CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
LAHONTAN REGION

ITEM NO. 6

LATE REVISIONS

MEETING OF NOVEMBER 16, 2010
SOUTH LAKE TAHOE

FOR

PROPOSED AMENDMENTS TO THE WATER QUALITY CONTROL PLAN FOR THE LAHONTAN REGION INCLUDING THE DRAFT LAKE TAHOE TOTAL MAXIMUM DAILY LOAD FOR SEDIMENT AND NUTRIENTS AND THE PROPOSED RESOLUTION

The following late revisions are proposed. Deletions are in ~~*Strikeout*~~ and additions are *Underlined*:

1. Enclosure 2, proposed Basin Plan amendment, Page 8, add an asterisk to "Urban Upland" source category and add a footnote at bottom of the page, Urban upland reduction requirements constitute waste load allocations for the City of South Lake Tahoe, El Dorado County, Placer County, and the California Department of Transportation.

2. Enclosure 2, proposed Basin Plan amendment, Page 12, add the word "waste" to modify load allocation in these three paragraphs:

   Paragraph 3: *Urban Runoff:* Through stormwater NPDES permits that regulate runoff discharges from the City of South Lake Tahoe, El Dorado and Placer Counties, and the California Department of Transportation, the Regional Board will specify waste load allocations and track compliance with required load reduction milestones.

   Paragraph 4: The Lake Tahoe TMDL expresses waste load allocations for the urban upland source as percent reductions from a basin-wide baseline load. The baseline basin-wide pollutant loads for the TMDL reflect conditions as of water year 2003/2004 (October 1, 2003 – September 30, 2004). To translate basin-wide urban runoff waste load allocations into jurisdiction-specific waste load allocations for municipalities and state highway departments, the Regional Board will require those agencies to conduct a jurisdiction-scale baseline load analysis as the first step in the implementation process. For each five year milestone, jurisdiction-specific waste load reduction requirements will be calculated by multiplying the

urban uplands basin-wide load reduction percentage by each jurisdiction's individual baseline load.

Paragraph 5: To ensure comparability between the basin-wide baseline waste load estimates and the jurisdiction-scale baseline waste load estimates for urban runoff, municipalities and the state highway department must use a set of standardized baseline condition values that are consistent with those used to estimate the 2003/2004 basin-wide pollutant loads. Specifically, baseline load estimate calculations must reflect infrastructure, land development conditions, and operations and maintenance practices representative of those implemented in October 2004.

3. Enclosure 2, proposed Basin Plan amendment, Page 19, Paragraph 3, delete the words "~~Deep Water~~" and replace with the word "Mid-Lake."

4. Enclosure 2, proposed Basin Plan amendment, Page 21, in the Table, Row 1, Column 2, add the shaded text: **Transparency:** For Lake Tahoe, the annual average deep water transparency as measured by the Secchi ~~secchi~~ disk ~~transparency~~ shall not be decreased below 29.7 meters, the levels recorded in 1967-71 by the University of California, Davis. ~~based on a statistical comparison of seasonal and annual mean values. *The "1967-71 levels" are reported in the annual summary reports of the "California-Nevada-Federal Joint Water Quality Investigation of Lake Tahoe" published by the California Department of Water Resources.*~~

5. Enclosure 2, proposed Basin Plan amendment, Page 31, as excerpted from the Table, Column 2, add the shaded underlined text and delete the shaded underlined strikeout text: **New Development, Redevelopment, and Existing Development ~~Private Property BMP~~ Stormwater Treatment Requirements**

For new development and re-development projects and private property Best Management Practice retrofit efforts, project proponents shall first consider opportunities to infiltrate stormwater runoff from impervious surfaces. At a minimum, permanent stormwater infiltration facilities must be designed and constructed to infiltrate runoff generated by the 20 year, 1-hour storm which equates to approximately one inch of runoff over all impervious surfaces during a 1-hour period.

Where conditions permit, project proponents should consider designing infiltration facilities to accommodate runoff volumes in excess of the 20 year, 1-hour storm to provide additional stormwater treatment.

~~Runoff from parking lots, retail and commercial fueling stations, and other similar land uses may contain oil, grease, and other hydrocarbon pollutants. Project proponents designing treatment facilities for these areas may be required to include pre-treatment devices to remove hydrocarbon pollutants prior to infiltration or discharge. Where a risk of hydrocarbon spills exist, project proponents must include contingency plans to prevent and facilities to sequester spills to avert groundwater pollution.~~

6. Enclosure 4, Resolution R6T-2010-(PROP), Page 3, Finding 13, delete entire paragraph: ~~The 65-year implementation period described in the TMDL will allow implementing agencies to pursue a variety of compliance~~

~~approaches. In conjunction with approval of the proposed TMDL, the State Water Board will also seek USEPA approval of the 65 year staged implementation under 40 CFR 131.13, which allows USEPA to approve state policies generally affecting the applications and implementation of water quality standards.~~

7. Enclosure 5, draft Lake Tahoe TMDL Report, Page 11-11 (last paragraph and last sentence) through top of Page 11-12, edit as follows: ~~Because TRPA's Regional Plan does not project beyond twenty years of implementation, subsequent~~ The TRPA Regional Plan update~~s are~~ is anticipated to include an atmospheric nitrogen emission reduction strategy that meets the TMDL transparency standard attainment needs.

8. Enclosure 5, draft Lake Tahoe TMDL Report, Page 13-3, insert the following text at the top of the page: multiple projects found in the same sub-drainage basin or the same watershed, and/or BMP improvement efforts within the entire basin). This type of monitoring is an integral part of the capital improvement, regulatory, and incentive programs and allows for the evaluation of individual or combined effects of water quality control actions. Results from effectiveness monitoring can be used by project designers to incorporate those design features that will most successfully remove the pollutants of concern.

