Source Water Protection) TRPA Initial Environmental Checklist (3d, 3h, and 3k) Washoe County Comprehensive Plan C.3.4

Source: Hauge Brueck Associates 2009

ENVIRONMENTAL IMPACTS AND RECOMMENDED MITIGATION

IMPACT: HYDRO-1: Will Project construction or operations result in the degradation of surface water quality in the East Stateline Point watershed?

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

Site disturbance and stormwater runoff during construction could pose short-term impacts to surface water quality of the project area. Runoff from modified impervious surfaces, slopes, and snow storage areas will occur from implementation of and long-term operations associated with the Project. Indirect impacts of atmospheric deposition of particulates could occur. If not addressed by the Project, potentially significant impacts to surface water quality could occur under all Alternatives from construction runoff, urban runoff, atmospheric deposition and snowmelt within the project area.

Construction Runoff. Construction associated with the Project will involve land disturbance activities, including excavation and backfill and stockpiling of soils, the extent of which will vary according to the project Alternative. Disturbed and compacted soils could contribute to runoff and subsequently increase peak and total runoff volumes from the project area, which could impact surface water quality. If soil erosion and runoff are not contained onsite, the capacities of storage and treatment systems and subsequently down-gradient drainages could be exceeded and degradation of surface water quality could occur.

Urban Runoff. Urban runoff can carry a variety of pollutants, such as metals, oils and grease, 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.

Currently, no sediment control or water quality protection BMPs are installed within the project area. An interim agreement between Boulder Bay and TRPA permitted the postponement of installation of permanent BMPs during the planning of site redevelopment. In fulfillment of the agreement, in October 2007 Boulder Bay completed temporary BMP improvements on the California Parcel (APN 090-305-016) and contributed $10,000 towards the maintenance and cleaning of area storm drains. Regular maintenance of existing facilities continues to date.

The results from pre-project stormwater sampling demonstrate that quality of stormwater runoff often exceeds the established TRPA discharge limits. There are no perennial stream channels draining the project area or East Stateline Point watershed and no direct and immediate hydraulic connection between ground and surface waters within the project area. Thus, TRPA environmental threshold WQ-4 is not directly applicable to the project area. Environmental threshold WQ-5, which outlines runoff water quality parameters and standards and WQ-6, which addresses discharges to groundwater apply to the Project. Discharge standards are listed in Table 4.3-2.

Boulder Bay completed pre-project monitoring for purposes of determining existing conditions for the project area and baseline surface water pollutant concentrations to which proposed permanent BMPs and stormwater treatment systems could be modeled

and designed. All project Alternatives will include installation of permanent BMPs and some degree of stormwater treatment systems. Facilities will capture and infiltrate runoff from the project area for expected improvements in stormwater quality as compared to existing conditions. These systems are described below, as they will differ depending on the approved Alternative but will at a minimum treat the peak runoff volume from the 20-year, 1-hour storm event and reduce pollutant concentrations to levels that comply with TRPA discharge limits.

Snowmelt. Existing surface water quality degradation is notably contributable to runoff that contains road salts and abrasives from adjacent and up-gradient roads and from untreated snowmelt from the existing snow storage area and parking lot (JBR Consultants 2009). Snowmelt from snow disposal areas can represent not only a significant source of nutrients but also of harmful hydrocarbons, metals, and biological oxygen demand.

The current TRPA Code of Ordinances does not outline detailed guidance for snow storage and disposal. The Regional Plan Update will include policies and ordinances outlining explicit criteria for snow removal and storage to ensure that snowmelt carrying contaminants to SEZs, groundwater or streams does not occur. The CEP has a goal of improved snow storage. The Project improves upon existing snow storage and management under all Alternatives.

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 vehicles, dust and particulates from unvegetated slopes, and pulverized road salts and abrasives.

Revegetation and landscaping of slopes and disturbed areas within the project area will improve surface water quality through stabilization of slopes and reduction of sediment sources. Post-Project monitoring will determine the degree to which dust, roadway abrasives and vehicle emissions are reduced and TRPA discharge limits are achieved. Short-term impacts to water quality from construction dust are reduced to a level of less than significant through implementation of the standard practices described in Chapter 6. Long-term, potential impacts to water quality from atmospheric deposition are reduced to a less than significant level through project design and maintenance.

Existing Conditions. Pre-project monitoring results report the baseline conditions of the project area, which are discussed above under the Environmental Settings sub-section. Surface water quality of the runoff from the project area does not currently comply with TRPA discharge standards listed in Code of Ordinances Chapter 81. Under all Alternatives, temporary construction-related impacts to surface water quality could occur during permanent BMP installation or redevelopment of the project area. However, upon completion of construction activities, the Project will have long-term, direct and indirect beneficial effects to the surface water quality of the project area and of the East Stateline Point watershed.

Alternatives A, B, C, D and E will pose similar potential impacts from construction runoff, urban runoff, snowmelt and atmospheric deposition; however, the strategies available for avoiding and reducing potential impacts will differ according to Alternative.

The impacts of each Alternative are discussed below, followed by a discussion of standard practices and design measures that are incorporated into the Project to avoid,

reduce and minimize these potential impacts. Standard Practices are those actions and measures that are either required by law, TRPA rules and regulations, or by CEP participation and as such are considered part of the Project. The design measures built into the Project could further avoid, reduce or minimize potential impacts that were identified during project planning and design. The analysis first addresses the required, codified TRPA regulations and CEP resolutions for program participation and then, when applicable, discusses the project components designed to move the Project "above and beyond" these base requirements to provide net benefits for the project area, NSCP, and East Stateline Point watershed.

Alternative A. Alternative A will retain the existing configuration of buildings and maintain existing land coverage. Alternative A will maintain 4.78 acres of Open Space required by the Tahoe Marnier Settlement Agreement but will not include the construction of a public park. At present, there are no existing formal parks or outdoor gathering places or plans for Washoe County to provide them within the project area. For Alternative A, no improvements will be made to public roads or infrastructure either on or offsite, but runoff from the project area and roadways will be captured in infiltration basins.

Alternative A will construct permanent BMPs as required by TRPA for water quality improvement (Code of Ordinance Chapter 25), but will not involve reconfiguration of the project area or construction of new structures. Construction of permanent BMPs will require general soil disturbance within the project area.

Alternative A will install stormwater treatment systems with the capacity to capture and infiltrate peak flow volumes from the project area for the 20-year, one-hour storm. A portion of the pollutants will be removed through pre-treatment of stormwater prior to infiltration and an additional amount of nutrients will be removed as stormwater percolates through the soil to the subsurface groundwater. Basin locations are depicted on the design sheets for Boulder Bay Master Plan BMPs for Existing Facilities (October 2007) in Appendix P. The plans illustrate the existing conditions of the project area and the proposed approach to capturing and conveying runoff to the Crystal Bay Motel site and the California Parcel for infiltration. An infiltration basin will be constructed on the California Parcel located to the south of State Route 28 and within Placer County. Runoff will be conveyed via an existing 18-inch culvert crossing of State Route 28. The basin is designed to infiltrate stormwater runoff generated from the Boulder Bay properties (existing Biltmore Casino) and Washoe County, Placer County and NDOT right of ways. A basin will also be located in the Crystal Bay Hotel property to the south of State Route 28. This basin will collect and infiltrate runoff generated from Parcels 123-042-01 and 123-042-02 as well as a portion of NDOT right-of-ways above these parcels and a portion of the Biltmore Casino Parcel.

Snow storage areas will be relocated to areas up gradient from infiltration basins that will capture and treat snow melt. Alternative A will reduce potential impacts from snowmelt by collecting and adequately treating resuspended particles from road salts and abrasives. Snow storage and disposal will be in accordance with the site criteria and management standards in the TRPA Handbook of BMPs. Slopes will be stabilized with rock-slope protection measures, to reduce sediment sources. Proper storage and management of snow will improve surface water quality through capture and removal of pollutants.

Under Alternative A the 177,500 square feet of existing surface parking, which will require application of abrasives for public safety, will remain in place.

Alternative B - Alternative B will retain the existing configuration of buildings and maintain existing land coverage. Alternative B will maintain 4.78 acres of Open Space required by the Tahoe Marnier Settlement Agreement but will not include the construction of a public park. At present, there are no existing formal parks or outdoor gathering places or plans for Washoe County to provide them within the project area.

Alternative B will construct permanent BMPs as required by TRPA for water quality improvement (Code of Ordinance Chapter 25), but will not involve reconfiguration of the project area or construction of new structures. Construction of permanent BMPs will require general soil disturbance within the project area.

Alternative B will install stormwater treatment systems with the capacity to capture and infiltrate peak flow volumes from the project area for the 20-year, one-hour storm. The system is the same as that described for Alternative A.

Snow storage areas will be treated the same as in Alternative A.

Under Alternative B implementation of airborne source controls will be the same as Alternative A.

Alternative C– Alternative C will relocate land coverage, demolish existing structures, erect new structures and install permanent BMPs. Construction activities will create open trenches and pits and require stockpiling of earthen spoils. Construction of Alternative C will require the removal of trees and general soil disturbance within the project area to accommodate new building footprints and roadways and permanent BMPs. The removal of vegetation and disturbance can lead to unstable slopes and unprotected soil and short-term increases in soil erosion could result from construction activities. Disturbed and compacted soils could contribute to runoff and subsequently increase peak and total runoff volumes from the project area, which could impact surface water quality. If soil erosion and runoff are not contained onsite, the capacities of storage and treatment systems and subsequently down-gradient drainages could be exceeded and degradation of surface water quality could occur.

Alternative C addresses potential impacts from urban runoff through reductions in land coverage, underground parking, improved roadways and slopes, offsite SEZ restoration, creation of open space, and installation of regional stormwater treatment systems and low impact development strategies.

To meet the codified requirements for BMPs and stormwater treatment, the 20-year, 1-hour storm volume must be contained and treated to reduce pollutant concentrations to meet TRPA discharge standards. Figure 4.3-1 depicts the BMP and stormwater system with the capacity to treat the 20-year, 1-hour storm volume from the project area and adjacent roadways.

The design buildings and facilities for Alternative C will allow for automatic snow melting capability throughout the pedestrian circulation and promenade and roadways interior to the project area. Automatic snow melting will eliminate the need for application of traction control materials during winter months and significantly reduce

the consequences of rain on snow precipitation events. Proper storage and management of snow will improve surface water quality through capture and removal of pollutants.

Under Alternative C. regenerative air street sweeping, landscaping, mass-transit and alternative transportation systems will be expanded and underground parking will be constructed. Revegetation and landscaping of slopes and disturbed areas within the project area will improve surface water quality through stabilization of slopes, reduction of sediment sources, and increased infiltration. The regenerative air street sweeping will remove particulates from roadways and reduce sediment loading to stormwater systems. Replacement of surface parking with an underground parking structures for Alternative C will provide benefits to surface water quality through reductions in impervious surfaces, snow storage needs, pollutants from motorized vehicles captured on paved surfaces and application of road salts and cinders. The underground parking structure will be regularly maintained and wash off will be directed to proposed stormwater treatment systems or the existing IVGID sewer system. Mass-transit and alternative transportation systems will reduce vehicle trips and the indirect effects to water quality.

