

APPENDIX IE-3 – Stormwater Management/BMP Retrofit Program Overview

Lake Tahoe is one of the most extraordinary lakes in the world but has experienced degradation over the last 50 years. Though the Lake's waters remain pure compared to other lakes, clarity declined at an average of nearly one foot per year from the late 1960s to 2000. Over the last decade, the decline of clarity loss has slowed, and restoration efforts continue to be one of the highest priorities of the Tahoe Regional Planning Agency (TRPA). The following issue paper outlines the background and current status of TRPA's Stormwater/Best Management Practices Program, which is designed to protect water quality in the Lake Tahoe Region.

Program Background

As one of many of restoration programs implemented through the Lake Tahoe Environmental Improvement Program, the Stormwater Management/Best Management Practices (BMP) Retrofit Program is a unique and innovative strategy that protects Lake Tahoe's water quality from the impacts of stormwater pollution. Stormwater pollution affecting the lake is directly correlated with the extent of urban development in the watershed. Approximately fifteen percent of the Lake Tahoe Region is privately owned and development is largely located in close proximity to the Lake. In these areas, urban pollutants accumulate on impervious surfaces such as driveways, parking lots, and roadways. During storm events and snowmelt conditions, polluted stormwater runoff flows directly to streams or the Lake, via roadways and the storm drain system. This nonpoint source pollution significantly contributes fine-particle sediment and nutrients (Tahoe's primary pollutants of concern) to the Lake, and is the cause of Lake Tahoe's clarity loss.

Scientists and policymakers believe the downward trend in clarity loss can be reversed and are taking action to return Lake clarity to historic levels. While cutting-edge research conducted for the Total Maximum Daily Load (TMDL) program is being used to evolve water quality strategies, the fundamentals have been in place for decades. TRPA's *Regional Plan* called for the creation of an erosion control program to advance water quality Threshold Standards. In 1992, the Agency codified the BMP Retrofit Program, a rigorous nonpoint source pollution control program (Chapter 60 *Code of Ordinances*). The BMP Retrofit Program requires all property owners in the Tahoe Region to install erosion control and stormwater infiltration measures on developed properties. BMPs must be designed to stabilize soil and infiltrate the volume of a 20-year, 1-hour storm onsite. By addressing stormwater and nonpoint source pollution generated on developed parcels in the Lake Tahoe Region, there are significant reductions in stormwater volumes and pollutant loads reaching Lake Tahoe.

The BMP Stormwater Management Program, also known as EIP #16, is one of the largest EIP programs both in scope and total cost and also represents the largest portion of the private sector contribution to the Environmental Improvement Program. The Stormwater Management Program facilitates implementation of the BMP Retrofit Program, which is unique because each parcel landowner bears the cost of installation. Costs may range from \$500 to \$10,000 for an average single-family residential property, and significantly more for multi-family residential and commercial operations. Successful implementation of the BMP Retrofit Program is essential to securing other funding for restoration work in the Region, as EIP #16 provides the private match source for public EIP projects.

Implementation of the BMP Retrofit Program is jointly executed by four agencies and one university extension. A Memorandum of Understanding (MOU) among TRPA's Stormwater Management Program, Nevada Tahoe Conservation District, Tahoe Resource Conservation District, and USDA – Natural Resources Conservation Service outlines the agency roles and implementation responsibilities among the partners. The

University of Nevada Cooperative Extension assists with education and outreach activities related to the program.

Program Evolution

The task of educating and then moving nearly 44,000 property owners to action was a significant challenge for TRPA as it contemplated the best path forward in the early 1990s. Budget constraints made the task even more daunting. The absence of funding plagued the viability of the Stormwater Management Program throughout the 1990s, until the advent of the Environmental Improvement Program and until TRPA secured additional grant funds. The Agency established three priority watersheds around the Tahoe Region with corresponding deadlines for compliance with retrofit requirements; 2008 was designated as the last target date.

