



Tahoe Valley and Meyers, CA

Community Watershed Partnership



R|O|Δnderson



*Final Watershed Strategy
Report - November 2015*

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ACRONYM LIST

TMDL	Total Maximum Daily Load
BMP	Best Management Practice
Tahoe RCD	Tahoe Resource Conservation District
CWP	Community Watershed Partnership
SNPLMA	Southern Nevada Public Land Management Act
NRCS	Natural Resources Conservation Service
EPA	Environmental Protection Agency
CTC	California Tahoe Conservancy
USFS	United States Department of Agriculture - Forest Service
TRPA	Tahoe Regional Planning Agency
TAC	Technical Advisory Committee
PLRM	Pollutant Load Reduction Model
NHC	Northwest Hydraulic Consultants
SFR	Single Family Residential
SWOT	Strengths, Weaknesses, Opportunities, and Threats
Water Board	Lahontan Regional Water Quality Control Board
SEZ	Stream Environment Zone
CALTRANS	California Department of Transportation
EIP	Environmental Improvement Program
TTD	Tahoe Transportation District
FSP	Fine Sediment Particles
TN	Total Nitrogen
TP	Total Phosphorus
CICU	Commercial-Industrial-Communications-Utilities

INTRODUCTION

Lake Tahoe is among the largest, deepest, and clearest lakes in the world. Its cobalt blue appearance, spectacular alpine setting, and remarkable water clarity is recognized worldwide. Recreational opportunities and scenic vistas have made Lake Tahoe a top national and international tourist destination. While visibility into the lake's depths is currently at 70 feet, it is listed as impaired because over thirty feet of clarity has been lost since the late 1960s. To address the impairment, the Lake Tahoe Total Maximum Daily Load (TMDL) program was adopted in 2011; it brought with it new regulatory requirements for state and local stormwater jurisdictions to reduce urban pollutant loads to Lake Tahoe.

Approved by the Environmental Protection Agency and the states of California and Nevada, the TMDL sets targets for a significant reduction of fine sediments, nitrogen, and phosphorus flowing to Lake Tahoe. Currently, stormwater jurisdictions are required to implement urban best management practices (BMPs) to decrease pollutant loading from urban runoff as part of their TMDL permit. Through this process, area-wide stormwater treatment has become a preferred strategy for effective TMDL implementation. Expected benefits include costs savings related to the economy of scale, and effective maintenance and tracking of pollutant loads.

In 2014, the Tahoe Resource Conservation District (Tahoe RCD) reached out to the Meyers community, in El Dorado County, and the City of South Lake Tahoe through a program called the Community Watershed Partnership to provide landscape conservation planning and technical services related to BMP implementation and area-wide stormwater planning. As part of this community engagement effort the Tahoe RCD also surveyed Meyers' homeowners and business owners on their willingness to support the management and treatment of stormwater on an area-wide scale in lieu of implementing individual parcel-level infiltration BMPs. Individual commercial property owners within the City's Tahoe Valley Area Plan were also interviewed. The purpose of the interviews was to determine the level of interest commercial property owners might have for supporting the management and treatment of stormwater through a Greenbelt design project that might include bike and pedestrian connections, and recreation amenities that could serve both locals and visitors.

PROJECT BACKGROUND

The Community Watershed Partnership (CWP) was developed through funding provided by the Southern Nevada Public Land Management Act (SNPLMA), and sponsored by both the Natural Resources Conservation Service (NRCS) and the Environmental Protection Agency (EPA). The funding for this program is intended to identify and address natural resource concerns or needs at a watershed level, and is designed to engage a variety of stakeholders to help facilitate communication between landowners, the general public, and Basin managers while furthering TMDL implementation and the restoration of Lake Tahoe.

The CWP approach complements the many environmental improvement projects implemented around the Lake Tahoe Basin by the California Tahoe Conservancy (CTC), U.S.D.A. Forest Service (USFS), the Counties of El Dorado and Placer, and the City of South Lake Tahoe (local stormwater jurisdictions). Improvements gained in water quality have largely resulted from urban stormwater capital improvement projects, as well as restoration work in stream environment zones. In addition to implementing large scale projects, there are opportunities for each private property owner to contribute to watershed restoration efforts by either implementing individual water quality BMPs on their parcel, or by partnering with stormwater jurisdictions on area-wide treatment. Until very recently, the opportunity for private property owners to participate in an area-wide treatment facility was non-

existent. Ultimately, successful implementation of BMPs on both the public and private scale will move Lake Tahoe closer to attaining its clarity goals. How each neighborhood or urban center executes this process will be a focus for Basin managers for the next several decades.

In 2002, the Tahoe RCD, the Nevada Tahoe Conservation District, NRCS, and the Tahoe Regional Planning Agency (TRPA) adopted a Memorandum of Understanding to establish a partnership that would provide technical support to homeowners, contractors, and property managers in implementing water quality BMPs on private property. Through grant funded incentive programs, the Tahoe RCD and its partners provided cost free property evaluations and BMP implementation plans for over fifteen years. However, only about three out of every ten private properties on the California side of the Tahoe Basin has installed BMPs; the level of implementation in Meyers is even lower at approximately 17 percent.

Both the Meyers community and the City's Tahoe Valley Greenbelt project were selected for CWP engagement due to several factors: the development of the Meyers Area Plan by El Dorado County and TRPA, the development of the Tahoe Valley Area Plan by the City of South Lake Tahoe, low private property BMP implementation rates, and the potential for stormwater pollutant generation (Figures 1 & 2).