Please note that the Late Revisions, listed above, are shown on the following pages that can be directly inserted in the respective Enclosure to replace each specific page. If printing the replacement pages, be sure to print the PDF pages as double-sided in the order provided.

concentrations. Because the majority of the pollutant loads discharged to Lake Tahoe are carried by upland runoff, the derived daily load estimates are for upland runoff and stream channel erosion sources. The daily load estimate for the atmospheric source may be estimated by dividing the average annual pollutant loading estimate by 365 days.

Although the daily load estimates for each pollutant are required by EPA, the average annual load expression remains a more useful and appropriate management tool for the Lake Tahoe basin. The deep water transparency standard is based on average annual conditions and the most meaningful measure of Lake Tahoe's transparency is generated by averaging the Secchi depth data collected during a given year. The modeling tools used to predict load reduction opportunity effectiveness as well as the lake's response are all driven by annual average conditions. An emphasis on average annual fine sediment particle and nutrient loads also addresses the hydrologic variability driven by inter-annual variability in precipitation amounts and types. Average annual estimates also provide a more consistent regulatory metric to assess whether urban implementation partners are meeting established load reduction goals. Finally, by emphasizing annual average conditions rather than instantaneous concentrations, implementers will have the incentive to focus action on the areas of greatest pollutant loads to cost effectively achieve required annual reduction requirements.

Table 5.18-2. Fine Sediment Particle Load Allocations by Pollutant Source Category.

	Baseline Load		Milestone Load Reductions												Standard Attainment
	Basin-Wide Load (Particles/yr)	% of Basin-Wide Load	5 yrs	10 yrs	15 yrs	20 yrs	25 yrs	30 yrs	35 yrs	40 yrs	45 yrs	50 yrs	55 yrs	60 yrs	65 yrs
Forest Upland	4.1E+19	9%	6%	9%	12%	12%	13%	14%	15%	16%	17%	18%	19%	20%	20%
Urban Upland*	3.5E+20	72%	10%	21%	34%	38%	41%	45%	48%	52%	55%	59%	62%	66%	71%
Atmosphere	7.5E+19	16%	8%	15%	30%	32%	35%	37%	40%	42%	45%	47%	50%	52%	55%
Stream Channel	1.7E+19	3%	13%	26%	53%	56%	60%	63%	67%	70%	74%	77%	81%	85%	89%
Basin Wide Total	4.8E+20	100%	10%	19%	32%	35%	38%	42%	44%	47%	51%	55%	58%	61%	65%

Table 5.18-3. Total Nitrogen Load Allocations by Pollutant Source Category.

	Baseline Load		Milestone Load Reductions												Standard Attainment
	Basin-Wide Nitrogen Load (MT/yr)	% of Basin-Wide Load	5 yrs	10 yrs	15 yrs	20 yrs	25 yrs	30 yrs	35 yrs	40 yrs	45 yrs	50 yrs	55 yrs	60 yrs	65 yrs
Forest Upland	62	18%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Urban Upland*	63	18%	8%	14%	19%	22%	25%	28%	31%	34%	37%	40%	43%	46%	50%
Atmosphere	218	63%	0%	0%	1%	1%	1%	1%	1%	1%	1%	1%	2%	2%	2%
Stream Channel	2	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Basin Wide Total	345	100%	2%	3%	4%	5%	6%	6%	7%	7%	8%	8%	9%	9%	10%

Table 5.18-4. Total Phosphorus Load Allocations by Pollutant Source Category.

	Baseline Load		Milestone Load Reductions												Standard Attainment
	Basin-Wide Phosphorus Load (MT/yr)	% of Basin-Wide Load	5 yrs	10 yrs	15 yrs	20 yrs	25 yrs	30 yrs	35 yrs	40 yrs	45 yrs	50 yrs	55 yrs	60 yrs	65 yrs
Forest Upland	12	32%	1%	1%	1%	2%	1%	1%	2%	2%	2%	2%	2%	3%	3%
Urban Upland*	18	47%	7%	14%	21%	23%	26%	28%	31%	33%	36%	38%	41%	44%	46%
Atmosphere	7	18%	9%	17%	33%	36%	39%	42%	45%	48%	51%	53%	56%	58%	61%
Stream Channel	1	3%	8%	15%	30%	32%	34%	36%	38%	40%	42%	44%	46%	48%	51%
Basin Wide Total	38	100%	5%	10%	17%	19%	22%	24%	26%	28%	30%	32%	33%	34%	35%

* Urban upland load reduction requirements constitute waste load allocations for the City of South Lake Tahoe, El Dorado County, Placer County, and the California Department of Transportation,.

Analysis conducted during Lake Tahoe TMDL development indicates that a complete, worst-case build-out scenario of remaining parcels could potentially increase fine sediment particle loading by up to two percent. Given the inherent uncertainty in the watershed modeling analysis and the conservative assumptions of the worst-case build out scenario, the potential pollutant load increase associated with future development will likely be less than the worst-case estimate.

Any activity, such as new development, re-development, or other land disturbing management actions, has the potential to increase localized (i.e. on a parcel scale) pollutant loading. To ensure that future growth does not increase pollutant loads, the City of South Lake Tahoe, El Dorado County, and Placer County must reduce fine sediment particle, total nitrogen, and total phosphorus loads as described in Tables 5.18-2, 5.18-3, and 5.18-4 from the established baseline condition. A municipality must annually demonstrate on a catchment (i.e. sub-watershed) basis that no increased loading in fine sediment particle, total nitrogen, and total phosphorus will result from any land disturbing activity permitted in the catchment. Efforts to eliminate the increased loads from these land disturbing activities will not be counted towards the annual load reduction requirements.

Implementation Plan

The Lake Tahoe TMDL Implementation Plan is a summary of programs the various funding, regulatory, and implementing agencies may take to reduce fine sediment particle, phosphorus, and nitrogen loads to Lake Tahoe to meet established load reduction milestones.