TRPA staff worked with the community and partner agencies to promote general understanding of the need for BMP requirements, and then executed the parcel-specific evaluation and certificate process. In most locations throughout the United States, requiring erosion control measures on new construction is standard protocol. However, requiring the retrofit of existing properties is unique, and presented the Agency with extraordinary challenges; such as the preponderance of part-time property owners, local resistance to TRPA policies, and economic constraints on the local community.

The program's focus on public education and outreach over the last decade has been successful in increasing awareness (based on public opinion data). In 2005, 63 percent of local residents polled said they had heard of best management practices or BMPs, and in 2011, that measure increased by a significant 16 percentage points to 79 percent. With awareness being necessary for behavior change, education has been a key strategy for the program. However, because costs are cited as the primary reason property owners do not install BMPs, the pace of BMP implementation has not met expectations over time.

As the final deadline for BMP implementation approached in 2008, partnership agencies developed a strategic plan for the program, recognizing the majority of private properties in the Tahoe Region would not be in compliance by the 2008 date; largely because of the costs associated with installing BMPs. More recently, the TRPA Stormwater Management Program has begun to incorporate accelerated implementation tools to increase the rate of BMP compliance.

Where the Program Is Today

As of December 2011, 14,714 of 43,470 parcels in the Tahoe Region have received a BMP Certificate. This equates to 56 percent compliance in Nevada, 25 percent compliance in California, and total Region-wide compliance of 34 percent. Notably, TRPA has issued approximately half all 14,714 certificates over the last four years as a result of an accelerated implementation program. Having erosion control and stormwater infiltration measures implemented on these properties represents a significant benefit to Lake Tahoe with the following pollutant load reductions:

- 232,269 tons per year of total suspended solids (including fine particles)
- 4,906 tons per year in total nitrogen
- 690 tons per year in dissolved phosphorus and 1,334 tons per year in total phosphorus¹

¹ Cumulative pollutant load reductions estimates were determined using the "Load Reduction by Land Use Model" developed by GeoSyntec Consultants. The model output does not estimate load reductions from Source Control Certificates, which reflect properties with sediment source control measures in place but no infiltration BMPs, due to site constraints (see Attachment C).

BMP Status in Nevada Lake Tahoe (through December 2011)					From 1/1/2007 through 12/31/2011
	Total Parcels*	Completed	Remaining ^	% Complete	
Single Family	6,006	2,752	3,254	46%	1,250
Multi-Family	5,560	3,993	1,567	72%	1,136
Commercial	426	257	169	60%	165
Total	11,992	7,002	4,990	58%	2,551
* Total parcel count does not include undeveloped parcels					
^ Remaining numbers are based on the number of properties that have not received BMP Certificates of Completion. However, some properties may be under active building permits that will include BMP implementation.					

BMP Status in California Lake Tahoe (through December 2011)					From 1/1/2007 through 12/31/2011
	Total Parcels*	Completed	Remaining ^	% Complete	
Single Family	24,607	5,134	19,473	21%	2,620
Multi-Family	5,381	2,788	2,593	52%	1,903
Commercial	1,490	272	1,218	18%	185
Total California	31,478	8,194	23,284	26%	4,708
* Total parcel count does not include undeveloped parcels					
^ Remaining numbers are based on the number of properties that have not received BMP Certificates of Completion. However, some properties may be under active building permits that will include BMP implementation.					

The importance of BMP installation was further emphasized by California and Nevada's recent adoption of the Lake Tahoe TMDL, which identifies BMPs as a key strategy to attain pollutant load reduction goals. For a complete look at the timeline for the BMP Retrofit Program, see Attachment A.