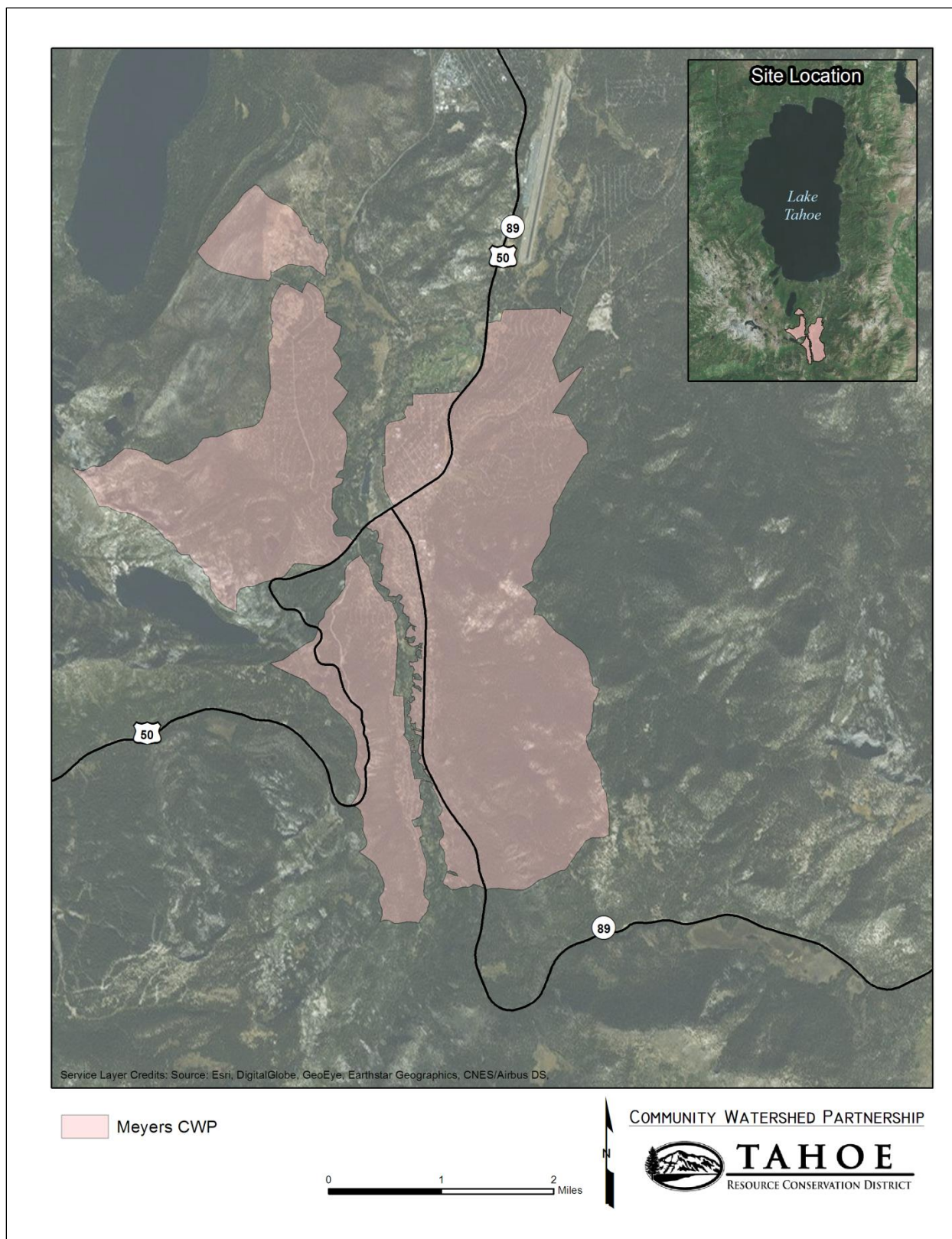


Figure 1. Community Watershed Partnership Modeling Project Area, Meyers California