Alternative D– Alternative D will relocate land coverage, demolish existing structures, erect new structures and install permanent BMPs. Construction activities will create open trenches and pits and require stockpiling of earthen spoils. Construction of Alternative D will require the removal of trees and general soil disturbance within the project area to accommodate new building footprints and roadways and permanent BMPs. The removal of vegetation and disturbance can lead to unstable slopes and unprotected soil and short-term increases in soil erosion could result from construction activities. Disturbed and compacted soils could contribute to runoff and subsequently increase peak and total runoff volumes from the project area, which could impact surface water quality. If soil erosion and runoff are not contained onsite, the capacities of storage and treatment systems and subsequently down-gradient drainages could be exceeded and degradation of surface water quality could occur.

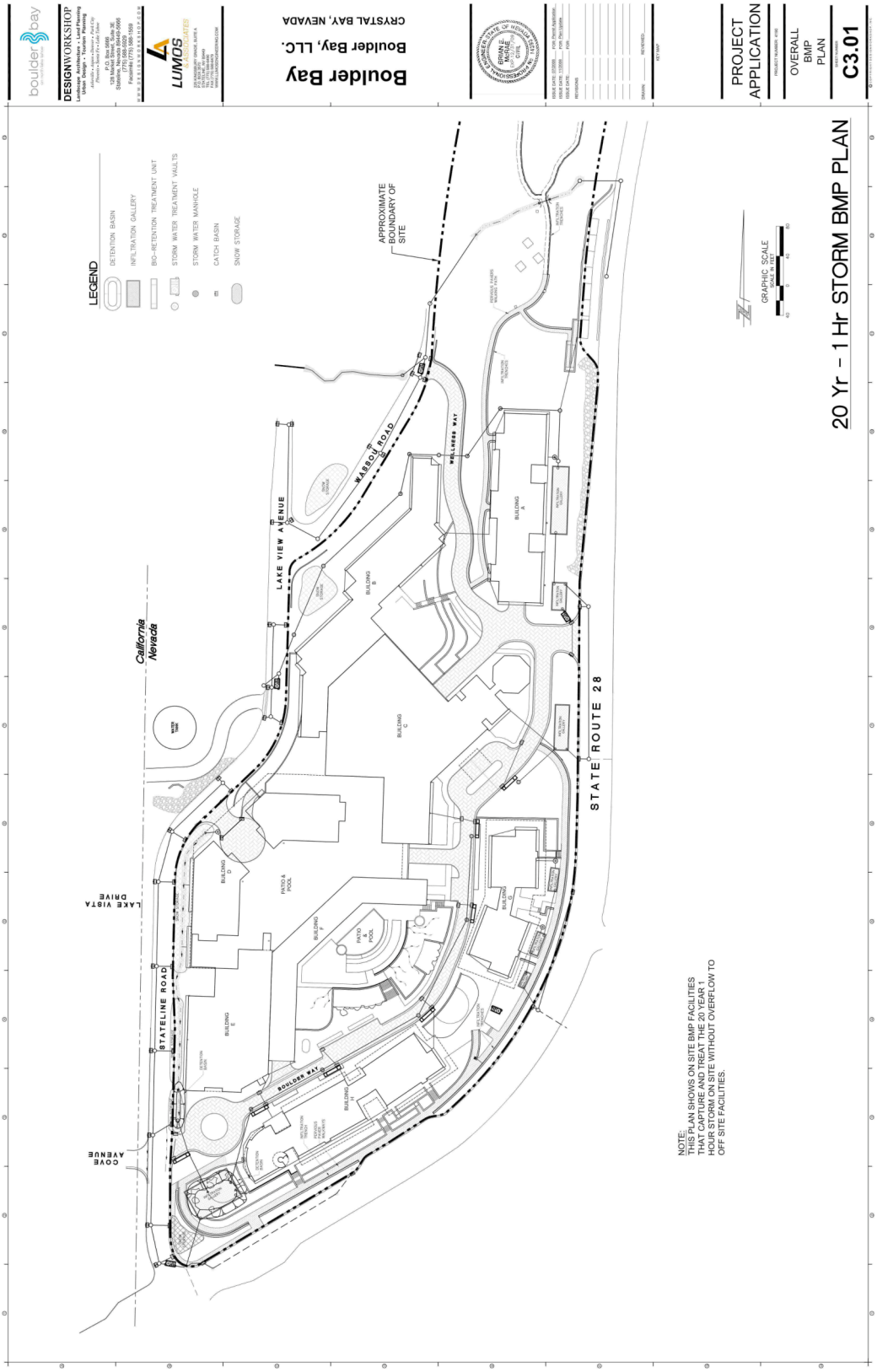
Alternative D addresses potential impacts from urban runoff through reductions in land coverage, underground parking, improved roadways and slopes, offsite SEZ restoration, creation of open space, and installation of regional stormwater treatment systems and low impact development strategies. The approach of Alternative D is comparable to that of Alternative C with minor adjustments for land coverage differences.

To meet the codified requirements for BMPs and stormwater treatment, the 20-year, 1-hour storm volume must be contained and treated to reduce pollutant concentrations to meet TRPA discharge standards. Figure 4.3-1 depicts the BMP and stormwater system with the capacity to treat the 20-year, 1-hour storm volume from the project area and adjacent roadways.

As with Alternative C, the design of buildings and facilities for Alternative D will allow for automatic snow melting capability throughout the pedestrian circulation and promenade and roadways interior to the project area. Proper storage and management of snow will improve surface water quality through capture and removal of pollutants.

Under Alternative D regenerative air street sweeping, landscaping, mass-transit and alternative transportation systems will be expanded and underground parking will be constructed. Please see discussion for Alternative C above.

Figure 4.3-1: 20-Year, 1-Hour Stormwater Treatment and BMP Plan



Alternative E – Alternative E will relocate a small amount of land coverage, demolish several existing structures, erect new structures and install permanent BMPs. Construction activities will create open trenches and pits and require stockpiling of earthen spoils. Construction of Alternative E could require the removal of trees and general soil disturbance within the project area to accommodate new building footprints and roadways and permanent BMPs. The removal of vegetation and disturbance can lead to unstable slopes and unprotected soil and short-term increases in soil erosion could result from construction activities. Disturbed and compacted soils could contribute to runoff and subsequently increase peak and total runoff volumes from the project area, which could impact surface water quality. If soil erosion and runoff are not contained onsite, the capacities of storage and treatment systems and subsequently down-gradient drainages could be exceeded and degradation of surface water quality could occur.

Alternative E will install stormwater treatment systems with the capacity to capture, treat and infiltrate peak flow volumes from the project area for the 20-year, one-hour storm. The approach of Alternative E will be the same as Alternative A above.

Under Alternative E, existing onsite roadways will be maintained and improved. Wassou Road will be extended through the project area, and Reservoir Road will be retrofitted to conform to Washoe County width and design standards as depicted in Figure 2-11. Project area slopes will be stabilized as necessary and in accordance with the Overall BMP Plan, Figure 2-8. The reduction in surface area parking under Alternative E will allow for additional onsite areas to be available for stormwater infiltration. Capture of runoff from the project area will improve surface water quality through the treatment and infiltration of runoff and reduction of pollutant concentrations.

Snow storage areas will be treated the same as in Alternative A.

Under Alternative E implementation of airborne source controls will include landscaping. Alternative E will relocate a portion of the existing surface parking to pedestal parking located under new structures and the surface parking lot will be retrofitted to capture, treat and infiltrate runoff from the 20-year, 1-hour storm event. Surface parking reductions are proven to indirectly improve surface water quality.

TRPA Permitting Requirements. The following are the standard practices incorporated into the Project (all action Alternatives) for compliance with TRPA codified regulations and project permitting conditions to avoid, reduce, minimize and mitigate potential, short-term impacts to water quality from construction and potential long-term impacts to water quality from operations:

- SP-2 – Prepare and Implement the TRPA Erosion Control Plan;
- SP-3 – Provide On-site Monitor;
- SP-4 – Prepare Storm Water Pollution Prevention Plan;
- SP-5 – Dewatering Plan;
- SP-6 – Tree Protection Measures;
- SP-7 – Revegetation/ Landscape Plan;

- SP-8 – Fertilizer Management Plan; and
- SP-9 – Post-Project BMP and Stormwater Monitoring Program.

These standard practices are detailed in the Mitigation and Monitoring Program (MMP) in Chapter 6.

Project permitting for permanent BMP installation and project construction requires the installation and maintenance of temporary BMPs in accordance with TRPA Code of Ordinances Chapter 25. This requirement is outlined in SP-2 – Prepare and Implement the TRPA Erosion Control Plan. The NDEP-approved SWPPP (SP-4) will be prepared in accordance with the State of Nevada Storm Water General Permit NVR100000 and supplementary to the Erosion Control Plan. Erosion control techniques listed therein will include temporary sediment barriers and temporary soil stabilization practices. Coir log sediment barriers and erosion control blankets that are embedded and anchored in the soil will be used to prevent erosion, runoff and remove suspended sediment from stormwater runoff. Likewise, filter fabric fences will collect sediments while allowing filtered stormwater to pass through.

Disturbed areas will be revegetated in accordance with the Landscape/Revegetation Plan (SP-7). Implementation will include performance of monitoring actions to assure BMPs are in-place, properly maintained, and effective. Trees will be protected in accordance with the Tree Protection Measures (SP-6). High traffic groomed turf areas and other areas included in the Landscaping/Revegetation Plan (see Appendix O) are designed and located to allow for controlled irrigation and fertilization of revegetated and landscaped areas. Irrigation will be installed and managed to minimize the potential for runoff to stormwater systems. Fertilizer will be carefully managed and will be used in dry form slow release applications. Special measures will be taken to prevent over-spray onto paved surfaces, which could result in runoff of nutrient rich water to the stormwater system. Fertilizer and irrigation management will be closely monitored to insure minimal escape of nutrients to the stormwater system and surface water of the Tahoe Basin.

Implementation will include performance of monitoring actions to assure BMPs are in-place, properly maintained, and effective. Monitoring actions are overlapping components of the standard practices listed above that are detailed in the Post-Project Monitoring Program or SP-9.

Capture of runoff from the project area under all Alternatives will improve surface water quality through the treatment and infiltration of runoff and reduction of pollutant concentrations to surface flows. However, an operations and maintenance plan and post-project monitoring program will be necessary to assure the proper functioning of systems and to determine the level of effectiveness of proposed permanent BMPs and stormwater systems. Post-project monitoring is committed to as part of the Project and is described in the MMP under SP-9. The operations and maintenance plan is identified as a necessary measure to assure potential impacts remain at a level of less than significant.