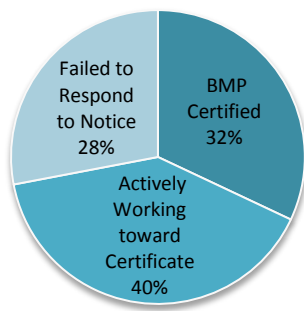
Accelerated Implementation Enforcement Strategy

The limited success of Region-wide compliance and conclusion of all BMP installation priority watershed deadlines in October of 2008 necessitated development of a new approach to accelerate targeted BMP installation. TRPA developed an accelerated BMP implementation and enforcement program in 2007. This program directs compliance efforts and accelerates BMP implementation in areas with the greatest water quality benefit. These areas include:

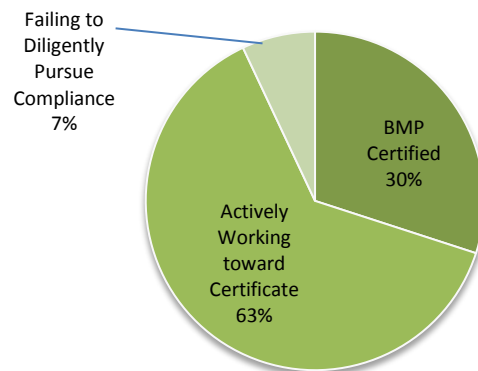
- Catchments with large amounts of impervious area (pavement and other non-porous areas)
- Areas where an EIP water quality improvement project has previously been, or is currently being implemented
- Areas where opportunities for area-wide water quality projects that integrate private and public BMPs may be explored. See Attachment B for more detail on the Targeted Enforcement Strategy
- Areas in proximity to Lake Tahoe, stream environment zones, and other sensitive lands

As of December 2011, the TRPA Stormwater Management Program has initiated accelerated implementation for nearly 350 commercial and large multi-family properties and 1,000 single family properties within the Tahoe Region. Overall, this enforcement program has been successful in increasing BMP compliance rates, with approximately 30 percent of targeted properties achieving BMP compliance, typically within one to three years after receiving an official notice from TRPA. In addition, 40 percent of targeted single family properties and 63 percent of commercial and multi-family parcels are actively working with TRPA and our Conservation District partners to achieve BMP compliance. The high rate of cooperation from commercial and multi-family property owners is attributed to an extensive outreach campaign to educate property owners along with TRPA's policy to work with property owners to set realistic implementation goals which include project phasing. TRPA staff members have prioritized compliance of commercial properties over residential because of the more significant water quality impacts from commercial sites. When a property owner fails to meet interim project deadlines and/or fails to communicate with Stormwater Management Team staff, they are no longer considered to be diligently pursuing compliance and may be subject to monetary penalties or other enforcement actions pursuant to TRPA Rules of Procedure. To date, TRPA has issued and collected penalties from four properties. Of those four properties, three have since achieved compliance, and the fourth is currently undergoing a change in ownership.

**Single Family Residential
Accelerated Implementation
Success**



**Commercial and Large Multi-Family
Accelerated Implementation
Success**



TRPA Works With Site-Constrained Properties On Source Control

Many Tahoe properties are unable to meet TRPA's BMP requirements because of site constraints. Presence of high seasonal ground water, shallow bedrock, slow infiltrating soils, location of utilities, and other site characteristics may limit a property's ability to capture and infiltrate the 20-year, one-hour storm event. TRPA staff members have worked with property owners in this situation to protect water quality, recognizing site constraints. Once all sediment source control activities are complete, such properties are eligible to achieve a "Source Control Certificate" with the understanding that future participation in a public/private area-wide treatment project may be needed to achieve greater water quality benefits and a full BMP Certificate of Completion. To date, 540 Tahoe properties have acquired a Source Control Certificate. TRPA's Stormwater Management Program secured grant funds in 2011 to assess the feasibility of two area-wide treatment pilot projects in Nevada. If feasible, TRPA will work with local general improvement districts to implement in-lieu fee programs for associated installation and maintenance costs in these areas. In California, TRPA continues to work with jurisdiction partners in the City of South Lake Tahoe and Placer County to coordinate private parcel BMPs in constrained areas such as the Bijou Commercial Core and Lake Forest.