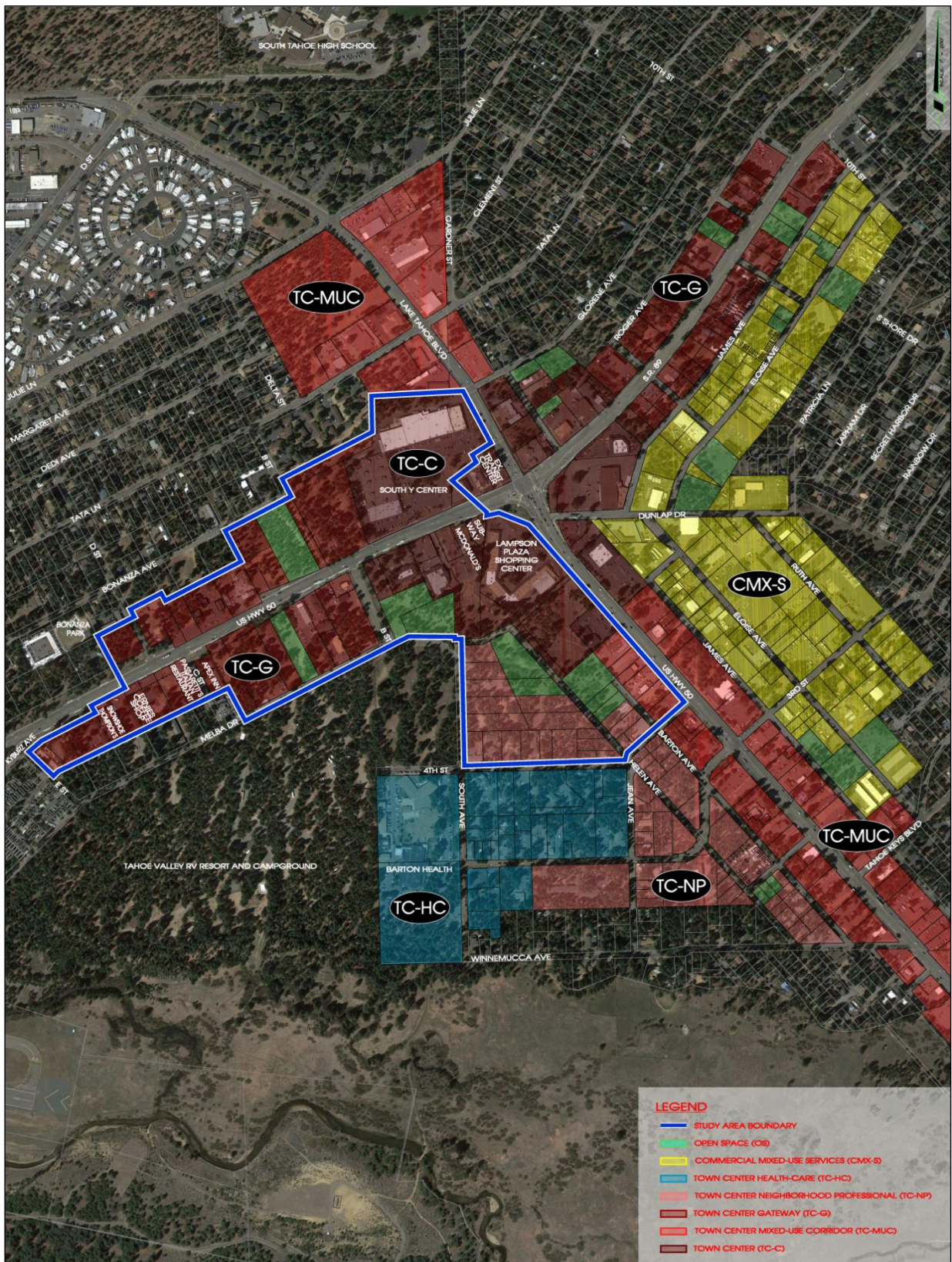


Figure 2. Community Watershed Partnership Initial Study Area, Tahoe Valley Greenbelt, City of South Lake Tahoe, California (solid blue line denotes boundary of study area)

MEYERS PROJECT SCOPE

The Meyers' CWP strategy is intended to provide useful TMDL implementation information to Basin managers, regulators, and stormwater jurisdictions. The Meyers community was identified as a priority watershed for development of a Community-based Watershed Strategy through a CWP ranking process that evaluated proximity to the lake, slope, soils, precipitation, and modeled pollutant load contributions (Figure 3). The development of the CWP Strategy was guided by a Technical Advisory Committee (TAC) led by the Tahoe RCD, and in partnership with EPA, the CTC, the USFS, El Dorado County, and the Lahontan Water Board to ensure the project was well coordinated and relevant to other projects implemented in the watershed. The TAC also helped identify project goals, and provided input on project execution.

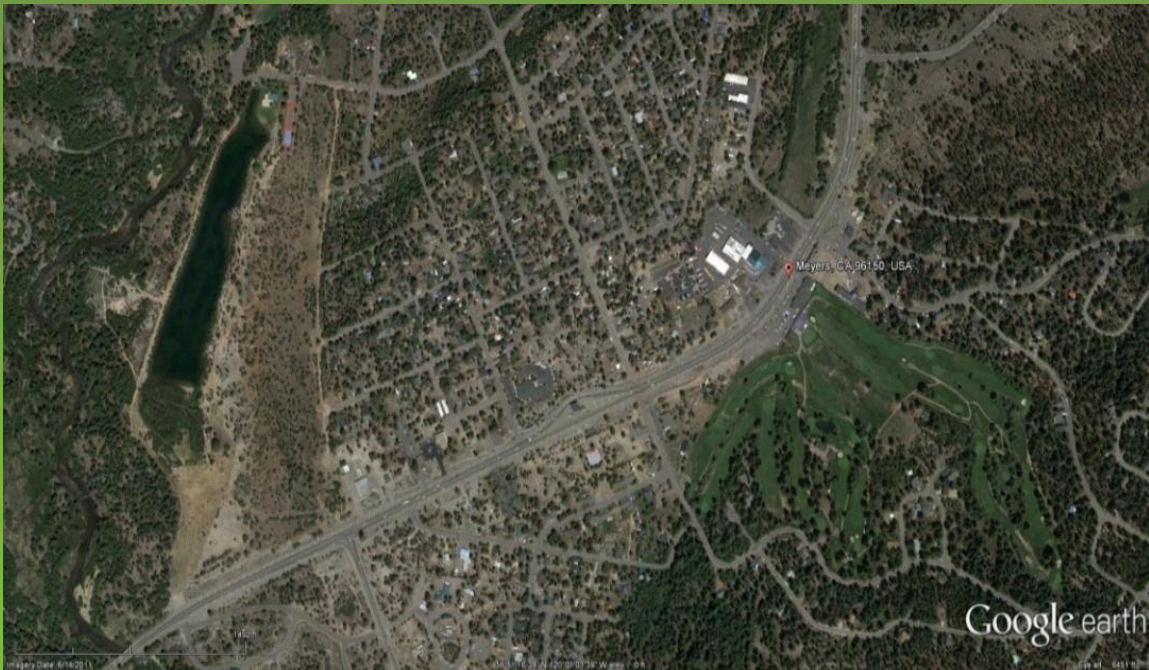


Figure 3. Meyers Commercial Core, the Upper Truckee River, Tahoe Paradise Park with Lake Baron, Tahoe Paradise Residential Subdivision and Tahoe Paradise Golf Course (Source: Google earth)

The purpose for engaging the Meyers' community was to identify strategies for assisting private property owners, commercial businesses, and local jurisdictions with TMDL implementation through a community-based watershed approach. The goal of EPA's Community Based Watershed Strategy grant is to explore approaches that integrate strategies for public and private partnerships using education, information sharing and project implementation. Through a community-based approach it is expected there will be an increase in general knowledge of restoration objectives, opportunities for improving environmental stewardship, and enhancements to the Lake Tahoe Basin's BMP and TMDL programs.

The Tahoe RCD and its partners identified the following goals for this project:

- Improved water quality through area-wide storm-water conveyance and treatment,
- Inclusion of elements that focused on smart use of limited space, and enhanced aesthetics within the community,
- Enriched public/private partnership opportunities for this commercial-core,
- Development of an innovative/successful template for future area-wide projects in the Region,
- Expanded business opportunities in the Meyers commercial-core.