Boulder Bay will provide an on-site monitor during demolition and construction to ensure compliance with permit conditions and fulfillment of all Project commitments. This commitment is outlined in the Mitigation and Monitoring Program (MMP) in Chapter 6 of the EIS under standard practice SP-3 – Provide On-site Monitor. Duties will include regular review of all required temporary BMPs during demolition and construction and

presence during installation of permanent BMPs. The purpose of the environmental monitor is to provide a qualified professional on-site that will respond quickly to and correct any potential environmental issues that may arise during construction.

Implementation of the Project's standard practices will reduce potential impacts from construction activities and long term operations to a level of less than significant for Alternatives A, B, C, D and E.

Community Enhancement Program Resolutions. Alternatives A, B and E are not CEP eligible. The following CEP program participation commitments that pertain to surface water quality were resolved in the February 8, 2007 TRPA Memorandum and are applicable to Alternatives C and D:

- Meet 5% land coverage reduction goal of the NSCP (NSCP Policy 13.2 and CEP Goal 4.G);
- Provide for improvements for a public park (1.27 acres of the open space acreage) and preservation of lands for open space (4.78 acres), including long term maintenance, per intentions of the Tahoe Mariner Settlement Agreement (NSCP Policy 11.4.1 and CEP Goal 3);
- Implementation of regional stormwater treatment systems, EIP project no. 114 - Washoe County Water Quality Improvement Project – Phase I/North Stateline Community Plan Lake Vista Mini Park) and EIP project no. 732 - Brockway Residential Water Quality Improvement Project (NSCP Policies 10.3, 13.3 and CEP Goals 4.A and 4.J and TMDL reduction targets); and
- Project will participate in Washoe County Water Quality Improvement Project – Phase I/North Stateline Community Plan Lake Vista Mini Park (EIP No. 114) and the Placer County Stateline Water Quality/Brockway Residential Project (EIP No. 732). Participation in these EIP water quality improvement projects address NSCP policies 10.3 and 13.3, CEP Goals 4.A and 4.J, and TMDL load reduction targets.
- Promote transfer of development that results in substantial environmental benefit (NSCP Policy 10.4 and CEP Goal 5.B).
- General improvement in snow storage.
- Promote transit-oriented development and vehicle miles traveled (VMT) reductions.

Alternatives C and D meet the CEP resolutions for continued program participation. Alternatives C and D will meet the 5% land coverage reduction goal, provide for improvements for a public park, preserve lands for open space, implement stormwater treatment systems that capture runoff from public right-of-ways, participate in the construction of EIP project 732, and transfer 40 tourist accommodation units (TAUs) from SEZ (includes removal and restoration of land coverage in land capability district 1b) on the Colony Inn site in South Lake Tahoe, California. The commitments to EIP project 732 are outlined in Chapter 2.

Above and Beyond Project Components – Alternatives C and D comply with CEP participation requirements and in some instances propose project components that exceed the TRPA codified requirements and CEP resolutions and serve to provide net environmental benefits to the project area, NSCP and East Stateline Point watershed.

Alternative C. Alternative C proposes additional land coverage reductions, additional deed restricted acreage for open space and public parks, expanded regional stormwater treatment systems, advanced snow management, low impact development (LID) strategies to further reduce potential impacts. LID is defined as "a stormwater management and land development strategy applied at a parcel and subdivision scale that emphasizes conservation and use of on-site natural features integrated with engineered, small-scale hydrologic controls to more closely mimic pre-development hydrologic function" (Hinman 2005). These above and beyond project components are discussed below.

- *Land Coverage.* The NSCP has a policy of 5 percent reduction in land coverage or 12,000 square feet (NSCP 13.2) for projects within the community plan area. Alternative C will provide for a land coverage reduction of 6.1 percent within the project area and an overall reduction of 15.8 percent reduction with the inclusion of the two off-site locations within the NSCP. This reduction in total land coverage will coincide with a reduction of impervious surface, which is linked to reductions in stormwater runoff and improved surface water quality. This reduction in land coverage exceeds CEP Goal 4.G by 10.8% or 56,317 square feet. Alternative C will also relocate land coverage from land capability district (LCD) 1a land to higher capability LCD 2 and 4. Land coverage reductions are possible in part because of relocation surface parking to a below ground parking structure. The replacement of surface parking with an underground parking structures for Alternative C will provide benefits to surface water quality through reductions of impervious surfaces, snow storage needs, pollutants from motorized vehicles captured on paved surfaces and application of road salts and cinders. The underground parking structure will be regularly maintained and wash off will be directed to proposed stormwater treatment systems or the existing IVGID sewer system.

- *Open Space.* Alternative C will deed restrict 5.7 acres of Open Space and create 3.07 acres of public park uses. Functional open space will not include impervious surfaces and will add to the ability to infiltrate stormwater within the project area. The alternative proposes acreage in excess of the requirements set forth in the CEP and the existing Tahoe Mariner settlement agreement, an additional 0.92 acres of open space and 1.7 acres of public park use. The public park acreage includes infiltration trenches for the capture of runoff from trails and impervious surfaces.

- *Regional Storm Water Treatment Systems and EIP Projects.* Alternative C will treat the peak storm volume from the 50-year, 1-hour storm event. Under Alternative C, the Project will participate in Washoe County Water Quality Improvement Project – Phase I/North Stateline Community Plan Lake Vista Mini Park (EIP No. 114) and the Placer County Stateline Water Quality/Brockway Residential Project (EIP No. 732). Participation in these EIP water quality improvement projects fulfills NSCP policies 10.3 and 13.3, CEP Goals 4.A and 4.J, and TMDL load reduction targets. The project exceeds the CEP resolutions

through expansion of proposed systems to treat the volume of the 50-year, 1-hour storm event for on-site facilities as well as Washoe County and NDOT public right-of ways.

- The redesign of the project area for Alternative C will allow for onsite infiltration galleries and detention basins to be sized to capture, treat and infiltrate peak flow volumes from the 50-year, 1-hour storm event from 468,900 square feet of contributing area. The 50-year, 1-hour stormwater treatment plan, detailed in Figure 4.3-2, shows onsite BMP facilities that will capture, treat and infiltrate peak flow volumes with the addition of an off-site bio-retention facility along the California Stateline Road parcel and detention basins on the Crystal Bay Motel site. The system is discussed in the analysis for impact HYDRO-3 below. With the addition of these treatment facilities, stormwater treatments meet the 50-year, 1-hour storm capacity for onsite contributing areas and for portions of Washoe County and NDOT roadway rights-of-way.

Capture of runoff from the project area will improve surface water quality through the treatment and infiltration of runoff and reduction of pollutant concentrations through stormwater treatment technologies. Implementation of regional stormwater treatment systems will allow for the treatment of runoff neighborhood contributing areas up gradient and from County and NDOT roadways. Larger capacity stormwater treatment systems will assure that if site-specific system capacities are maximized, stormwater will be transmitted to or recaptured in down- gradient facilities and continue to provide benefits to surface water quality in the East Stateline Point watershed.

- *Advanced Snow Management* - Alternative C proposes advanced snow management both onsite and for adjacent public roadways. In locations where automatic snow melting is infeasible, which are primarily the Washoe County public roads and right-of-ways surrounding the project area, areas have been designed for snow removal and storage. The snowmelt will be collected, transported and treated in the stormwater treatment system. Snow management will also include protection from snowmelt from the roofs. The Overall BMP Plan, illustrated in Figure 2-8, delineates several areas available on site for snow storage. The north end of the project area is more conducive to snow removal and storage than the south end. Alternative C will also address Washoe County and NDOT snow removal requests by proposing a reconfiguration of SR 28 to allow for plowing to the center and then transport of excess snow to storage locations to avoid snow storage along the project area frontage.

- *Low Impact Development (LID) Strategies - Green Roofs, Pervious Pavers, and Bioretention for Stormwater Filtration Systems.* LID strategies focus on evaporating, transpiring and infiltrating stormwater on-site through native and engineered soils, vegetation and bioengineering applications for reductions in peak and total stormwater volumes. Cold climate challenges for stormwater management include temperature dependent changes in aquatic chemistry, water density, ion exchange capacity, hydrology of snowmelt, and the high concentration of contaminants on rain on snow storage volumes during winter runoff events. LID strategies that are tested to perform well in cold climates were identified during planning and design. The LID strategies that will contribute to surface water quality improvements from the project area and are considered above and beyond include:

- Advanced snow management (discussed below under snowmelt subsection);
- Regionally approved and water conserving landscaping;
- Expanded, regional stormwater treatment systems;
- Additional reductions in land coverage;
- Increased open space area;
- Green roofs;
- Pervious pavers; and
- Bio-retention for stormwater filtration systems.

Alternative C will implement a Boulder Bay TMDL Reduction Plan (Appendix R) that includes pollutant source controls, hydrologic source controls, stormwater treatment and airborne source controls that will work together to further reduce pollutant loads. The TMDL Reduction Plan schematic is shown in Figure 4.3-3 and highlights LID strategies such as green roofs, green roof collection areas, stormwater roof collection systems, pervious pavers and bio-retention treatment systems. With the addition of these LID project components, effective site coverage is reduced and on-site stormwater treatment systems and BMPs are expected to retain and infiltrate the 100-year, one-hour storm capacity. Effective coverage is defined as subset of total impervious area that is hydrologically-connected via sheet flow or discrete conveyance to a drainage system or receiving body of water (Washington State University 2005).

Basin-wide TMDL recommended implementation strategies 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.

Alternative C will utilize pervious pavers and pavement on approximately 55,000 square feet throughout the project area to facilitate stormwater infiltration and reduce runoff volumes. Surfaces will be swept with a high-efficiency vacuum sweeper once in the fall, once in the early spring, and as necessary to preserve infiltration capabilities.