BMP Maintenance

Once BMPs are installed, the Lake Tahoe TMDL identifies that BMP maintenance is critical to sustain the reduction of nonpoint source pollution needed to reach the “Clarity Challenge,” which sets a goal of achieving nearly 80 feet in Lake clarity over the next 15 years. Providing information on proper inspection and maintenance practices, and following up to ensure owners of BMP Certified properties are maintaining their BMPs are important actions to help jurisdictions meet their pollutant load reductions. TRPA is initiating a BMP Maintenance Program that contacts properties with BMP Certificates more than five years old to remind them of maintenance requirements and will follow up with compliance on a subset of properties annually.

In summary, the TRPA Stormwater Management Program uses a multi-faceted approach to achieve BMP implementation on private parcels. By building on a foundation of education and outreach, and following with targeted accelerated implementation using the tools provided by TRPA regulations, the Stormwater program continues to support Lake clarity threshold goals. TRPA will continue working with partner agencies to evolve the program from labor-intensive parcel by parcel implementation, to area-wide strategies with accelerated compliance on a larger scale.

ATTACHMENT A - BMP retrofit timeline

Prior to June 1992

- BMPs are a condition of project approval

June 1992

- In response to the recommendations of the 1991 Threshold Evaluation TRPA amends the Goals and Policies and the *Code of Ordinances* to include a mandatory BMP Retrofit Program
- Goals and Policies established the relationship between TRPA and the Resource Conservation Districts
- Program is designed to place a strong emphasis on education and outreach
- Priority Watershed Compliance dates set at 1995, 1997, and 1999
- BMP Retrofit program includes an optional alternate compliance program for Homeowners Associations, and other local Jurisdictions. Deadline for participation in program is 1993, compliance date is 1997

1995

- TRPA begins direct mail notifications to property owners in Priority One Watershed areas

1997

- Priority Watershed dates moved back to 2000, 2006, 2011
- TRPA receives grant funding for the BMP Retrofit Program

1999

- TRPA begins issuing BMP Certificates of Completion

2002

- Rules of Procedure are revised to include a streamlined BMP Retrofit Enforcement Program
- *Code of Ordinances* is updated to include a disclosure of BMP requirements at the point of sale
- Compliance date for Priority 3 Watersheds is changed from 2011 to 2008
- Alternate Residential Program is removed from the code (dates expired)

2002-2007

- TRPA staff and partners actively engage Lake Tahoe property owners about the BMP program

2007-2009

- TRPA and partners develop and execute accelerated implementation strategy

Present

- Stormwater program staff continues applying adaptive management principles while working within the existing code to implement the BMP Retrofit Program. Examples of program improvements include:
 - Establishing "Source Control Certificates" for properties that cannot infiltrate run-off due to site constraints
 - Developing Certified Evaluator Program to expedite BMP work in the community
 - Modifying pine needle mulching requirements to be consistent with fire Defensible Space guidelines
 - Issuing paving waivers for seasonal properties
 - Partnering with local jurisdictions and homeowners associations to issue BMP Certificates for parcels participating in regional treatment systems

ATTACHMENT B – Accelerated BMP Implementation Strategy

In order to provide the greatest benefit to the clarity of Lake Tahoe, the Stormwater Management Program is utilizing adaptive management to modify the way in which it targets properties for accelerated implementation, as well as dedicating additional resources to education and outreach efforts. In the past, accelerated implementation efforts were mainly focused on Priority One commercial properties. Since these deadlines have passed and more precise information regarding pollutant loading has become available, the program now considers the following additional factors when determining which properties to target for accelerated implementation action:

- Properties with obvious discharges
- Properties within catchments identified in the TMDL as large contributors to fine particles
- Private and public properties adjacent to upcoming public EIP Erosion Control Projects
- Properties adjacent to/directly connected to Lake Tahoe, other lakes, tributaries, and stream environment zones (SEZs)
- Properties in which TRPA receives a request for assistance from other jurisdictions
- Properties with existing violations or existing properties with expired, open permits, and retained securities
- Properties which have been identified as potential participants in a Regional treatment system
- Properties that may have installed BMPs but failed to request a final inspection or failed to properly maintain existing BMPs

The Stormwater Program accelerated implementation procedure for properties that meet some or all of these criteria consists of a strong emphasis on education followed by the accelerated implementation procedures outlined in TRPA Rules of Procedures. Currently this outreach campaign includes print, web, and television advertisements, as well as alternative media and direct mail. TRPA also holds informational public meetings, which allow owners of non-compliant properties to speak directly with staff.