In support of the first two goals, this report includes two separate conceptual drawings for an area-wide stormwater system in Meyers, Pollutant Load Reduction Model (PLRM) estimates for single family residential (SFR) BMPs at theoretical rates of 30, 50 and 100 percent implementation, as well as PLRM estimates that represent the potential benefits of area-wide treatment in the Meyers commercial core, and pollutant load reduction estimates.

To achieve the remaining goals, key business owners were also engaged to discuss options for area-wide stormwater treatment. A case study is provided in this report that discusses the steps taken to engage the community, and the results of those efforts. A second case study describes the process for establishing a benefit assessment, if public support for such a mechanism is identified.

Traditional technical services related to SFR BMP implementation, as well as landscape conservation assistance were also provided throughout this project.

HISTORICAL INFLUENCES

Meyers was first established in 1851 as a stagecoach stop, trading post, and Pony Express way station. It lies in the headwaters of the largest tributary to Lake Tahoe, the Upper Truckee River at an elevation of 6352 feet (Watershed Assessment, 2000). In 1859, Martin Smith, Meyers' original developer, sold the station to Yank Clement, who named it Yank's Station. The station provided food, lodging, water, and pasture to the thousands of travelers and animals journeying over Echo Summit. Yank's Station included a hotel, two saloons, a general store, a blacksmith shop, a cooperage, private homes, and stables and barns.

In 1863, Carlo Giuseppe Celio homesteaded in what was known as the Upper Lake Valley of the South Shore of Lake Tahoe. Overtime, the Celio family accumulated over 4,000 acres including the town of Meyers which they bought in 1903. In 1903, the town included a variety of businesses and 22 buildings. The Celios operated a dairy (shipping Tahoe butter as far as San Francisco) with 125 cattle. In 1905, the Celio family incorporated and created a lumber company with milling facilities. Nineteen twelve (1912) marked the year the Celio family started harvesting beef in their new slaughter house and providing beef to the resorts popping up around the Lake Tahoe Basin. Both the beef and dairy cattle spent spring through early fall grazing on the grasses from Upper Lake Valley to Meiss Meadows. Every fall the cattle were driven (cattle drive) to the Placerville area to graze and wait out winter, and then they were driven back up the mountain again in the spring.



Historic Meyers California (Source: www.SierraCollege.edu)

During the 1960s, the area around Meyers was part of a large (even by today's standards) residential subdivision plan originally developed by two corporations: Tahoe Paradise Homes and Tahoe Paradise Properties, Inc. The new neighborhoods were to be called Tahoe Paradise. Since that time, the entire area is referred to as either Meyers or Tahoe Paradise. An area of ten (10) square miles was subdivided into 4,400 parcels.

CURRENT COMMUNITY CONTEXT

Meyers functions as one of 6 "gateways" into the Lake Tahoe Basin. However, more visitors enter the Tahoe Basin through Meyers than through any other entry point. Meyers serves as the residential, commercial and public service hub for the El Dorado County portion of the Lake Tahoe Basin. Meyers is separated from the more typical commercial centers found along the shore of Lake Tahoe and has retained its own character while accommodating many of the land uses found elsewhere in the Basin including dining, lodging and recreation.

In 1993, the Meyers Community Plan was adopted by both the TRPA and El Dorado County to guide planning and development in the Meyers commercial core and to be responsive to the unique circumstances found within the built environment and the natural landscape. Many of today's aesthetics and environmental problems can be attributed to past actions that occurred across the Meyers landscape without a clear vision for an effective business district or full recognition of resource sensitivities to development.



Meyers Study Area 2014 – Flooding Across from Lira’s Market (Source: John Dayberry)

With the adoption of the TRPA’s Regional Plan Update in 2012, an effort is underway to update existing Community Plans, which are now being called Area Plans, throughout the Basin. The Meyers Area Plan (Area Plan) was in the draft stages during the efforts of this study. The current draft of the Area Plan builds upon the 1993 plan. The Area Plan also includes lands not previously contained within the 1993 plan and includes additional implementation measures to achieve both economic and environmental objectives.

The Area Plan includes approximately 669 acres of mixed-use (industrial, commercial, and residential), recreational, and conservation land use designations. Land ownership within the area plan is 32 percent private and 69 percent public ownership (Meyers Area Plan Draft, June 2014). The public lands are primarily under the management of the US Forest Service and California Tahoe Conservancy. The Meyers Area Plan consists mainly of flat, high capability lands. There are three areas within the Area Plan that have been identified Stream Environment Zone (SEZ) and are considered environmentally sensitive and not available for additional development.

Land use in the commercial core is generally mixed (Figure 4) with both private and public land holdings. The biggest opportunity to work with public land holders is with the USFS and the CTC, each having substantial property at the east and west ends of the commercial core. At the east end of Meyers, there is also a small wetland in need of restoration that was identified by the TAC as an important feature that could take on rerouted stormwater while providing a hydrologic benefit through groundwater recharge of the meadow system.

During the development of El Dorado County’s Pollutant Load Reduction Plans required by the Lake Tahoe TMDL, Meyers was identified as a significant pollutant load contributor (personal communication, Brendan Ferry, 2014). This fact, in combination with the knowledge that the Upper Truckee River accounts for 25 percent of tributary loads entering Lake Tahoe, makes this watershed a priority for implementing stormwater improvement actions.