The Regional Board evaluated load reduction opportunities for all pollutant sources as part of the Pollutant Reduction Opportunity Report (Lahontan and NDEP 2008a) and found that the most cost effective and efficient load reduction options for the forested upland, stream channel erosion, and atmospheric deposition sources are consistent with existing programs. The Pollutant Reduction Opportunity Report concluded that continued implementation of measures to address disturbances in undeveloped areas, control eroding stream banks, and reduce atmospheric deposition are critical to meeting required load reductions. Therefore, a regulatory policy that maintains the current implementation approaches for these source categories is appropriate to meet TMDL load allocations.

The most significant and currently quantifiable load reduction opportunities are within the urban uplands source. Because urbanized areas discharge the overwhelming bulk of the average annual fine sediment particle load reaching Lake Tahoe, much of the load reductions must be accomplished from this source. Even if it were feasible to completely eliminate the fine sediment particle load from the other three sources, the transparency standard would never be met.

Consequently, the Lake Tahoe TMDL implementation plan emphasizes actions to reduce fine sediment particle and associated nutrient loading from urban stormwater runoff. Due to the magnitude of both the pollutant source and related control opportunities, the Regional Board has devoted time and resources to develop detailed

tools and protocols to quantify, track, and account for pollutant loads associated with urban runoff.

The following sections briefly describe the implementation approaches for each of the four major pollutant source categories. Due to the relative magnitude of the pollutant source and the importance of reducing loads from the developed upland area, the most detailed policy and regulatory changes are for managing urban stormwater.

The tools for estimating the expected average annual fine sediment particle load reduction associated with actions to address stream channel erosion, atmospheric deposition, and forest upland sources are less advanced than the methods to estimate urban upland control measure effectiveness. Acknowledging the science that indicates that stream channel erosion, atmospheric deposition, and forest upland sources contribute less pollutants overall (especially fine sediment particles) to Lake Tahoe, coupled with the high cost of developing estimation and tracking tools, the Regional Board has not developed detailed load reduction estimation, accounting, and tracking procedures for these sources. The Regional Board will, however, require responsible entities to report on load reduction activities to ensure ongoing implementation of forest, stream channel, and atmospheric load reduction efforts.

Urban Runoff: Through stormwater NPDES permits that regulate runoff discharges from the City of South Lake Tahoe, El Dorado and Placer Counties, and the California Department of Transportation, the Regional Board will specify waste load allocations and track compliance with required load reduction milestones.

The Lake Tahoe TMDL expresses waste load allocations for the urban upland source as percent reductions from a basin-wide baseline load. The baseline basin-wide pollutant loads for the TMDL reflect conditions as of water year 2003/2004 (October 1, 2003 – September 30, 2004). To translate basin-wide urban runoff waste load allocations into jurisdiction-specific waste load allocations for municipalities and state highway departments, the Regional Board will require those agencies to conduct a jurisdiction-scale baseline load analysis as the first step in the implementation process. For each five year milestone, jurisdiction-specific waste load reduction requirements will be calculated by multiplying the urban uplands basin-wide load reduction percentage by each jurisdiction's individual baseline load.

To ensure comparability between the basin-wide baseline waste load estimates and the jurisdiction-scale baseline waste load estimates for urban runoff, municipalities and the state highway department must use a set of standardized baseline condition values that are consistent with those used to estimate the 2003/2004 basin-wide pollutant loads. Specifically, baseline load estimate calculations must reflect infrastructure, land development conditions, and operations and maintenance practices representative of those implemented in October 2004.

The Lake Clarity Crediting Program provides a system of tools and methods to allow urban jurisdictions to link projects, programs, and operations and maintenance activities to estimated pollutant load reductions. In addition to providing a consistent method to track compliance with stormwater regulatory measures, the Lake Clarity Crediting

Research projects have been funded to assess the benefits stream restoration project components that reconnect the stream to its natural floodplain in reducing fine sediment particles and nutrients. The Water Board anticipates that these efforts will provide consistent protocols useful for quantifying the load reductions from certain streams under specified flow conditions.

Tributary Monitoring

Stream water quality monitoring and suspended sediment load calculations are regularly done as part of the Lake Tahoe Interagency Monitoring Program (LTIMP). LTIMP is a cooperative program including both state and federal partners and is operationally managed by the United States Geological Survey, UC Davis – Tahoe Environmental Research Center, and the Tahoe Regional Planning Agency. LTIMP was formed in 1978 and one of its primary objectives is to monitor discharge, nutrient load, and sediment loads from representative streams that flow into Lake Tahoe. Cumulative flow from these monitored streams comprises about 50 percent of the total discharge from all tributaries. Each stream is monitored on 30 - 40 dates each year and sampling is largely based on hydrologic events. Nitrogen and phosphorus loading calculations are performed using the LTIMP flow and nutrient concentration database. This data is stored on the USGS website at http://wdr.water.usgs.gov/.

Lake Monitoring:

Lake sampling is done routinely at two permanent stations. At the Index Station (location of the Lake Tahoe Profile or LTP), samples are collected between 0 - 105 meters in the water column at 13 discrete depths. This station is the basis of the > 40 year continuous data set and monitoring is done on a schedule of 25-30 times per year. The ~~Deep Water~~ Mid-Lake Station has been operational since 1980 and has been valuable for comparison with the Index Station. At this location, samples are taken down a vertical profile to the bottom of the lake (0 - 450 meters) at 11 discrete depths on the order of once per month. Sampling along the complete vertical depth profile allows for the analysis of whole-lake changes. In addition, the lake monitoring program also includes phytoplankton and zooplankton taxonomy and enumeration, algal growth bioassays (using natural populations), and periphyton (attached) algae. Much of this monitoring is summarized in a report entitled, *Tahoe: State of the Lake Report* published by UC Davis (UC Davis - TERC 2009).

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Thodal, C.E. 1997. Hydrogeology of Lake Tahoe Basin, California and Nevada, and Results of a Ground-Water Quality Monitoring network, Water Years 1990-92: U.S. Geological Survey Water-Resources Investigations Report 97-4072, 53 p."