Figure 4.3-2: 50-Year, 1-Hour Stormwater Treatment and BMP Plan

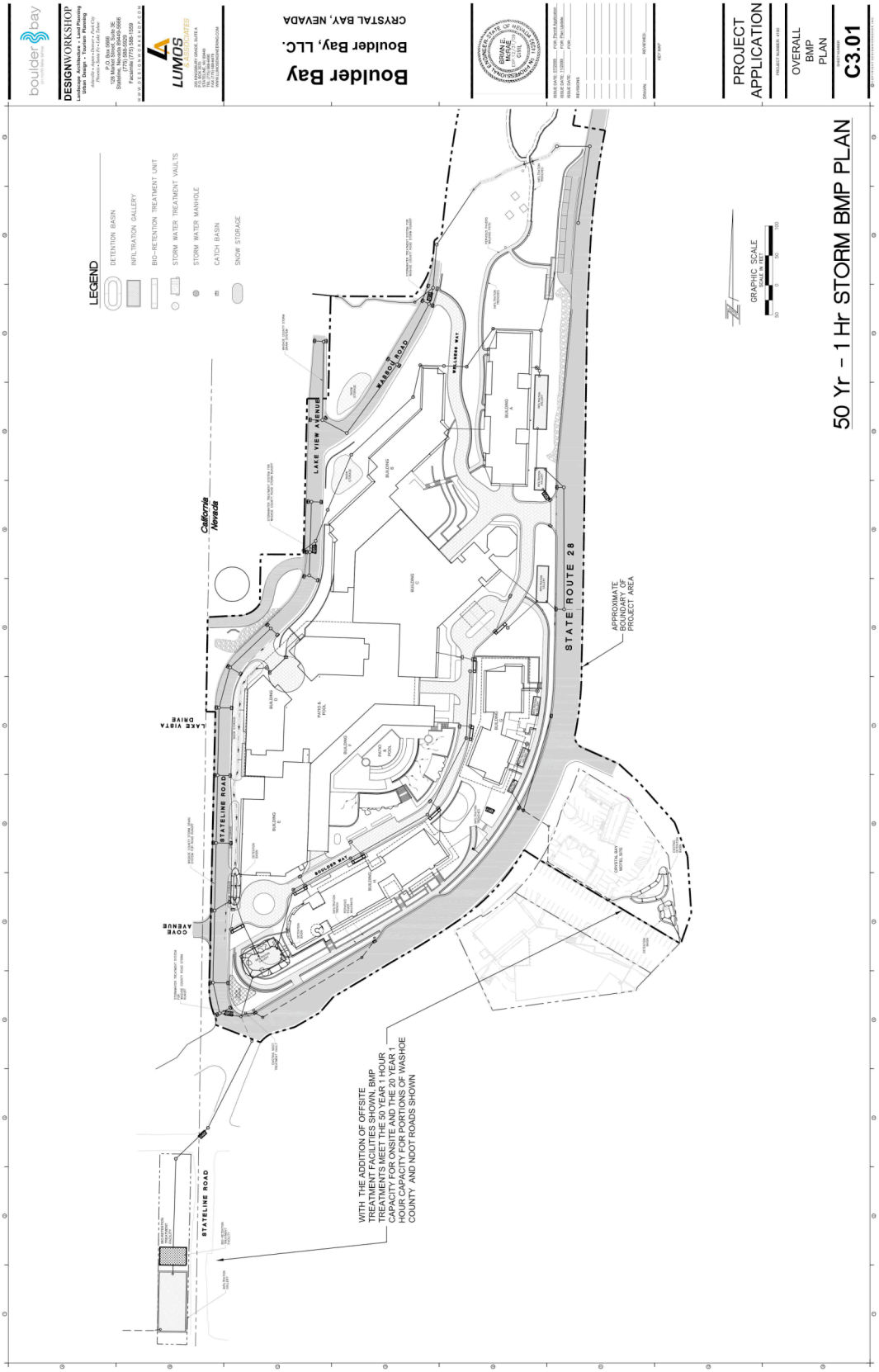
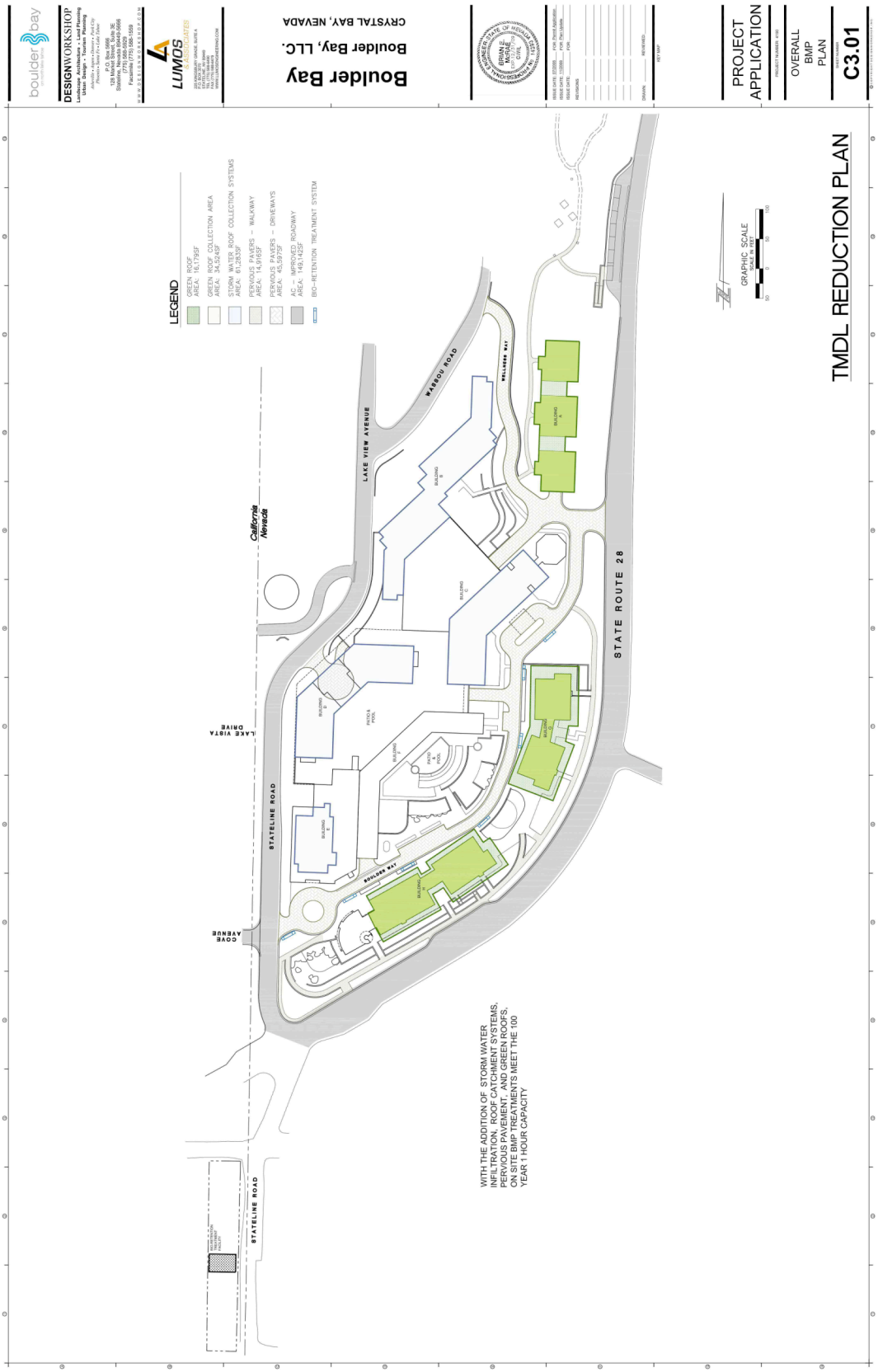


Figure 4.3-3: TMDL Reduction Plan



Stormwater catchment systems, equaling approximately 61,300 square feet will be installed on the rooftops of buildings B, C, D and E. Green roofs, which reduce heat island effects and improve building aesthetics, will be installed on retail buildings G and H, covered pedestrian walkways and the interior roof of building A. The planted area will be approximately 16,200 square feet and the catchment area is estimated at 34,500 square feet.

Bio-retention systems will be used in line with stormwater conveyance and retention systems. Runoff will flow into the landscaped systems, pond and infiltrate into the soil horizon. The engineered soil mix and vegetation will provide water quality treatment and infiltration similar to undeveloped areas. Systems are proposed along Stateline Road, along SR 28 in front of building A and the Crystal Bay Motel site for over flow parking. Systems will be positioned in portions of the project area that are determined by pre-project monitoring as having the worst stormwater quality.

The Boulder Bay TMDL Reduction Plan design objectives and forecasted benefits are detailed in Appendix R and summarized below:

- Total Effective Site Coverage of 35.8%;
- Stormwater Runoff Volume Capture Capacities of (TRPA/TMDL, as discussed for impact HYDRO-3 below)
    - 20-yr, 1-hr – 125%/150%
    - 50-yr. 1-hr – 100%/125%
    - 100-yr, 1-hr – 75%/100%;
- Total Suspended Sediment Annual Load Reduction of 90%; and
- Fine Sediment (<20 micron) Annual Load Reduction of 90%.

Surface water quality within the project area will improve under Alternative C as a result of installation of permanent BMPs, stormwater treatment systems, underground parking and LID strategies discussed above. The degree of surface water quality improvement is inferred from engineering design objectives, BMP and stormwater treatment effectiveness ratings, and best available science (Referenced to 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). Post-project monitoring will determine the degree of predicted improvements to surface water quality and ensure that potential impacts remain at a less than significant level and that the expected above and beyond benefits are further quantified.

Alternative D - Alternative D proposes additional land coverage reductions, additional deed restricted acreage for open space and public parks, expanded regional stormwater treatment systems, advanced snow management, low impact development (LID) strategies to further reduce potential impacts.

Alternative D will treat the peak storm volume from the 50-year, 1-hour storm event as illustrated for Alternative C, but modified in response to slight changes in land coverage and building locations. The potential impacts from urban runoff and the approaches towards avoiding and reducing the impacts are similar under both alternatives. Please reference the discussion for Alternative C above. The differences between Alternative D and C include:

- Alternative D will deed restrict 4.99 acres of Open Space (excess of 0.21 acres) and establish 2.60 acres of public park uses (excess of 1.23 acres);
- Alternative D will provide for a reduction of 3.1 percent within the project area and 9.7 percent with the inclusion of the two off-site parcels within the NSCP, which exceeds the CEP resolution by 4.7% or 29,974 square feet; and
- Stormwater treatment of 50-year, 1-hour storm volume from 466,500 square feet of contributing area.

In summary, the Project poses potential impacts to surface water quality from pollutants sources such as construction runoff, urban runoff, snowmelt and atmospheric deposition. The Project includes standard practices that directly and indirectly avoid, reduce and minimize potential impacts, as required by TRPA Code of Ordinances and conditions of project permitting. The Project will bring the project area into compliance with TRPA codified requirements for protection of water quality and will improve upon existing conditions of the project area, the benefits of which will be measured during post-project monitoring. Should monitoring results continue to show non-compliance with TRPA discharge standards, expansion and retrofit of proposed systems will be necessary. To further mitigate potential impacts and assure long-term compliance with TRPA discharge standards, the application of the Project's TRPA security deposit towards the retrofit and/or expansion of BMPS and stormwater treatment systems are recommended as outlined in HYDRO-1.