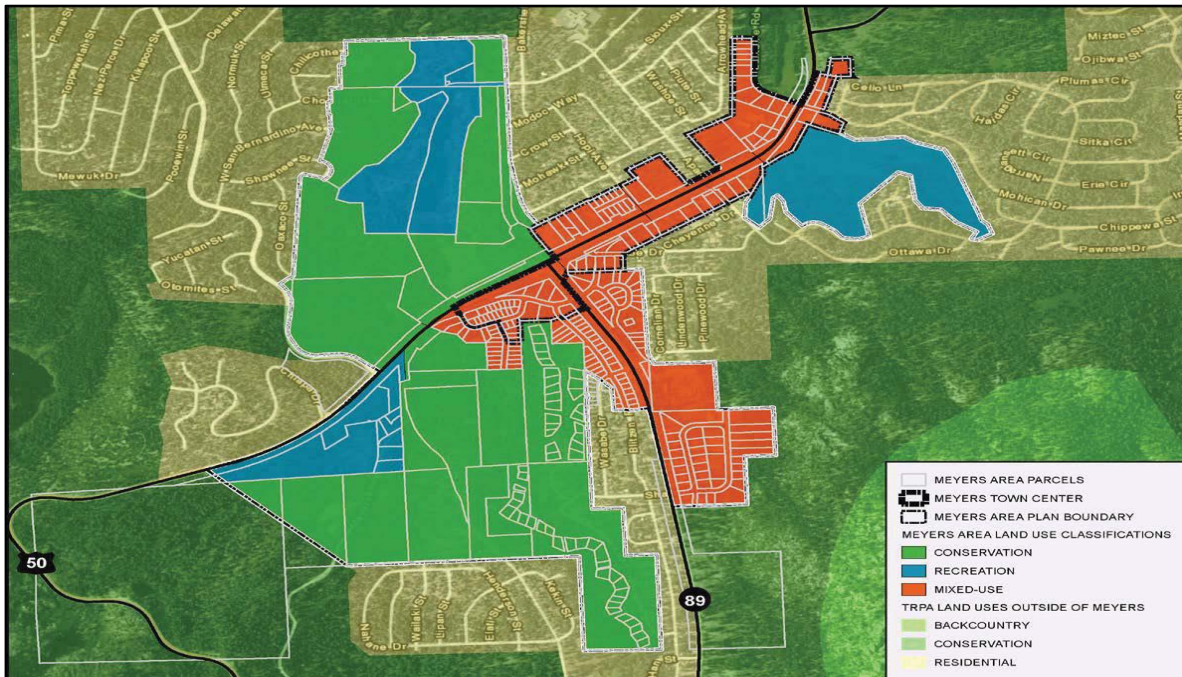


Figure 4. Meyers Land Use Map Recreated from the Meyers Area Plan (Source: <http://www.edcgov.us/Meyers/>)

MEYERS – A CASE STUDY

The first stages of this project were focused on convening a Technical Advisory Group (TAC) including agency representatives from the Tahoe RCD, EPA, El Dorado County, and the consultant team from RO Anderson. Three meetings with the TAC were held (December 13, 2013, February 10, 2014 and April 24, 2014). The project was initiated with a kick-off session that included a discussion detailing the purpose of the project, development of Critical Success Factors and a site visit to discuss opportunities, constraints, and the project area scope.

Project Critical Success Factors

The listed Critical Success Factors below represent the agreed upon outcomes to be realized with the completion of this study.

- Final Report provides EPA with helpful information on TMDL strategies.
- The identified approaches can be modeled in other communities.
- The identified strategies are actionable.
- The project increases awareness of the support El Dorado County and the Tahoe RCD provide to the Meyers community.
- The community feels empowered to reach common goals and objectives.



(Top Row left to right). Meyers Commercial-Core along US Highway 50 (Source: Coleen Shade)
(Bottom Row left to right). Meyers Creek and Adjacent Meadow (Source: Coleen Shade)

Based on the TAC field discussions, the consultant team was directed to develop two BMP concept strategies. The first concept was to focus on the Meyers commercial core between Apache (near the Agricultural Inspection Station) and Pioneer Trail. The second concept was to focus on the residential area along the Apache “uphill” loop where the City had installed BMPs 20+ years ago and was likely going to need infrastructure improvements.

While on the site visit, the TAC identified public lands that might be integrated with an area-wide strategy. In particular, the meadow at the north end of the study area adjacent to U.S. Highway 50 was identified as a restoration opportunity. The meadow, consisting of approximately 23 parcels, is impaired; running along the western edge of the meadow is the deeply incised Meyers Creek.

Between the first and second TAC meetings, R.O. Anderson’s landscape architect/erosion control specialist, engineer, and project manager walked the proposed project area. At that time, the existing BMPs in the uphill neighborhood were judged to be functioning and in good working order. Based on this site visit the TAC recommended that the consultant team focus efforts on developing two concepts for the commercial-core area instead of one residential and one commercial site.

The second TAC meeting was attended by representatives from the Tahoe RCD, EPA, El Dorado County, the Lahontan Regional Water Quality Control Board, and the consultant team. Discussions included identification of current and foreseeable planning efforts in the area, opportunities and constraints, and

a detailed discussion on approaches to BMP concepts; the following project summary information resulted.

Project Summary Information

- Current and Planned Projects in Meyers:
 - Caltrans – Begin May 2014. Curb, gutter, basins, crosswalk.
 - County EIP – Erosion control project within ROW from Apache to San Bernardino.
 - CA State Parks – Golf course relocation and river restoration.
 - CTC – Campground restoration.
 - TTD – Request for Congestion Mitigation and Air Quality Improvement funds to connect East and West San Bernardino via a bicycle/pedestrian bridge.
 - Strategic Growth Council – TRPA is applying for funds for the mid-level planning of the Meyers Corridor.
 - TRPA – On Our Way grant submittal for Meyers’ core mobility enhancements.
- Constraints:
 - Shallow ground water-design considerations.
 - Caltrans right-of-way is not consistent (can go right up to the front door of businesses).
 - High Traffic Area.
 - Polarized Community: some don’t want change.
 - Misunderstandings around the Area Plan and its process.
 - Topography – relatively flat.
- Opportunities:
 - Opportunity to rethink business frontages – Linear road separate from Hwy 50 integrating cars, pedestrians, and bikes.
 - County could take on portions of Caltrans right-of-way so better community planning can occur.
 - BMPs are required on all Commercial Properties.
 - Focus BMP needs on existing large parking lots (Liras, Steve’s Transmission, Meeks, and Golf Course).
 - Meyers Creek – currently takes urban run-off through the meadow (Best case scenario is to add pipe for stormwater conveyance from Lira’s side to meadow while Caltrans has road dug up for their project).
 - Meadow Restoration – convey flows from commercial core to meadow.
 - Public Lands – there are public parcels within the project area that may provide opportunities to enhance conveyance and detention.
 - Off-line linear option could include overflow with landscaping – There are property owners within the commercial core that own more than one parcel.