US EPA, 2007. Options for Expressing Daily Loads in TMDLs. United States Environmental Protection Agency Office Wetlands, Oceans, and Watersheds

B. Proposed Changes to Existing Basin Plan Language

The following changes are to be made in to the sections designated in the "Location" column. Deletions are shown in ~~strikethrough~~, additions underlined.

Location	Text
pg. 3-9, column 1, pgph.1	**Transparency:** For Lake Tahoe, the annual average deep water transparency as measured by the Secchi ~~secchi~~ disk ~~transparency~~ shall not be decreased below 29.7 meters, the levels recorded in 1967-71 by the University of California, Davis. ~~based on a statistical comparison of seasonal and annual mean values. *The "1967-71 levels" are reported in the annual summary reports of the "California-Nevada-Federal Joint Water Quality Investigation of Lake Tahoe" published by the California Department of Water Resources.*~~
pg. 4-4, column 1, pgph. 3	Some of the water quality control programs for the Lahontan Region do have specific compliance deadlines, which are discussed later in this Basin Plan. ~~For example, the control measures for the Lake Tahoe Basin which are discussed in Chapter 5 are to be implemented over a 20-year period (through 2007) to ensure attainment of objectives.~~ For example, the Lake Tahoe TMDL includes 5-year load reduction requirements for the four major pollutant source categories.
pg. 4.3-1, column 2, pgph. 3	Nutrients and fine sediment particles from stormwater are considered a major source of pollution to Lake Tahoe. Fine sediment particles are defined as inorganic particles less than 16 micrometers in diameter. The Lake Tahoe TMDL has identified urban stormwater runoff as the largest source of these pollutants and the TMDL implementation plan emphasizes urban runoff treatment. ~~Deicing compounds are of special concern in the Lake Tahoe/Truckee region because the death of roadside vegetation due to salt impacts can increase erosion, and thus sediment and nutrient loading, to sensitive surface waters. Few quantitative data are available on concentrations of heavy metals and other toxic pollutants in stormwater in these areas.~~
pg. 4.3-3, column 1, pgph. 4	"Areawide treatment systems" for municipal stormwater which involve combinations of infiltration, retention and detention basins, and natural and artificial wetlands, are being proposed in the Lake Tahoe Basin (see Chapter 5). ~~Their ability to meet effluent limitations has not yet been demonstrated.~~ In some states, wastewater treatment plants similar to those used for domestic wastewater have been constructed to treat stormwater.
pg. 4.3-3, column 1, pgph. 5	***Use of Wetlands for Stormwater Treatment*** Natural and artificial wetlands are employed elsewhere in the U.S. for treatment of municipal wastewater and acid mine drainage. Large scale wetland treatment systems for urban runoff are in service in ~~coastal areas of~~ California. The use of "Stream Environment Zones" for removal of fine sediment particles and nutrients from stormwater in the Lake Tahoe Basin is an important part of that area's water quality program (see Chapter 5). In general, wetlands slow the flow of stormwater, allowing time for settling out of fine sediment particles, adsorption of dissolved constituents onto soils, and uptake of nutrients by soil microorganisms and rooted vegetation (see "Wetlands Protection" in Section 4.9 of this Chapter for a more detailed discussion of

	wetland functions)
pg. 4.3-4, column 2, pgph. 1	Because of the extraordinary resource values of Lake Tahoe, and the threat to its water quality posed by stormwater discharges containing sediment and nutrients, the State Board determined in 1980 that municipal stormwater was a significant source of pollutants and directed that stormwater NPDES permits should be issued to local governments. Municipal stormwater NPDES permits have been issued to the portions of Placer and El Dorado Counties within the Lake Tahoe Basin, and to the City of South Lake Tahoe, even though their populations are less than 100,000. ~~A special set of surface runoff effluent limitations applies to stormwater discharges in the Lake Tahoe Basin (see Chapter 5).~~
pg. 4.3-7, column1, pgph. 5	~~Only one set of general stormwater effluent limitations has been adopted in the Lahontan Region: the "Tahoe Regional Runoff Guidelines" (see Chapter 5). As more information becomes available about surface runoff quality in different areas, the Regional Board should consider adopting other effluent limitations for specific areas or types of stormwater discharges.~~
pg. 4.3-11, column1, pgph.2	The Tahoe Regional Planning Agency has recognized the importance of ~~windblown sediment~~ airborne fine sediment particulates in nutrient loading to Lake Tahoe, and has called for increases in the rate of BMP retrofit, and additional controls on offroad vehicle use, to reduce wind erosion and aerial deposition from disturbed areas.
pg. 4.8-4, column 1, pgph. 2	~~At least three alternate deicers have been explored: calcium magnesium acetate, potassium acetate, and magnesium chloride with corrosion inhibitors. These products have shown some promise, but further study is required. The cost to switch to an alternate deicer will be significant. The road departments are unwilling to make the switch unless an alternate deicer is demonstrably better environmentally, will not require too much adjustment on the part of the maintenance crews and equipment, and will actually do an effective and predictable job when applied.~~
pg. 4.8-4, column 2, pgph. 3	~~In the Lake Tahoe Basin, all governmental agencies assigned to maintain roads are required to bring all roads in the Lake Tahoe Basin into compliance with current "208" standards, within a specified time schedule. That is, all existing~~ Existing facilities ~~must~~ should be retrofitted to treat ~~handle the~~ stormwater runoff ~~from the 20-year, 1-hour storm,~~ and to restabilize all eroding slopes in a manner consistent with the pollutant load reduction requirements described by the Lake Tahoe TMDL. ~~The twenty-year time frame for this compliance process ends in 2008.~~
pg. 4.9-27, column 1, pgph. 1	Examples of both of these categories of restoration are found in the Lahontan Region. To prevent pollutant loading into Lake Tahoe, waste discharge prohibitions have been implemented and many millions of dollars have been spent on slope stabilization, revegetation and other remedial erosion control measures (see "Stormwater Runoff, Erosion, and Sedimentation" section in this Chapter). The clarity, nutrient levels and both phytoplankton and periphyton productivity in Lake Tahoe are carefully monitored. Transport of fine sediment particles to the lake, identified by the Lake Tahoe TMDL as a primary cause of deep water transparency decline, has been monitored since 2005 and will continue to be assessed. To prevent nutrient loading into Eagle Lake (Lassen County), waste discharge prohibitions are also implemented. The prolific growth of