Mitigation: **HYDRO-1. Apply TRPA Security Deposit Towards Retrofit and/or Expansion of BMPs and Stormwater Treatment Systems if Post-Project Monitoring Determines TRPA Standards are Not Met**

If post-project monitoring determines that TRPA discharge standards are exceeded, then the TRPA Security Deposit shall be used to implement additional water quality treatment needs in the East Stateline watershed and the project area. The contractor shall make repairs or improvements to the proposed permanent BMPs and stormwater treatment systems to improve performance and effectiveness per TRPA permit requirements. If the repairs and/or improvements result in compliance with discharge standards, then no additional mitigation is required.

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

All Alternatives will install BMPs and stormwater treatment systems that will improve existing surface water quality conditions and will bring the project area into compliance with TRPA Code of Ordinance requirements for water quality protection and containment of stormwater runoff. Alternatives C and D will also implement LID strategies and TMDL load reduction measures that will provide additional benefits to surface water quality. The impact analysis supports a conclusion that impacts to surface

water quality from implementation of all Alternatives will be reduced to a less than significant level and that long-term operations of the Project will provide benefits to the project area, NSCP and East Stateline Point watershed.

Standard practices are incorporated into the Project and will be implemented under all Alternatives. The standard practices are listed above and detailed in Section 6.5 of the MMP in Chapter 6. Installation and routine maintenance and monitoring of permanent BMPs and stormwater treatment systems will assure that runoff from the project area is contained and infiltrated and that BMPs and systems are functioning properly to remove pollutants from urban runoff. Project monitoring will continue for documentation that BMPs and stormwater treatment systems are effective, TRPA discharge limits are achieved, and potential impacts are maintained at a level of less than significant as based on evaluation criteria for impact HYDRO-1.

The degree of surface water quality improvement is inferred from engineering design objectives and calculations, BMP and stormwater treatment effectiveness ratings, and best available science (Referenced to 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). Post-project monitoring, outlined in SP-9, will determine the degree of predicted improvements to surface water quality and ensure that potential impacts remain at a less than significant level.

To further ensure that the Project will not adversely impact surface water quality, mitigation measure HYDRO-1 will be required if post-project monitoring results demonstrate that stormwater from the project area does not comply with TRPA discharge standards. If monitoring shows TRPA discharge standards are exceeded, the contractor will make repairs or improvements to the proposed control measures to improve their effectiveness per TRPA permit requirements. If discharge standards continue to be exceeded, the Project will be subject to TRPA directives towards the upgrade and/or expansion of the installed stormwater treatment system. These additional measures, if necessary, will ensure compliance with TRPA standards and will reduce the potential impact to a less than significant level.

IMPACT: HYDRO-2: Will Project construction or operations result in the degradation of groundwater quality in the East Stateline Point watershed?

Analysis: *No Impact; Alternatives A and B*

There is no direct and immediate hydraulic connection between ground and surface waters of the project area (e.g., surface water does not enter the groundwater table in the project area). There will be no direct discharges to groundwater resulting from the Project, and groundwater was not encountered during investigations of exploratory borings or test pits.

Infiltration galleries and basins for the stormwater treatment systems designed for Alternatives A and B will be installed at a maximum depth of 4.5 feet to allow for sufficient treatment of pollutants. Infiltration basins are sized to allow for larger sized sediment and particulate materials to settle out. A portion of the pollutants will be removed through pre-treatment of stormwater prior to infiltration and an additional amount of nutrients will be removed as stormwater percolates through the soil to the subsurface groundwater. Sediment and nutrient removal occurs through adsorptions, precipitation, trapping, straining and bacterial degradations or transformation.

Groundwater investigations determine the unsaturated zone to be in excess of 55 feet bgs within and in the vicinity of the project area, a depth that will allow for sufficient time for removal and reduction of particulate and dissolved constituents through physical, chemical and biological processes.

Project area runoff will be contained on-site, treated and infiltrated to reduce discharge of contaminants to groundwater. Excavations that could intercept groundwater and compromise groundwater quality will not occur under Alternatives A and B.

Mitigation: No mitigation is required.

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

There is no direct and immediate hydraulic connection between ground and surface waters of the project area (e.g., surface water does not enter the groundwater table in the project area). There will be no direct discharges to groundwater that result from the Project. Project area runoff will be contained on-site, treated and infiltrated to avoid potential discharge of contaminants to groundwater. Groundwater was not encountered during investigations of exploratory borings or test pits.

Infiltration galleries and basins will be installed at a maximum depth of 4.5 feet and 3 feet, respectively, for Alternatives C, D and E to allow for sufficient treatment of pollutants. Vaults of the stormwater treatment system could be installed at a depth of seven feet. These vaults serve as containment and treatment portions of the system and will not infiltrate stormwater at these points.

Infiltration basins are sized to allow for larger sized sediment and particulate materials to settle out and for runoff waters to infiltrate. A portion of the pollutants will be removed through pre-treatment of stormwater prior to infiltration and an additional amount of nutrients will be removed as stormwater percolates through the soil to the subsurface groundwater. Sediment and nutrient removal occurs through adsorptions, precipitation, trapping, straining and bacterial degradations or transformation. Groundwater investigations determine the unsaturated zone to be in excess of 55 feet bgs within and in the vicinity of the project area, a depth that will allow for sufficient time for removal and reduction of particulate and dissolved constituents through physical, chemical and biological processes.

Kleinfelder as reported in a February 5th, 2007 Memo to TRPA drilled borings on January 17, 2007 and concluded that excavations to the proposed depths of 20 feet below ground surface (bgs) should not encounter seasonal groundwater. Lumos and Associates completed investigations and borings to a maximum of 55 feet (bgs) in August of 2008 and concluded that groundwater is not expected to impact development of the project area, as final grades at the site will be from zero to 47 feet below existing grades.

Excavations to a maximum depth of 47 feet bgs will be necessary to secure foundation footings of new buildings and for construction of the below ground parking structure for Alternatives C and D. Alternative E will require excavations to a lesser depth to provide parking below the proposed buildings and to secure foundation footings.

Seasonal groundwater is not expected to be encountered during construction. If seasonal groundwater is encountered during excavation activities a comprehensive dewatering

plan included as a standard practice for the Project will be followed. The dewatering plan is detailed in Appendix I and outlined in SP-5 in the Mitigation and Monitoring Plan. TRPA requests the following in the Soils Hydrologic Approval Letter (February 2009): temporary BMPs are to be installed and maintained prior to excavation and during all phases of the Project; all excavated materials shall be hauled away from the site to a legally acceptable location; no fills or recontouring other than backfill for the cut-retaining structures shall be allowed; and blasting of rocks should be kept to an absolute minimum to avoid damage to surrounding rocks and vegetation.

Treatment systems discussed under impact HYDRO-1 will treat stormwater runoff through pre-treatment (oil and grease separators, treatment vaults) and passive (retention and settling of suspended sediments) methods. Water infiltrated from proposed infiltration galleries and basins will be of superior water quality than that of surface waters that currently runoff the project area and infiltrate soils untreated. Because infiltration galleries and basins were designed to accommodate a depth to the unsaturated zone sufficient for the protection of groundwater quality, water infiltrated from the stormwater treatment systems will not have a direct hydraulic connection to groundwater. Based upon project area investigations, maximum excavation depths and stormwater treatment designs, the impact to groundwater quality is considered to be less than significant.

Mitigation: No mitigation is required.

IMPACT: HYDRO-3: Will Project construction or operations alter the existing surface water drainage patterns, or the rate and amount of surface water runoff so that a 20-year, 1-hour storm runoff cannot be contained on the site?

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

The existing project area does not have systems in place capable of treating runoff volumes from the 20-year, 1-hour storm event. Under Alternatives A, B and E, the project area will be retrofitted to comply with TRPA's BMP requirements set forth in Chapter 25 of the Code of Ordinances for the protection and restoration of water quality and attainment of discharge standards. TRPA requires that BMP improvements be sized to infiltrate the runoff generated from the upslope impervious areas as a result of the 20-year, 1-hour storm, which is estimated at one inch of rainfall over the impervious area. Stormwater conveyance systems will be installed with the capability of conveying, at a minimum, the runoff volume from the 20-year, 1-hour storm for 399,884 square feet of land coverage plus additional upslope contributing areas to infiltration basins installed on the California Parcel and the Crystal Bay Motel Parcel.

TRPA Permitting Requirements - Permanent BMPs, stormwater conveyance systems and infiltration basin locations to be implemented under Alternatives A and B are detailed in the August 9, 2007 response memo from Lumos and Associates to TRPA's October 10, 2003 letter concerning BMP installation for the project area. Appendix P contains the memorandum and five plan sheets. A slight design change, but not a significant change in contributing area could be necessary for the Project implemented under Alternative E.

Basin locations are depicted on the design sheets for Boulder Bay Master Plan BMPS for Existing Facilities (October 2007) in Appendix P. The plans illustrate the existing

conditions of the project area and the proposed approach to capturing, conveying and treating runoff:

1. An infiltration basin will be constructed on the California Parcel located to the south of State Route 28 and within Placer County. Runoff will be conveyed via an existing 18-inch culvert crossing of State Route 28. The basin is designed to infiltrate stormwater runoff, sized to capture the 20 year, one hour storm volume, generated from the Boulder Bay properties (existing Biltmore Casino) and Washoe County, Placer County and NDOT right of ways. A basin will also be located in the Crystal Bay Hotel property to the south of State Route 28. This basin will collect and infiltrate runoff generated form Parcels 123-042-01 and 123-042-02 as well as a portion of NDOT right of way above these parcels and a portion of the Biltmore Casino Parcel.
2. Barren soil areas within the project area will be mulched with 1 to 2 inches of pine needles or other organic mulch. These areas consist of the small road and parking lot side slopes in the northern portion of the casino parking area near the intersection of Reservoir Road and Wassou Avenue.
3. "H" rails will be installed along the top and the toe of the steep cut slope on parcel 123-053-02 along with erosion control fabric installed on the slope to prevent to migration of sediment.
4. Existing inlets and outlets will continue to be cleaned out and maintained. Slopes near building footings and retaining walls will be reinforced with rock-slope protection.
5. The drop inlets on the north central position of parcel 123-052-04 will be plugged so that runoff reaches basins described under item 1 above via sheet flow.
6. Snowmelt will be captured and conveyed to basins described under item 1 above.
7. Irrigation and fertilizer application will be in accordance with the TRPA Handbook of Best Management Practices.

Construction and operation of the Project under Alternatives A, B and E will alter the existing surface water drainage patterns and the rate and amount of surface water runoff so that a 20-year, 1-hr storm runoff volume can be contained entirely within the project area if offsite locations are not available. The level of impact to existing surface water drainage patterns, or the rate and amount of surface water runoff, is considered less than significant for Alternatives A, B because of compliance with TRPA requirements for stormwater treatment and permanent BMPs. The proposed project area conditions will be an improvement upon existing project area conditions as based on TRPA criteria for containment and treatment of runoff.

Post-project monitoring (SP-9) and on-going maintenance as determined in the operation and maintenance plan will assure the long-term functioning and effectiveness of installed systems.