In addition to these broad-based outreach efforts, targeted outreach techniques are being employed to ensure that owners of targeted properties as well as key elected officials and jurisdictional partners, are aware of impending accelerated implementation actions. By executing the procedure below, stormwater staff has conducted accelerated implementation for nearly 350 commercial/multi-family properties and 1,000 single family residential properties.

- Stormwater staff collaborates with Communication Team staff to send out public press releases as well as communicate with elected officials and jurisdictional employees to discuss strategy, information dissemination, and solutions to potential public dissent.
- Stormwater staff sends an informal informational letter and educational materials to non-compliant property owners and a reminder that formal accelerated implementation may be pending.
- Stormwater staff sends an official accelerated implementation letter and initiates Article IX procedures to owners of properties not in compliance.
- Stormwater staff works cooperatively with property owners to set interim deadlines and realistic implementation schedules, and reserves the imposition of monetary penalties for properties who fail to show diligent pursuit of compliance with BMP regulations.

In addition, staff continues to pursue neighborhood solutions to BMPs. This includes many site-specific solutions ranging in scale from two property owners working together to install BMPs on their adjoining properties, to large neighborhood systems owned by the jurisdictions and maintained through annual fees.

By continuing to use an adaptive management approach to targeted accelerated implementation, and working cooperatively with property owners, staff has succeeded in bring an average of 30 percent of targeted properties into compliance, and an additional 40 to 60 percent of property owners are actively working towards compliance. Accelerated implementation measures, along with incentives such as point of sale disclosure and permitting requirements, will assist TRPA in reaching BMP compliance goals and preserving Lake clarity.

ATTACHMENT C – Cumulative pollutant load reductions estimates were determined using the “Load Reduction by Land Use Model” developed by GeoSyntec Consultants.

POLLUTANT LOAD BY LAND USE					
Land Use Category	Target Event Mean Concentrations (Load) mg/L				
	TSS	TN	DN	TP	DP
Single Family Residential	56.40	1.752	0.144	0.468	0.144
Multi Family Residential	150.00	2.844	0.420	0.588	0.144
Commercial/Industrial	296.40	2.472	0.293	0.702	0.078

STORMWATER FLOW BY LAND USE				
Land Use	Number of Properties to be Retrofitted	Average Parcel Size (ft ²)*	Total Area (ft ²)	Flow Rate (cfs)**
Single Family Residential	7,886	16,430	129,566,980	2,998.04
Multi Family Residential	6,781	9,260	62,792,060	1,452.94
Commercial/Industrial	529	38,491	20,361,739	471.15
TOTAL	15,196			4,922.12

TOTAL POLLUTANT LOAD GENERATED FROM "NO RETROFIT" SCENARIO					
Land Use	Total Load Generated by Retrofitted Properties by Land Use for 20-year/1- Hour Storm Flow (tons/year)***				
	TSS	TN	DN	TP	DP
Single Family Residential	166,347	5,167	425	1,380	425
Multi Family Residential	214,407	4,065	600	840	206
Commercial/Industrial	137,384	1,146	136	325	36

TOTAL POLLUTANT LOAD REDUCED BY PROJECT					
Land Use	Total Load Reduced Through BMP Implementation by Land Use (tons/year)****				
	TSS	TN	DN	TP	DP
Single Family Residential	73,193	2,429	255	732	NA
Multi Family Residential	94,339	1,911	360	445	NA
Commercial/Industrial	83,804	951	126	264	NA
TOTAL	251,336	5,290	741	1,441	

* From TRPA GIS Data Analysis

** Based on 20 year storm equal to 1 inch of water in 1 hour

*** Load equals flow * concentration

**** From BMP Performance Paper by Eric Strecker, GeoSyntec Consultants