	Department of Transportation to develop and implement comprehensive Pollutant Load Reduction Plans (PLRPs) describing how proposed operations and maintenance activities, capital improvements, facilities retrofit projects, ordinance enforcement, and other actions will meet required pollutant load reduction requirements. PLRPs provide responsible jurisdictions the opportunity to prioritize pollutant load reduction efforts and target sub-watersheds that generate the highest annual average pollutant loads. The Water Board developed the Lake Clarity Crediting Program to establish protocols for tracking and accounting for load reductions. The Lake Clarity Crediting Program links actions to improve urban stormwater quality to expected fine sediment particle and nutrient loads and provides the flexibility for the discharger to maximize pollutant load reduction opportunities. **New Development, Redevelopment, and ~~Existing Development Private Property BMP~~ Stormwater Treatment Requirements** For new development and re-development projects and private property Best Management Practice retrofit efforts, project proponents shall first consider opportunities to infiltrate stormwater runoff from impervious surfaces. At a minimum, permanent stormwater infiltration facilities must be designed and constructed to infiltrate runoff generated by the 20 year, 1-hour storm which equates to approximately one inch of runoff over all impervious surfaces during a 1-hour period. Where conditions permit, project proponents should consider designing infiltration facilities to accommodate runoff volumes in excess of the 20 year, 1-hour storm to provide additional stormwater treatment. ~~Runoff from parking lots, retail and commercial fueling stations, and other similar land uses may contain oil, grease, and other hydrocarbon pollutants. Project proponents designing treatment facilities for these areas may be required to include pre-treatment devices to remove hydrocarbon pollutants prior to infiltration or discharge. Where a risk of hydrocarbon spills exist, project proponents must include contingency plans to prevent and facilities to sequester spills to avert groundwater pollution.~~ Runoff from parking lots, retail and commercial fueling stations, and other similar land uses may contain oil, grease, and other hydrocarbon pollutants. Project proponents designing treatment facilities for these areas must include pre-treatment devices to remove hydrocarbon pollutants prior to infiltration or discharge and contingency plans to prevent spills from polluting groundwater. Infiltrating runoff volumes generated by the 20 year, 1-hour storm may not be possible in some locations due to shallow depth to seasonal groundwater levels, unfavorable soil conditions, or other site constraints such as existing infrastructure or rock outcroppings. For new development or redevelopment projects, site constraints do not include the existing built environment.
	In the event that site conditions do not provide opportunities to infiltrate the runoff volume generated by a 20 year, 1-hour storm, project proponents must either (1) meet the numeric effluent limits in Table 5.6-1, or (2) document coordination with the local municipality or state highway department to demonstrate that shared stormwater treatment facilities treating private property discharges and public right-of-way stormwater are sufficient to meet the municipality's average annual fine sediment and

	nutrient load reduction requirements.
pg. 5.7-13, column 1, pgph. 1	Ground water contributes an estimated 13 percent of the annual nutrient loading to Lake Tahoe, but is assumed to contribute no fine sediment particles to the lake. ~~Although data are limited, research to date indicates that ground water nutrient loading represents a substantial contribution to Lake Tahoe.~~ Loeb (1987) found ground water concentrations of nitrate in three watersheds to be lowest (by a factor of two to ten) in areas farthest upgradient from Lake Tahoe and to increase downgradient toward the lake. This corresponds to the degree of land disturbance. The TMDL relies on findings of the Army Corps of Engineers (ACOE) Groundwater Evaluation report (2003). The study divided the Tahoe basin watershed into five ground water basins, and also analyzed the average nutrient concentrations of land use types based on ground water monitoring wells (Table 5.7-5). Findings by the ACOE study supports previously asserted hypotheses that urbanization ~~Urbanization~~ can significantly increase nitrate concentration in ground water through fertilizer addition, ~~irrigation,~~ sewer line exfiltration, ~~sewage spills,~~ infiltration of urban runoff, and leachate from abandoned septic systems. Future development and/or continued soil disturbance in already developed areas may ~~will~~ increase nutrient transport in ground water by removing vegetation which normally recycles nutrients in the watershed. Although ground water disposal of stormwater is generally preferable to surface discharge because it provides for prolonged contact with soils and vegetation which remove nutrients, infiltration of urban stormwater in areas with high groundwater tables may be undesirable because of possible contamination of drinking water supplies from toxic runoff constituents.
INSERT PAGE 5.7-21, new, Table 5.7-5	TABLE 5.7-5 Average nutrient concentrations of groundwater wells based on land-use types (USACE 2003)

Land-use	Nitrogen Ammonia + Organic Dissolved (mg/L)	Nitrogen Nitrite plus Nitrate Dissolved (mg/L)	Total Dissolved Nitrogen (mg/L)	Dissolved Orthophosphorus (mg/L)	Total Dissolved Phosphorus (mg/L)
Residential	0.26	0.37	0.63	0.081	0.11
Commercial	0.16	0.51	0.67	0.092	0.12
Recreational	0.40	1.2	1.6	0.073	0.10
Ambient	0.16	0.11	0.27	0.040	0.049

pg. 5.10-1, column 2, pgph. 3	Current levels of consumptive water use in the Lake Tahoe Basin are unknown. Most water use is currently not metered. State law (AB 2572) enacted in 2004 requires all water suppliers to install water meters on all customer connections by January 1, 2025. New residential construction has occurred since 1982, but conservation efforts (e.g., landscape watering restrictions and requirements for ultra-low flow toilets) have increased due to drought conditions. ~~TRPA predicts that there will be a 27% increase~~

sediment particles, total nitrogen, and total phosphorus for Lake Tahoe. While the Lahontan Water Board has no discretion to not establish a TMDL (the TMDL is required by federal law), the Lahontan Water Board does exercise discretion in assigning waste load allocations and load allocations, determining the program of implementation, and setting various milestones in achieving the narrative water quality objectives and protecting the beneficial uses.