CEP Resolutions - Alternatives A, B and E are not eligible for CEP participation.

Above and Beyond Components - Alternatives A, B and E will bring the project area into compliance with TRPA requirements, but do not include measures that are considered above and beyond those requirements for project permitting.

Mitigation: No mitigation is required.

Analysis: *Less Than Significant Impact; Alternatives C and D*

TRPA Permitting Requirements - Under Alternatives C and D, the project area will be retrofitted to comply with TRPA's BMP requirements set forth in Chapter 25 of the Code of Ordinances for the protection and restoration of water quality and attainment of minimum discharge standards. TRPA requires that BMP improvements be sized to infiltrate the runoff generated from the upslope impervious areas as a result of the 20-year, 1-hour storm, which is estimated at one inch of rainfall over the impervious area. Figure 4.3-1 illustrates the project area design for meeting permitting requirements to contain and infiltrate the 20-year, 1-hour storm volume.

CEP Resolutions - CEP program participation requires that the Project implement or substantially contribute to an EIP project that will provide environmental benefits or mitigation in excess of TRPA's general project permit requirements. The Project will participate in EIP project 732, which includes the Brockway Water Quality Improvement Project and the added Stateline Interstate Flow Mitigation System.

Above and Beyond Components - Under Alternatives C and D, the project area will be redeveloped to the extent that the area can be retrofitted with stormwater systems capable of capturing, treating and infiltrating the cumulative runoff volume from the 50-year, 1-hour storm event. The stormwater treatment system designed for Alternatives C and D is illustrated in Figure 4.3-2 and further detailed along with other permanent BMPs in Chapter 2 on Figure 2-8. The proposed stormwater treatment system includes:

- Nine infiltration galleries;
- Four detention basins;
- Five infiltration trenches;
- Biorentention for Stormwater filtration systems; and
- Stormwater treatment vaults.

The system will have sufficient infiltration capacity to capture, treat and infiltrate runoff volumes from the 50-year, 1-hour storm event from approximately 468,900 square feet for Alternative C and 466,500 square feet of contributing area for Alternative D. The contributing area includes all impervious surfaces of the project area plus adjacent County and State road surfaces and ROWs that are combined into eight treatment areas. The implementation of this regional stormwater treatment system is a goal of the CEP and is considered above and beyond the base requirements for project permitting.

The galleries, basins and trenches are sized with enough capacity to treat a percent of runoff that is slightly more than the volume of the 50-year, 1-hour storm event. The galleries are designed linearly so that if an upstream gallery becomes clogged or over-burdened, the additional capacity in the down slope galleries will absorb the overflow. The impervious areas for the project are grouped into eight main areas with respect to the improvement(s) that infiltrate the runoff generated by that area. These areas are referred to as follows:

1. Park: The trails in the park drain to infiltration trenches located adjacent to the trails.

2. Infiltration Galleries 2 and 3: The onsite roof areas of Buildings A (1-4) and B, the ADA ramp to the park and the driveway entrance to Building A (Wellness Way) drain to Infiltration Galleries 2 and 3 located adjacent to Building A. The roof drain system has downspouts that enter a stormwater conveyance system, and the ADA ramp and driveway entrance drain to catch basins. These collection points drain via stormwater conveyance to Infiltration Galleries 2 and 3. In addition to these areas within the project area, runoff from Lakeview Avenue and Wassau Road will be infiltrated in Galleries 2 and 3.

3. Infiltration Gallery 4: The onsite roof areas of Building C and its porte-cochere as well as the area of Boulder Way from the SR 28 entrance to the porte-cochere drain to Infiltration Gallery 4, which is located adjacent to Building C. The roof drain system has downspouts that enter a stormwater conveyance system. Boulder Way and its entrance drain to catch basins. These collection points drain via stormwater conveyance to Infiltration Gallery 4.

4. Infiltration Galleries 5-7: The onsite roof area of Building G, as well as the entrance and patio on the eastern side of Building G, drain to the three proposed Infiltration Galleries (5, 6 and 7) located adjacent to the building. The roof drain system has downspouts that enter a stormwater conveyance system, which drain to the two infiltration galleries.

5. Southwest Corner: The onsite roof areas of Buildings D, E, F and H, the pool/patio areas between Buildings D and F and F and G, the entrances to Building D off Stateline Road and Boulder Way from Stateline Road to the porte-cochere at Building C drain to Detention Basins 1 and 2 and Infiltration Gallery 8, which are located at the southwest corner of the project area. The roof and patio/pool drain systems have downspouts that enter a stormwater conveyance system. Boulder Way and its entrance drain to catch basins. These collection points drain via stormwater conveyance to the detention basins.

6. Infiltration Gallery 9: Runoff from Stateline Road (Washoe County) and SR 28 (NDOT) drains to the proposed infiltration gallery located at the vacant lot on the California side of Stateline Road between CalNeva and Crystal Drives. Runoff from SR 28 and Stateline Road is collected in catch basins and conveyed to the California site via stormwater conveyance across SR 28 to the infiltration gallery.

7. Crystal Bay Hotel: Runoff from SR 28 (NDOT), as well as runoff from the roofs, walkways and parking lot on the Crystal Bay Hotel site, drains to the existing Detention Basin 3 located to the south of the Crystal Bay Hotel. SR 28 runoff is collected in catch basins and conveyed to the detention basin via stormwater conveyance across SR 28 to the hotel site.

8. Nugget Parking Lot: Runoff from the Nugget Parking Lot drains to the proposed Detention Basin 4 and Infiltration Gallery 10 located to the south of the Crystal Bay Hotel. Runoff from the parking lot is collected in a catch basin and conveyed to the detention basin via stormwater conveyance and rock-lined ditch.

9. Infiltration Trenches: The walkways on the west side of Building A and highway side of Buildings C, G and H drain to infiltration trenches located adjacent to the walkways.

As stated above, TRPA requires that BMP improvements be sized to infiltrate the runoff generated by the upstream impervious areas for a 20-year, 1-hour storm, which is estimated at 1 inch of rainfall over the impervious area. Boulder Bay intends to infiltrate the runoff generated by the upstream impervious areas for a 50-year, 1-hour storm. The NOAA Atlas 14 Point Precipitation Frequency Estimates value of 1.25 inches for the 50-year, 1-hour storm is used. Capacity calculations based on cumulative runoff from the 50-year, 1-hour storm event under Alternative C for the galleries, basins and trenches are detailed in Tables 4.3-5, 4.3-6 and 4.3-7, respectively. Capacity calculations based on cumulative runoff from the 50-year, 1-hour storm event under Alternative D for the galleries, basins and trenches are detailed in Tables 4.3-8, 4.3-9 and 4.3-10, respectively.

The comparison of the runoff generated to the infiltration capacity is provided below for each area for Alternative C. Slight capacity changes would be necessary for Alternative D but the flow path for treatment remains the same with the exception of gallery 10, which is not constructed under Alternative D.

1. Park: Calculations show that the trenches along the edges of the paths in the park have a combined capacity of 774 CF, which is greater than the 469 CF of cumulative runoff generated by the 50-year, 1-hour storm from the paths.

2. Infiltration Galleries 2 and 3: Infiltration Galleries 2 and 3 are designed linearly; Gallery 2 is connected to Gallery 3 by an overflow pipe. Calculations show that these galleries have a combined capacity of 10,887 CF, which is greater than the 7,806 CF of cumulative runoff generated by the 50-year, 1-hour storm from the contributing areas. Runoff from these contributing areas within the project area boundaries will be captured and conveyed to treatment vaults prior to entering the infiltration galleries. A proposed treatment vault with sand and oil separators within the County ROW will treat runoff from the contributing areas outside the project boundaries – portions of Lakeview Avenue and Wassau Road.

3. Infiltration Gallery 4: The enclosed calculations show that Infiltration Gallery 4 has a capacity of 5,037 CF, which is greater than the 4,736 CF of runoff generated by the 50-year, 1-hour storm from the roof and paved areas. Runoff from these contributing areas will be treated with the use of bio-retention treatment units.

4. Infiltration Galleries 5-7: Infiltration Galleries 5, 6 and 7 are designed linearly; Gallery 5 connects to Gallery 6, and Gallery 6 connects to Gallery 7 with storm drains. In addition, Gallery 7 is connected to Detention Basins 3 and 4 at the Crystal Bay Hotel site by storm drain. The enclosed calculations show that Galleries 5, 6 and 7 have a combined capacity of 2,561 CF, which is greater than the 1,817 CF of cumulative runoff generated by the 50-year, 1-hour storm from the contributing areas. Runoff from these contributing areas will be treated with the use of pre-treatment vaults (sand and oil separators) prior to the infiltration galleries.

5. Detention Basins 1 and 2, Infiltration Gallery 8: Detention Basins 1 and 2 and Infiltration Gallery 8 are designed linearly. Basin 2 overflows to Basin 1, and

Basin 1 overflows into Infiltration Gallery 8. In addition, any possible overflow from Gallery 8 is connected in series to Infiltration Gallery 9, located at the California Site. The enclosed calculations show that these Basins and Gallery have a combined capacity of 16,082 CF, which is greater than the 15,938 CF of cumulative runoff generated by the 50-year, 1-hour storm from the contributing areas. Runoff from Boulder Way and the proposed adjacent buildings will be treated with the use of bio-retention treatment units, while the remainder of the runoff from within the project area is treated with the use of pre-treatment vaults (sand and oil separators) prior to the infiltration galleries and detention basin. Runoff from County ROW shall be treated with a pre-treatment vault that contains sand and oil separators.

6. Infiltration Gallery 9: The enclosed calculations show that Infiltration Gallery 9 has a capacity of 14,248 CF, which is greater than the 10,646 CF of runoff generated by the 50-year, 1-hour storm from the contributing area. Runoff from the NDOT portion of this area will continue to be treated by the existing treatment vault located at the corner of SR 28 and Stateline Road. Runoff from the Washoe County portion of this area (Stateline Road) will be treated with the use of a new treatment vault with sand and oil separators.

7. Detention Basin 3: The enclosed calculations show that Detention Basin 3 has a capacity of 3,954 CF, which is greater than the 3,492 CF of runoff generated by the 50-year, 1-hour storm from the contributing areas. In addition, Detention Basin 3 is connected in series to Detention Basin 4, located downstream of Detention Basin 3 on the Crystal Bay Hotel Site.

8. Detention Basin 4 and Infiltration Gallery 10: Detention Basin 3 and Infiltration Gallery 10 are designed linearly so that overflow from Basin 4 flows via storm pipe to Gallery 10. The enclosed calculations show that Detention Basin 3 and Infiltration Gallery 10 have a combined capacity of 2,082 CF, which is greater than the 2,042 CF of runoff generated by the 50-year, 1-hour storm.