In addition to concept designs, the consultant team was asked to interview existing property and business owners within the Meyers commercial core that represented properties that had either complied with BMP requirements or had not yet installed BMPs. The purpose for the interviews was to gauge the interest in supporting (both in concept and financially) the implementation of an area-wide BMP/stormwater system that would provide conveyance and treatment throughout the identified study area for both public and private properties. The interviews were conducted in March and April of 2014. The summary of those discussions are below.

Concurrent to the Tahoe RCD’s CWP effort in Meyers, the Area Plan led by El Dorado County and TRPA was nearing completion of a public draft. Both the content and the process of the Area Plan was

questioned by the community, and during the summer of 2014 newspaper articles and public opinion seemed to suggest that the community was not interested in new development in Meyers. The controversy and skepticism of the Area Plan became a real constraint for implementing tasks planned for the CWP project. In fact, the Tahoe RCD was asked by the County and TRPA to hold off from bringing area-wide strategies to the Advisory Council and the community.

At the third and final TAC meeting, it was decided that due to low support from business and property owners, coupled with topographic constraints for developing an area-wide system, pushing forward with the CWP project at this time could affect future opportunities to gain community support for area-wide stormwater treatment and commercial-core upgrades.

Area-wide Stormwater Concept Plans

Two conceptual designs were developed by the consultant engineer and landscape architect. As noted above, the objective was to create two commercial-core design scenarios; the first simply addresses water quality improvements (Figure 5) and the second integrates water quality improvements with other elements that might bring additional value to property and business owners in the commercial core (Figure 6).

Conceptual Plan #1 works within the existing Caltrans right-of-way providing “rain-garden” type depressions connected to treat and convey storm water to the meadow for final treatment. Plan #1 also includes a potential public parking site at the north end of the study area in the same location that the draft Area Plan identifies. This concept is mainly focused on areas that are publicly owned.