~~13. The 65-year implementation period described in the TMDL will allow implementing agencies to pursue a variety of compliance approaches. In conjunction with approval of the proposed TMDL, the State Water Board will also seek USEPA approval of the 65 year staged implementation under 40 CFR 131.13, which allows USEPA to approve state policies generally affecting the applications and implementation of water quality standards.~~

14. In preparing the accompanying CEQA substitute environmental documentation, the Lahontan Water Board has considered the requirements of Public Resources Code section 21159 and California Code of Regulations, title 14, section 15187, and intends the substitute documents to serve as a tier 1 environmental review. Nearly all of the compliance obligations will be undertaken either by public agencies that will have their own obligations under CEQA or by landowners that must seek permits from public agencies that have CEQA obligations. Project level impacts will need to be considered in any subsequent environmental analysis performed by other public agencies, pursuant to Public Resources Code section 21159.2.

15. Two CEQA Scoping hearings were conducted on July 15 and July 17, 2008, one in South Lake Tahoe and one in North Lake Tahoe. A notice of the CEQA Scoping hearings was sent to interested parties including implementation agencies, counties, and conservation groups within the Lake Tahoe watershed. A Supplemental Scoping hearing was held on August 12, 2009 in South Lake Tahoe.

16. A Notice of Filing, a written TMDL staff report, a CEQA environmental checklist, and the draft basin plan amendment were prepared and distributed to interested individuals and public agencies for review and comment in accordance with state environmental regulations (California Code of Regulations, title 23, section 3775 et seq.) and federal Clean Water Act regulations, 40 Code of Federal Regulations Part 25 and 40 Code of Federal Regulations (CFR) Part 131.

17. The Lahontan Water Board heard and considered all written public comments and all testimony presented at a duly noticed public hearings held at its regular meetings on September 8, 2010 and November 16, 2010.

18. The Lahontan Water Board considered costs of implementing measures to achieve the TMDL. The costs to implement the TMDL will be incurred by identified implementing agencies. These costs have been deemed reasonable relative to the water quality benefits to be derived from implementing the TMDL.

19. The record as whole, including the TMDL staff report and environmental document, indicates that this order is consistent with the provisions of the State Water Resources Control Board Resolution No. 68-16, "Statement of Policy with Respect to Maintaining High Quality of Waters in California" and 40 CFR Section 131.12. The TMDL will result in improved water quality and will maintain the level of water quality necessary to protect existing and anticipated beneficial uses.

20. The environmental documentation, when considered together with the record of the public review process as a whole, indicates that adoption of the proposed amendments to the Water Quality Control Plan for the Lahontan Region will have no significant adverse impacts, either individually or cumulatively, on the environment.

21. The environmental documentation, when considered together with the record of the public review process as a whole, also indicates that the adoption of the proposed amendments will have no environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly.

22. The Lahontan Water Board finds that the analysis contained in the Lake Tahoe TMDL Report, the substitute environmental documentation, the CEQA Checklist and the responses to public and peer review comments comply with the requirements of the State Water Board's certified regulatory CEQA process, as set forth in California Code of Regulations title 23, section 3775 et seq. Furthermore, the Lahontan Water Board finds that the analysis fulfills the Lahontan Water Board's obligations attendant with the adoption of regulations "requiring the installation of pollution control equipment, or a performance standard or treatment requirement," as set forth in Public Resources Code section 21159.

23. The proposed amendments meet the necessity standard of the Administrative Procedures Act, Government Code section 11353, subdivision (b), and were developed in accordance with Water Code section 13240, et seq.

achieve better hydrologic function and complete restoration activities to mimic natural conditions are also recommended to reduce pollutant loads.

Implementation Actions to Meet the Clarity Challenge and Achieve the TMDL

The following is a representative list of practices and treatment options that responsible parties may use to meet the Clarity Challenge load reductions by year 15, and achieve the TMDL in 65 years. Many of these practices are already in use by responsible parties, and an enhanced level of effort may contribute to reduce sediment and nutrients to Lake Tahoe. In the future, technological advances may add other actions to this list. This list is not intended to be exclusive; implementing agencies may select other actions to achieve required load reductions.

- Install and maintain (annually) full unpaved roadway BMPs (e.g. waterbars, armored swales, drainage stabilization, and stormwater treatment infrastructure)
- Revegetate and stabilize ski runs
- Implement forest treatments with low pressure and other innovative ground-based equipment and standard BMPs
- Capture and retain sediment from unpaved roadways
- Install and maintain advanced BMP measures to increase infiltration and reduce runoff from landings, ski runs, trails and paved and unpaved roads in forested areas
- Decommission and re-contour unauthorized or historic roads and trails by tilling, adding organic soil amendments, mulching, and revegetation
- Fully restore legacy roads and trails to return to native forest conditions with natural hydrologic function

Performance, Compliance Assessment, and Reporting

The forest upland load reductions described by the Recommended Strategy will be accomplished through continued implementation of forest management programs, policies, restoration activities, and vegetation management approaches. The United States Forest Service Lake Tahoe Basin Management Unit (LTBMU), Nevada Division of State Parks, California Department of Parks and Recreation, and the California Tahoe Conservancy (CTC) are the primary public forested land management agencies responsible for maintaining and expanding existing land management activities as needed to reduce pollutant loads from forested lands to meet the Clarity Challenge and other load reduction goals.