9. Infiltration Trenches: The enclosed calculations show that the trenches have a combined capacity of 2,527 CF, which is greater than the 2,118 CF of cumulative runoff generated by the 50-year, 1-hour storm from the walkways.

The above comparison shows that each of the areas has sufficient infiltration capacity to capture, detain and infiltrate the 50-year, 1-hour storm. In addition, the galleries are designed linearly so that if it occurs that an upstream gallery is clogged or over-burdened the additional capacity in the downstream galleries will absorb some of the overflow.

Referencing tables 4.3-5, 4.3-6 and 4.3-7, the combined capacity for the Alternative C system to contain the 50-year, 1-hour storm volume is 102% at the Gallery 10 end point and 134% at the Gallery 9 end point. Referencing tables 4.3-8, 4.3-9 and 4.3-10, the combined capacity for the Alternative D system is 140% denoted by Gallery 9 capacity calculations.

Table 4.3-5

Infiltration Gallery Capacity Calculations for the 50-year, 1-hour Storm Volume – Alternative C

Gallery	2*	3*	4	5**	6**	7**	8***	9***	10****
Total Contributing Area (SF)	57,839	17,095	45,462	17,442	0	0	0	102,199	0
50yr/1hr accumulation (in)*****	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25
50-Yr Storm Volume (CF)	6025	1781	4736	1817	0	0	0	10646	0
Overflow from upstream Basin (CF)	0	0	0	0	794	0	8,724	0	310
Volume to Gallery (CF)	6,025	1,781	4,736	1,817	794	0	8,724	10,646	310
Gallery Capacity (CF)	8,800	2,087	5,037	1,023	1,023	515	8,868	14,248	356
Enough Capacity?	YES	YES	YES	NO	YES	YES	YES	YES	YES
Difference	2,775	306	301	-794	229	515	144	3,602	46
% 50-yr Contained	146%	117%	106%	56%	113%	141%	101%	134%	102%

Source: Lumos and Associates April 20, 2009 Correspondence

Notes

* Gallery 2 overflows to Gallery 3

** Gallery 5 overflows to Gallery 6, and Gallery 6 overflows to Gallery 7

*** Overflow from detention basins 1 and 2 reach Gallery #8, located beneath basin #1. Overflow from Gallery #8 reaches Gallery #9 at the California

**** Overflow from detention basin 4 reaches Gallery #10.

***** 50yr/1hr storm accumulation value taken from NOAA Point Precipitation Frequency Estimates

Table 4.3-6

Infiltration Basin Capacity Calculations for the 50-year, 1-hour Storm Volume – Alternative C

Basin	1	2	Onsite Basins (1-2)*	Gallery #8 (Under Basin 1)*	3** (Crystal Bay Motel)	4*** (Crystal Bay Motel)
Total Contributing Area (SF)	153,007	0	153,007	0	31,489	19,543
50yr/1hr Storm Accumulation (in)****	1.25	1.25	1.25	1.25	1.25	1.25
50yr/1hr Storm Volume (CF)	15,938	0	15,938	0	3,280	2,036
Overflow from Upstream Basin/Gallery			0	8,724		
Volume to Basin			15,938	8,724	3,280	2,036
Basin Capacity	6,336	878	7,214	8,868	3,954	1,726
Enough Capacity?			NO	YES	YES	NO***
Difference			-8,724	144	674	-310
% 50yr Contained			45%	101%	121%	85%

Source: Lumos and Associates April 20, 2009

Notes

* Basin 2 overflows to Basin 1; Basin 1 overflows to Gallery #8 (below Basin 1)
** Basin 3 overflows to Basin 4
*** Basin 4 overflows to Gallery 10
**** 50yr/1hr storm accumulation value taken from NOAA Point Precipitation Frequency Estimates

Table 4.3-7

Infiltration Trench Capacity Calculations for the 50-year, 1-hour Storm Volume – Alternative C

Trench Areas	1	2	3	4	5
Contributing Areas (SF)	3,318	8,917	4,258	3,835	4,498
50yr/1hr accumulation (in)*	1.25	1.25	1.25	1.25	1.25
50-Yr Storm Volume (CF)	346	929	444	399	469
Trench Capacity (CF)	652	988	457	430	774
Enough Capacity (50-yr)?	YES	YES	YES	YES	YES

Source: Lumos and Associates April 20, 2009 Correspondence

Notes

* 50yr/1hr storm accumulation value taken from NOAA Point Precipitation Frequency Estimates

Table 4.3-8

Infiltration Gallery Capacity Calculations for the 50-year, 1-hour Storm Volume – Alternative D

Gallery	2*	3*	4	5**	6**	7**	8***	9***	10****
Total Contributing Area (SF)	2,500	76,678	17,695	28,808	21,893	0	0	0	97,745
50yr/1hr accumulation (in)****	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25
50-Yr Storm Volume (CF)	260	7987	1843	3001	2281	0	0	0	10182
Overflow from upstream Basin (CF)	0	0	0	0	0	1,258	235	8,774	0
Volume to Gallery (CF)	260	7,987	1,843	3,001	2,281	1,258	235	8,774	10,182
Gallery Capacity (CF)	933	8,800	2,087	3,526	1,023	1,023	515	8,868	14,248
Enough Capacity?	YES	YES	YES	YES	NO	NO	YES	YES	YES
Difference	672	812	244	525	-1,258	-235	280	94	4,066
% 50-yr Contained	358%	110%	113%	117%	45%	90%	112%	101%	140%

Source: Lumos and Associates April 20, 2009 Correspondence

Notes

* Gallery 2 overflows to Gallery 3

** Gallery 5 overflows to Gallery 6, and Gallery 6 overflows to Gallery 7

*** Overflow from detention basins 1 and 2 reach Gallery #8, located beneath basin #1. Overflow from Gallery #8 reaches Gallery #9 at the California

**** Overflow from detention basin 4 reaches Gallery #10.

***** 50yr/1hr storm accumulation value taken from NOAA Point Precipitation Frequency Estimates

Table 4.3-9

Infiltration Basin Capacity Calculations for the 50-year, 1-hour Storm Volume – Alternative D

Basin	1	2	Onsite Basins (1-2)*	Gallery #8 (Under Basin 1)*	3** (Crystal Bay Motel)	4** (Crystal Bay Hotel)
Total Contributing Area (SF)	159,659	0	159,659	0	42,890	Overflow from Basin 3
50yr/1hr Storm Accumulation (in)***	1.25	1.25	1.25	1.25	1.25	1.25
50yr/1hr Storm Volume (CF)	16,631	0	16,631	0	4,468	0
Overflow from Upstream Basin/Gallery			0	8,774		
Volume to Basin			16,631	8,774	4,468	0
Basin Capacity	6,336	1,521	7,857	8,868	3,954	1,513
Enough Capacity?			NO	YES	NO	YES
Difference			-8,774	94	-514	999
% 50yr Contained			47%	101%	89%	122%

Source: Lumos and Associates April 20, 2009

Notes

* Basin 2 overflows to Basin 1; Basin 1 overflows to Gallery #8 (below Basin 1)
** Basin 3 overflows to Basin 4
*** Basin 4 overflows to Gallery 10
**** 50yr/1hr storm accumulation value taken from NOAA Point Precipitation Frequency Estimates

Table 4.3-10

Infiltration Trench Capacity Calculations for the 50-year, 1-hour Storm Volume – Alternative D

Trench Areas	1	2	3	4	5
Contributing Areas (SF)	2,815	1,034	7,751	3,045	3,977
50yr/1hr accumulation (in)*	1.25	1.25	1.25	1.25	1.25
50-Yr Storm Volume (CF)	293	108	807	317	414
Trench Capacity (CF)	542	268	1,100	339	430
Enough Capacity (50-yr)?	YES	YES	YES	YES	YES

Source: Lumos and Associates April 20, 2009 Correspondence

Notes

* 50yr/1hr storm accumulation value taken from NOAA Point Precipitation Frequency Estimates

The calculations in the tables above only take into account capacities of the proposed infiltration galleries, detention basins and infiltration trenches of the project. The comparative analysis above does not take into account LID measures, such as pervious pavement, green roofs and street sweeping, that cannot be quantified at this time due to uncertainties in final design and structural requirements. The addition of these elements in the final BMP design will increase the overall treatment capacity of the BMP design.

The impact is considered beneficial for Alternatives C and D because the proposed project area conditions will be an improvement upon existing project area conditions as based on TRPA criteria for containment of runoff. Construction and operation of the Project, under Alternatives C and D, will alter the existing surface water drainage patterns and the rate and amount of surface water runoff so that a 20-year, 1-hr storm runoff volume can be contained on the site. With the expansion of detention basins (Basins # 3 and 4 in Figure 2-8) on the Crystal Bay Motel site and the addition of the off-site infiltration basin (Basin # 9 in Figure 2-8) that is located on the California site parcel, the runoff volume of the 50-year, 1-hour storm event from the project area and contributing areas from Washoe County and NDOT roadways and ROWs will be captured, treated and infiltrated.

The addition of the LID strategies, discussed under impact HYDRO-1 and detailed in Appendix P in the TMDL Reduction Plan, will further decrease effective coverage and increase the overall treatment capacity of the proposed stormwater treatment system so that cumulative runoff from the project area that approaches the volume of a 100-year, 1-hour storm will be captured and treated. As illustrated in Figure 4.3-3, the use of pervious pavement for approximately 30 percent of the project area, green roofs for buildings A, G and H, and stormwater catchments for buildings B, C, D and E will reduce peak flows and allow for increased time of treatment for runoff. Table 4.3-11 presents the calculations for the 50-year, 1-hour capacity system with consideration of reductions in peak flows from LID strategies. Table 4.3-12 presents the calculations that support the ability of the proposed stormwater treatment system to capture and treat the 100-year, 1-hour storm volumes when benefits of green roofs, pervious pavers and stormwater catchments are considered.

Based on treatment abilities of proposed stormwater treatment systems, permanent BMPS and LID strategies, the impact to existing surface water drainage patterns, or the rate and amount of surface water runoff, is determined to be beneficial for Alternatives C and D. Expansion of stormwater systems to capture, treat and infiltrate runoff from lands and roadways adjacent to the project area along with implementation of pollutant source controls, hydrologic source controls, stormwater treatment and airborne source controls will provide environmental benefits not only for the project area but for the NSCP and East Stateline Point watershed.

Mitigation: No mitigation is required.