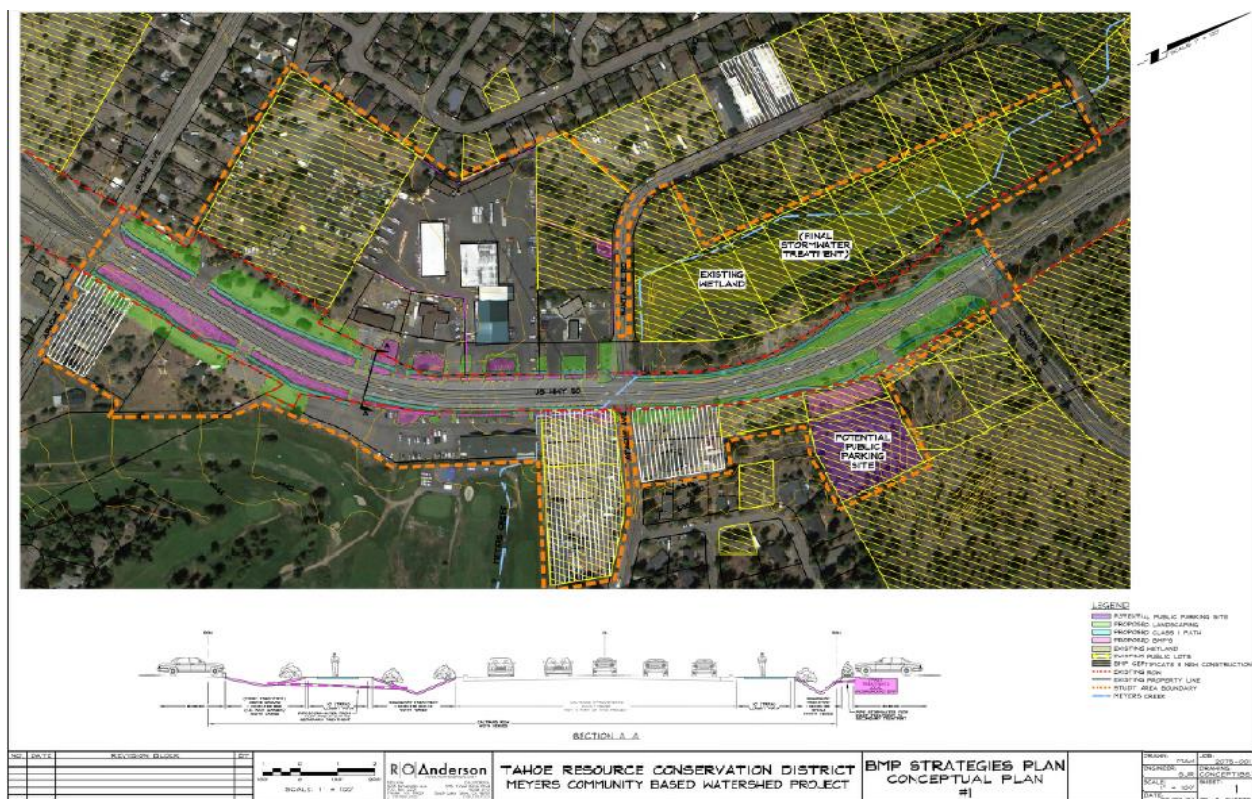


Figure 5. Meyers Study Area – Conceptual Plan #1

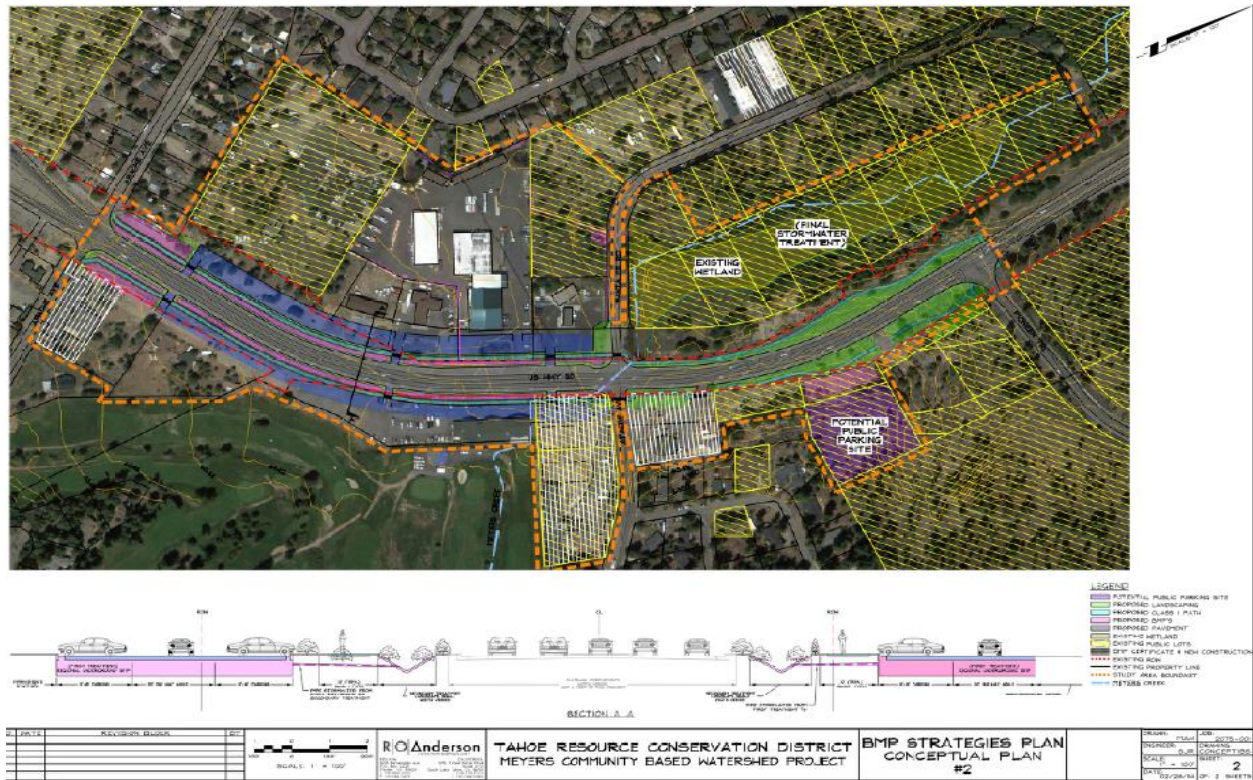


Figure 6. Meyers Study Area – Conceptual Plan #2

Conceptual Plan #2 works within the existing Caltrans right-of-way, within public lands, and on private property. Plan #2 includes improved circulation elements by adding a frontage “drive” along both sides of the highway. These one-way frontage drives allow for additional diagonal parking that separates the auto movement from the pedestrian and bicycle movement. The landscaped “rain-garden” structure separates the pedestrian and bicycle movement from the traffic on the highway. Plan #2 also includes additional public parking in a parking lot at the north end of the study area. These designs were inspired by the information presented at several Meyers Community Meetings.

The Meyers Community Watershed Partnership project also focused on presenting a model approach to developing a benefit assessment, or community facility district that could be used to support future stormwater projects or infrastructure in Meyers’ commercial core. In addition to the technical and planning services the Tahoe RCD provided to the Meyers Community and El Dorado County, the Tahoe RCD wanted to provide community outreach services to discuss with pivotal landowners how they envision the future Meyers commercial core functioning, and what amenities would make them more likely to partner with the County and TRPA on future Area Plan implementation.

MODELING RESULTS

The Lake Tahoe TMDL requires that Tahoe jurisdictions reduce pollutant loading of fine sediment particles (FSP), total nitrogen (TN), and total phosphorous (TP) to help improve water clarity in Lake Tahoe. The Pollutant Load Reduction Model v1.1 (PLRM) was developed as a tool to estimate pollutant load reduction to the lake based on the implementation of water quality improvement projects and management actions in a watershed. Using methods described in the Lake Tahoe Clarity Crediting Program Handbook (Crediting Handbook), pollutant load reductions are translated into Lake Clarity Credits used to track TMDL progress. Currently, Lake Clarity Credits are based on the amount of FSP

load reduction to Lake Tahoe (the crediting program assumes if FSP is reduced TN and TP are concurrently reduced); therefore, modeling results in this study focus solely on FSP load reductions. The objectives of the PLRMv1.1 modeling in this report are to 1) estimate the potential Lake Clarity Credits that could be obtained through traditional SFR BMP implementation in the Meyers area, and 2) estimate the potential Lake Clarity Credits that could be obtained through installation of area-wide BMPs in the Meyers Commercial Core. All PLRM models were established using the approach described in the PLRM User's Manual (NHC 2009).

PLRM Modeling: Single Family Residential BMPs

Four catchments in the Meyers area (Figure 7) were modeled using PLRMv1.1 to determine potential Lake Clarity Credits that could be obtained through SFR BMP implementation. Acreage of each catchment, percent of the catchment that is SFR, percent of SFR land use that is impervious area, and the number of SFR parcels for each catchment are summarized in Table 1.