The Water Board and NDEP have worked with the LTBMU to include references to applicable TMDL implementation elements in the updated Land and Resource Management Plan. The Water Board and NDEP expect the revised Forest Plan to commit to ongoing maintenance of LTBMU unpaved roadways and trails; regular inspections and maintenance of trailhead and parking lot best management practices; continued efforts to identify and restore landscape disturbances; and responsible

implementation of vegetation management actions with appropriate BMPs. Similarly, the California Department of Parks and Recreation, the CTC, and the Nevada Division of State Parks have programs and policies in place to implement projects and activities to reduce pollutant loads.

The Water Board and NDEP will track forest implementation partner activities to determine whether expected load reduction actions are being taken and are remaining consistent with the Recommended Strategy and the TMDL Implementation Plan. If forest management agencies continue to complete projects and activities consistent with the Pollutant Reduction Opportunity Analysis (Lahontan and NDEP 2008a), the Recommended Strategy (Lahontan and NDEP 2008b) and this TMDL, then the Water Board and NDEP expect forest upland load reduction requirements will be met.

If the LTBMU, CTC, and the California Department of Parks and Recreation fail to continue to implement needed load reductions, the Water Board maintains the authority to issue Waste Discharge Requirements or Time Schedule Orders, as needed, to be certain appropriate programs, policies, and activities continue as anticipated to reduce pollutant loading to Lake Tahoe. The NDEP has the authority to enter into Memoranda of Agreement with forest management partners on the Nevada side of the Lake Tahoe basin to explicitly define TMDL expectations on undeveloped lands in Nevada to meet Lake Tahoe TMDL pollutant load reductions should those agencies fail to implement expected load reduction actions.

11.3.3 Atmospheric Deposition

Roughly 15 percent of the basin-wide fine sediment particle load is transported and deposited on the lake surface through atmospheric deposition. The Recommended Strategy and this implementation plan focus on stationary sources of fine sediment particles within the atmospheric source category because these sources provide the bulk of the load reaching Lake Tahoe from the air, primarily as road dust. Dust sources, such as paved and unpaved roads, disturbed vacant parcels, and construction sites are responsible for more than 88 percent of atmospheric fine sediment particle emissions in the Lake Tahoe Basin (Lahontan and NDEP 2008a).

Mobile sources (such as automobiles, buses, and boats) predominantly produce nitrogen, not fine sediment particles or phosphorus. Stationary source controls for fine sediment particles and associated phosphorus are also three orders of magnitude less expensive per unit removed than mobile sources according to the *Pollutant Reduction Opportunity Report* (Lahontan and NDEP 2008a).

This TMDL relies on the Tahoe Regional Planning Agency's (TRPA) air quality and transportation plans to continue managing the load of nitrogen to the atmosphere from the mobile sources; this continued management is expected to reduce the basin-wide nitrogen load by at least one percent within 15 years. A two percent reduction in nitrogen load from the atmosphere is needed to attain the transparency standard. ~~Because TRPA's Regional Plan does not project beyond twenty years of~~

~~implementation, subsequent~~ The TRPA Regional Plan update~~s are~~ is anticipated to include an atmospheric nitrogen emission reduction strategy that meets the TMDL transparency standard attainment needs.

Implementation Actions to Meet the Clarity Challenge and Achieve the TMDL

Cost-effective treatments to reduce road dust include enhanced operations and maintenance of non-mobile dust sources including paved and unpaved roadways, parking lots, and construction sites as well as revegetation and/or stabilization of disturbed vacant land. TRPA programs for reducing emissions from residential wood burning are also expected to provide some particle reduction from this source.

The following is a representative list of practices and treatment options that responsible parties may use so the Forest Upland source could meet the basin-wide load reduction necessary to achieve the Clarity Challenge by year 20, and achieve the TMDL in 65 years. Many of these practices are already in use by responsible parties, and an enhanced level of effort may contribute to reduced sediment and nutrient discharges to Lake Tahoe. In the future, technological advances may add other actions to this list. This list is not intended to be exclusive; implementing agencies may select other actions to achieve required load reductions.

- Regularly vacuum sweep streets
- Pave or apply gravel to unpaved roads
- Limit speed on unpaved roads
- Require adequate soil moisture or other dust suppression techniques during earth moving operations
- Reduce residential wood burning emissions
- Reduce Vehicle Miles Traveled (VMT) through incentives/disincentives

Performance, Compliance Assessment, and Reporting

Since the majority of the atmospheric fine sediment particle load is generated by urban roadways, much of the required atmospheric load reductions and interim load allocations will be met by implementing measures to control the sources of stormwater pollutants from urban roadways under the urban upland source category. Similarly, TMDL implementation actions taken to control runoff issues from unpaved roadways (see the Forest Uplands section above) will also reduce dust from these areas. Urban and forest stormwater dischargers cannot, however, "take credit" or otherwise account for these reductions as progress at reducing pollutant loads from the urban and forest pollutant sources.

11.3.4 Stream Channel Erosion

Multi-objective stream channel restoration programs in the Lake Tahoe basin are well established. Because these programs achieve a number of environmental benefits in

addition to water quality improvements, implementation efforts for this source category are based on current plans and approaches. The loading and load reduction analysis focused only on fine sediment particles (and associated nutrients) released from stream bank and bed erosion. Load reduction estimates did not consider the other potential ecological benefits available from stream or wetland restoration. The Water Board and NDEP anticipate that restoring floodplain connectivity and improving natural geomorphic function will provide additional fine sediment particle and nutrient load reductions. When research and monitoring are able to quantify these expected benefits, the load reductions will be accounted for through the adaptive management process.