Table 4.3-11

Infiltration Gallery Capacity Calculations for the 50-year, 1-hour Storm Volume with LID Strategies Considered – Alternatives C and D

Gallery	2*	3*	4	5**	6**	7**	8***	9***	10****
Total Contributing Area (SF)	33,750	1,108	24,119	162	0	0	0	102,199	0
50yr/1hr Storm Accumulation (in)****	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25
50-Yr Storm Volume (CF)	3516	115	2512	17	0	0	0	10646	0
Overflow from upstream Basin (CF)	0	0	0	0	0	0	2,411	0	316
Volume to Gallery (CF)	3,516	115	2,512	17	0	0	2,411	10,646	316
Gallery Capacity (CF)	8,800	2,087	5,037	1,023	1,023	515	8,868	14,248	356
Enough Capacity?	YES	YES	YES	YES	YES	YES	YES	YES	YES
Difference	5,284	1,971	2,525	1,006	1,023	515	6,458	3,602	40
% 50-yr Contained	250%	1808%	200%	6061%	12121%	15176%	167%	134%	102%

Source: Lumos and Associates April 20, 2009 Correspondence

Notes

* Gallery 2 overflows to Gallery 3

** Gallery 5 overflows to Gallery 6, and Gallery 6 overflows to Gallery 7

*** Overflow from detention basins 1 and 2 reach Gallery #8, located beneath basin #1. Overflow from Gallery #8 reaches Gallery #9 at the California

**** 50yr/1hr storm accumulation value taken from NOAA Point Precipitation Frequency Estimates

Table 4.3-12

Infiltration Gallery Capacity Calculations for the 100-year, 1-hour Storm Volume with LID Strategies Considered – Alternatives C and D

Gallery	2*	3*	4	5**	6**	7**	8***	9***	10****
Total Contributing Area (SF)	33,750	1,108	24,119	162	0	0	0	102,199	0
100yr/1hr accumulation (in)****	1.55	1.55	1.55	1.55	1.55	1.55	1.55	1.55	1.55
100-Yr Storm Volume (CF)	4359	143	3115	21	0	0	0	13201	0
Overflow from upstream Basin (CF)	0	0	0	0	0	0	4,721	0	1,182
Volume to Gallery (CF)	4,359	143	3,115	21	0	0	4,721	13,201	1,182
Gallery Capacity (CF)	8,800	2,087	5,037	1,023	1,023	515	8,868	14,248	356
Enough Capacity?	YES	YES	YES	YES	YES	YES	YES	YES	NO
Difference	4,440	1,944	1,922	1,002	1,023	515	4,148	1,047	-826
% 100-yr Contained	202%	1458%	162%	4888%	9775%	12238%	135%	108%	

Source: Lumos and Associates April 20, 2009 Correspondence

Notes

**** 100 yr/1hr Storm Accumulation

IMPACT: HYDRO-4: Will Project construction or operation interfere with groundwater movement or change the quantity of groundwater, either through direct additions or withdrawals, or through interception of an aquifer by cuts or excavations?

Analysis: *Less than Significant Impact; Alternatives A and B*

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.

Groundwater flows around and within the project area have been previously modified by the construction of SR 28 and Washoe County Roads, affecting historic pre-Crystal Bay development surface and groundwater conditions. Construction activities under Alternatives A and B will not result in a change to the current site topography or grade. The existing structures and roads will remain in place and operable. Interior remodeling will occur (Alternatives A and B) and use will shift from hotel to timeshare (Alternative B). No new impact to groundwater movement or change in the quantity of groundwater is expected under Alternatives A and B, as no direct additions or withdrawals or interception of an aquifer by cuts or excavation will occur.

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

Construction of the Project as described under Alternatives C, D and E involves excavation and fill activities. Excavation of earth below existing ground surfaces presents the potential to intercept or interfere with seasonal groundwater movement. Groundwater flows around and within the project area have been previously modified by the construction of SR 28 and Washoe County Roads, affecting historic pre-Crystal Bay development surface and groundwater conditions.

TRPA Code, Chapter 64, Section 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 natural topography of the site is maintained. To assure that no additional modifications to groundwater quantity and movement occur from the proposed development, TRPA requires that a site-specific geotechnical investigation and report be completed and consulted during project design and permitting. If the report determines that groundwater will be encountered during project construction and/or operation, TRPA must make findings consistent with Subsection 64.7.A (2) of TRPA Code of Ordinances to approve exceptions to the prohibitions of groundwater interception or interference:

(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.

A Soils and Hydrologic Scoping Investigation completed by Lumos and Associates in August 2008 reported no groundwater in the six test pits excavated to a depth of 12 feet below ground surface (bgs) and nine borings that were advanced to a maximum depth of 55.5 feet bgs. A review of the project grading plans indicate that excavation within the project area under Alternatives C and D will be from zero to 47 feet bgs. The excavation depths within the project area under Alternative E will be approximately half of the depths proposed for Alternatives C and D.

TRPA approved the proposed excavation depths in their February 24, 2009 Soils Hydrologic Approval Letter (Appendix I). The soils/hydrologic report includes a summary of the geologic, soil, and hydrologic conditions expected to be encountered within the project area. Qualifications of the personnel who conducted the soil/hydrologic investigation are also provided in the report. The report specifies the field exploration conducted by backhoe excavation test pits or drill boring, and the depths to which the samples were taken. Field Methods complied with TRPA requirements to reveal information to 125% of the proposed excavation depth. 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.

Proposed excavation depths are a minimum of 8.5 feet above the maximum boring depths of 55.5 feet bgs that were achieved during the test pits, the depth at which no groundwater or evidence of groundwater was found. The investigation concludes that based on observations of borings and test pit data, seasonal groundwater will not be encountered in the excavations and thus interference or interception of groundwater will not occur. The TRPA Soils Hydrologic Approval Letter verifying excavations is included in Appendix I.

The excavations are designed so that no damage will occur to mature trees that will remain after project construction, including root systems, and hydrologic conditions of the soil. An Arborist Report, that analyzes the potential impact to trees that will remain after project construction, is included in Appendix J. Special vegetation protection measures will be employed to ensure damage will not occur as a result of excavation. The Project is designed to not only maintain the natural topography of the project area, but has incorporated the natural topography of the project area into the design of the project area and locations of buildings and facilities. Additionally, standard practice, SP-6 – Tree Protection Measures will be followed.

Although Alternatives C, D and E will require excavations in excess of five feet, the site-specific soils/hydrologic investigations conclude that excavations from 0 to 47 feet will

not result in the interception or interference of groundwater. The level of impact is less than significant.

To further reduce the level of potential impact, should unanticipated groundwater be encountered during excavation activities, a dewatering plan is included as a standard practice of the Project. The dewatering plan, SP-5, is included in Appendix I and detailed in the MMP in Chapter 6.

Mitigation: No mitigation is required.

IMPACT: HYDRO-5: Will the Project alter the course or flow of the 100-year floodwaters or expose people or property to water related hazards such as flooding and/or wave action from 100-year storm occurrence or seiches?

Analysis: *No Impact; Alternatives A, B, C, D and E*

The Project will not impact the course or flow of the 100-year floodwaters or expose people or structures to water-related hazards as the project area is not located within a Federal Emergency Management Agency (FEMA) 100-year floodplain. The hydrology of the project area, a sloped and sufficiently drained area, does not support an active stream channel and thus does not present a high potential for localized flooding, inundation and/or wave action from the 100-year storm occurrence. The project area is a sufficient distance from and elevation above Lake Tahoe as to not expose people or property to the hazards of a seiche.

Mitigation: No mitigation is required.

IMPACT: HYDRO-6: 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: *No Impact; Alternatives A, B, C, D and E*

Construction and operation of the Project will not change the amount of surface water in any water body or be located within 600 feet of a water source protection zone depicted on TRPA Source Water Assessment maps. The project area is not directly connected to an active stream channel, Lake Tahoe or drinking water source. The installation of permanent BMPs and stormwater treatment systems will allow for the infiltration of waters that currently commingle and runoff the project area. Infiltrated water must comply with TRPA discharge to groundwater limits as stated in Chapter 81 of the Code of Ordinances and outlined in Table 4.3-2. IVGID provided an approval letter validating that the Project will not significantly reduce the amount of water otherwise available for public water supplies in their service area. The Project, implemented under Alternatives A, B, C, D or E, will not impact public water supplies.

Mitigation: No mitigation is required.

CUMULATIVE IMPACTS AND MITIGATION MEASURES

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

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

The geographic setting for this cumulative analysis is the East Stateline Point Watershed, which is an indirect tributary to Lake Tahoe via overland flows, along NDOT, Caltrans, and Washoe and Placer County roadways and neighborhood drainage systems. The analysis considers current and foreseeable development in the watershed and evaluates whether the Project, together with the potential impacts 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 significance.

Construction of the Project, along with the development of other projects in the East Stateline Point watershed as well as other projects located in the northern end of Lake Tahoe could have the potential to disturb soils and create unstable slopes, which could cause sedimentation and erosion or otherwise mobilize pollutants, especially if they occur concurrent with Boulder Bay construction. Excavation work associated with any future projects could disrupt the recharging of the water table while increasing the potential for introducing pollutants into groundwater sources. The operation of future completed projects could increase pollutant loads in urban and upland runoff. Increased impervious surfaces and/or changes in land use patterns associated with future projects could alter drainage patterns and increase the potential for flooding.

TRPA, federal, State and local policies and programs are in place to avoid, reduce and mitigate potential impacts to surface and ground water resources at the project and regional scales. Project-level regulations and mitigations, such as requirements to implement water quality protection measures, BMPs, and stormwater treatment systems, avoid and reduce potential impacts from individual projects to a less than significant level 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, the proposed Lake Tahoe TMDL load reduction goals that may be approved in the near future, and the current 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.

No significant impacts to hydrology or surface water or groundwater resources are expected from the construction or long-term operation of the Project. Improvement to existing conditions and stormwater quality will result due to implementation of the Project, and as such, potential incremental effects will not result in cumulatively considerable impacts to hydrology or water resources. Cumulatively, the Project is expected to provide direct beneficial effects to hydrology, surface water quality and groundwater through the reductions in impervious surfaces and resultant runoff quantity and the active treatment of runoff prior to infiltration to groundwater. Additionally, historic problems with interstate flows (i.e. runoff from Washoe County and NDOT roadways across the Stateline to Placer County and Caltrans roadways and associated stormwater systems) are addressed through the regional stormwater treatment system proposed as part of the Project. Other water quality benefits of the Project include:

reduced amount of surface parking that requires snow removal and sweeping, new landscaping with improved water conservation and fertilizer management, and use of modern sweeper technology to reduce airborne contaminants.

Cumulative impacts to water resources are considered to have a less than significant impact. Other future projects in the East Stateline Point watershed 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 (proposed TMDL load reductions when they are adopted and stormwater treatment performance and BMP effectiveness). As a result, their cumulative impact will be reduced, minimizing the potential for cumulative adverse impacts. Mitigation measure HYDRO-1 requires post-project monitoring of BMP effectiveness, revegetation success and specific stormwater treatment system performance standards. Should monitoring results identify impacts to surface or ground water resources from the Boulder Bay Project, remedial measures have been identified as a means of avoiding, reducing or further mitigating incremental contributions to potential cumulative water quality effects.

Mitigation: No mitigation is required.

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