Implementation Approach

TMDL stream channel erosion reduction estimates were developed based on ongoing implementation and planned restoration activities in the top three fine sediment particle producing streams in the basin, which are responsible for 96 percent of the fine sediment particle load in this source category (Lahontan and NDEP 2008a). These streams, in order of load production, are:

1. Upper Truckee River
2. Blackwood Creek
3. Ward Creek

Implementation and funding agencies have well-developed restoration plans for each of these three streams and are in various phases of planning and/or construction to implement restoration actions. Detailed, multi-agency planning for five different reaches of the Upper Truckee River was initiated in 2002. The California Tahoe Conservancy (CTC) has completed a project at the mouth of the river to remove fill placed during development of the Tahoe Keys (Lower West Side Upper Truckee River Project) and is evaluating alternatives for restoring the Upper Truckee Marsh. The CTC is also actively planning Upper Truckee restoration at the Sunset Stables property. The City of South Lake Tahoe constructed channel improvements adjacent to the Lake Tahoe Airport in 2008 and are completing the restoration effort in 2010. The California Department of Parks and Recreation is working to address stream bank erosion by restoring portions of the Upper Truckee River that flow through the Lake Tahoe Golf Course. Finally, the Tahoe Resource Conservation District is working with private property owners to construct stream channel improvements downstream of the Lake Tahoe Airport.

The Lake Tahoe Basin Management Unit (LTBMU) has taken the lead in planning and constructing restoration projects on Blackwood Creek. Three projects have been constructed on Blackwood Creek within the past five years, including removal of fish passage barriers, Barker Pass culvert removal and bridge construction; and floodplain rehabilitation. The LTBMU has additional plans for further channel and floodplain work to address channel instability from historic gravel mining and grazing disturbances. The CTC is also planning work on Blackwood Creek to treat channel incision at the Highway 89 crossing.

multiple projects found in the same sub-drainage basin or the same watershed, and/or BMP improvement efforts within the entire basin). This type of monitoring is an integral part of the capital improvement, regulatory, and incentive programs and allows for the evaluation of individual or combined effects of water quality control actions. Results from effectiveness monitoring can be used by project designers to incorporate those design features that will most successfully remove the pollutants of concern.

- *Status and trends monitoring*: Broadly defined as the monitoring of the status and trends of water quality conditions and controlling factors. This is the principal type of monitoring used to gather the data that can inform us about long-term changes in water quality conditions relative to established water quality standards and/or goals. Status and trends monitoring is directly linked to effectiveness monitoring in that it evaluates water quality improvement over time at each of the spatial scales listed above (e.g. single and multiple BMPs, watershed, whole-basin).

Typically, TMDL monitoring focuses on the specific parameters related to water quality impairment. In the case of the Lake Tahoe TMDL these include Secchi depth in the lake and the amount of nitrogen, phosphorus and fine sediment particles entering the lake from the various major sources.

13.3 Source Load Reduction Monitoring

The following sections describe the various efforts underway to develop the monitoring components for each of the four pollutant source categories.

13.3.1 Urban Uplands

In 2007 the Tahoe Science Consortium began planning a Lake Tahoe Regional Stormwater Monitoring Program (RSWMP) to better understand local urban runoff conditions, evaluate the impact of erosion control and stormwater treatment efforts, and coordinate and consolidate an urban stormwater monitoring work. Agency and Tahoe Science Consortium representatives formed the RSWMP Core Working Group to develop a conceptual framework and craft a phased program implementation approach. The Core Working Group consists of eighteen individuals representing various interests, including regulatory agencies, funding groups, science community, and local and state implementing agencies at Lake Tahoe.

The RSWMP has been organized in three phases. The first phase, completed in 2008, focused on collaboratively framing the elements of a comprehensive stormwater monitoring program. The framework includes relevant agency, implementer and science considerations, an outline of the required elements for a monitoring program, the design for structural (administrative) elements, and goals and objectives for a sustainable program. This phase produced a technical document that provides guidance for the

development of the detailed RSWMP technical and organizational plan (Heyvaert et al. 2008).

The second phase of RSWMP builds on the conceptual framework by designing a specific monitoring program for the Tahoe basin to meet regulatory, implementing, and funding agency needs. Phase Two components include: a quality assurance project plan; specific monitoring goals and data quality objectives; monitoring design specifications; detailed sampling and analysis plan; stormwater database development, data management and analysis details; organizational structure of RSWMP; operational costs; funding arrangements; agency roles and responsibilities; and internal and external peer-review processes. The USFS LTBMU agreed to fund the second phase. The work began in 2009 and will be completed in 2010.

During the second phase, a list of priority analytic constituents and physical variables will be created to guide monitoring plan development. The past TMDL Stormwater Monitoring Study (Heyvaert et. al 2007) collected data on the following constituents: total nitrogen, total Kjeldahl nitrogen, nitrate, un-ionized ammonia, total phosphorus, total dissolved phosphorus, soluble reactive phosphorus, total suspended solids (or suspended solids concentration), particle size distribution, turbidity, pH and electrical conductivity. This preliminary list will be evaluated in forming the monitoring plan, and in some cases, data on additional constituents may be needed. In some cases, surrogate variables may substitute for more costly analysis (i.e. using turbidity in place for particle size distribution) depending on additional research to verify preliminary relationships.

A generalized list of consolidated monitoring goals were developed to meet the needs of all interested parties in the Tahoe basin as expressed by the agency, implementer and science representatives in the RSWMP Core Working Group.

- *Pollutant Reduction:* Quantify progress in pollutant reduction and restoration efforts. Includes status and trends monitoring and the watershed/basin scales of effectiveness monitoring.

- *BMP Design, Operation and Maintenance:* Develop information for improvements in BMP design, operation, and maintenance. Includes implementation monitoring and the BMP/project scales of effectiveness monitoring.

- *Pollutant Source Identification:* Identify and quantify specific sources of urban stormwater pollutants needed to update and refine the event mean concentrations (or characteristic runoff concentrations) for stormwater quality used in a number of the management tools.

The last RSWMP phase will be the funding and implementation of the actual stormwater monitoring program. This phase includes selecting monitoring sites and equipment, providing staff to conduct the monitoring, and developing the detailed processes and protocols for reporting monitoring results. Since the RSWMP will largely provide