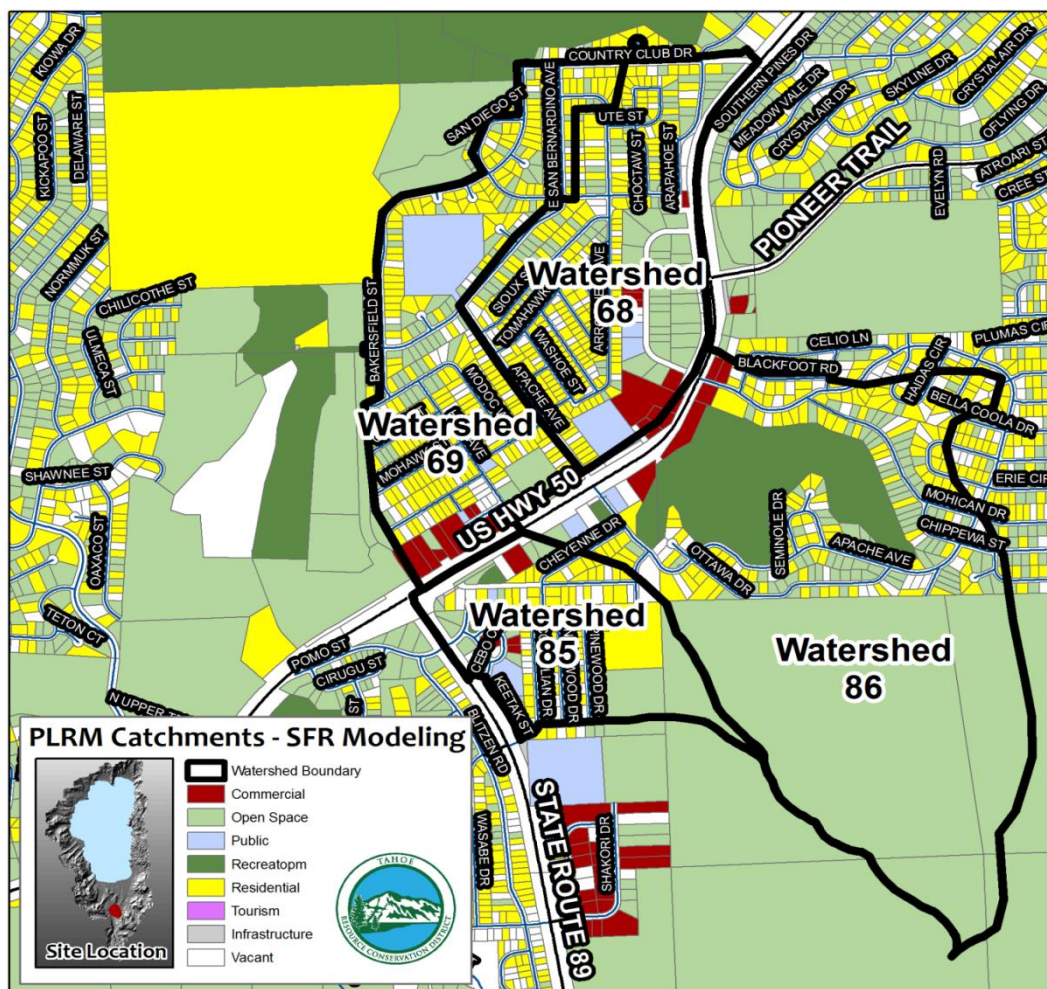


Figure 7. Catchment modeled with PLRM in the Meyers Study Area to estimate Lake Clarity Credits from SFR BMP implementation

Meyers Watershed Characteristics				
	Watershed 68	Watershed 69	Watershed 85	Watershed 86
Acres	163	137	78	340
SFR %	34	40	34	11
SFR Impervious Area %	32	28	23	18
# of SFR parcels	259	229	95	147

Table 1. Acres, total percentage SFR, percentage of SFR that is impervious area, and number of SFR parcels for the watersheds modeled with the PLRM

In order to calculate the potential Lake Clarity Credits that could be obtained with SFR BMP implementation, PLRM models were run with SFR BMP compliance rates of 30 percent (the approximate compliance rate for the Tahoe basin), 50 percent, and 100 percent; all model results are summarized in Table 2. For reference, Table 3 shows the number of SFR parcels that would be necessary to achieve 30, 50, and 100 percent SFR BMP compliance in the Meyers area. The maximum number of credits that could be obtained with 100 percent SFR BMP compliance ranges from 0.68 to 1.61 for the four basins modeled. The number of SFR BMP certificates necessary to achieve 100 percent SFR BMP ranges from 88 to 241 per watershed.

Estimated Lake Clarity Credits - Calculated by PLRM				
SFR BMP Implementation	Watershed 68	Watershed 69	Watershed 85	Watershed 86
30%	0.34	0.39	0.17	0.21
50%	0.64	0.74	0.32	0.39
100%	1.39	1.61	0.68	0.84

Table 2. Lake Clarity Credit potential for 30%, 50%, and 100% BMP compliance rates for the four Meyers catchments, determined through PLRM modeling

Number of SFR parcels to achieve BMP compliance				
	Watershed 68	Watershed 69	Watershed 85	Watershed 86
30% SFR BMP compliance (# parcels)	60	53	22	34
50% SFR BMP compliance (# parcels)	111	98	41	63
100% SFR BMP compliance (# parcels)	241	213	88	137

Table 3. Number of SFR parcels at baseline and the number of parcels that would be required to achieve 30%, 50%, and 100% SFR BMP compliance

PLRM Modeling: Area-Wide Stormwater Treatment

The Meyers commercial-core study area (Figure 8) was modeled using PLRMv1.1 to determine the potential Lake Clarity Credits that could potentially be obtained with the implementation of an area-wide stormwater treatment system. The area modeled covered 24.2 acres and is predominantly classified as commercial-industrial-communications-utilities (CICU) land use. Acreage of the area modeled, percent of the catchment that is CICU, percent of CICU that is impervious area, and the number of CICU parcels for the area modeled is summarized in Table 4 below. The PLRM model results estimate approximately 20 Lake Clarity Credits could be obtained through the implementation of area-wide treatment in the Meyers Commercial Core (Table 5).

Meyers Commercial Core	
Acres	24.2
CICU %	65.0
CICU Impervious Area %	73.5
# of CICU parcels	14

Table 4. Acres, total percentage commercial-industrial-communications-utilities (CICU) land use, percentage of CICU that is impervious area, and number of CICU parcels for the area modeled with PLRM

PLRM FSP Modeling in the Meyers Commercial Core
Estimated Lake Clarity Credits (#)
19.8

Table 5. A conservative estimate of the number of Lake Clarity Credits that could be claimed though Area-Wide Treatment of the Meyers Commercial Core, as modeled with PLRM

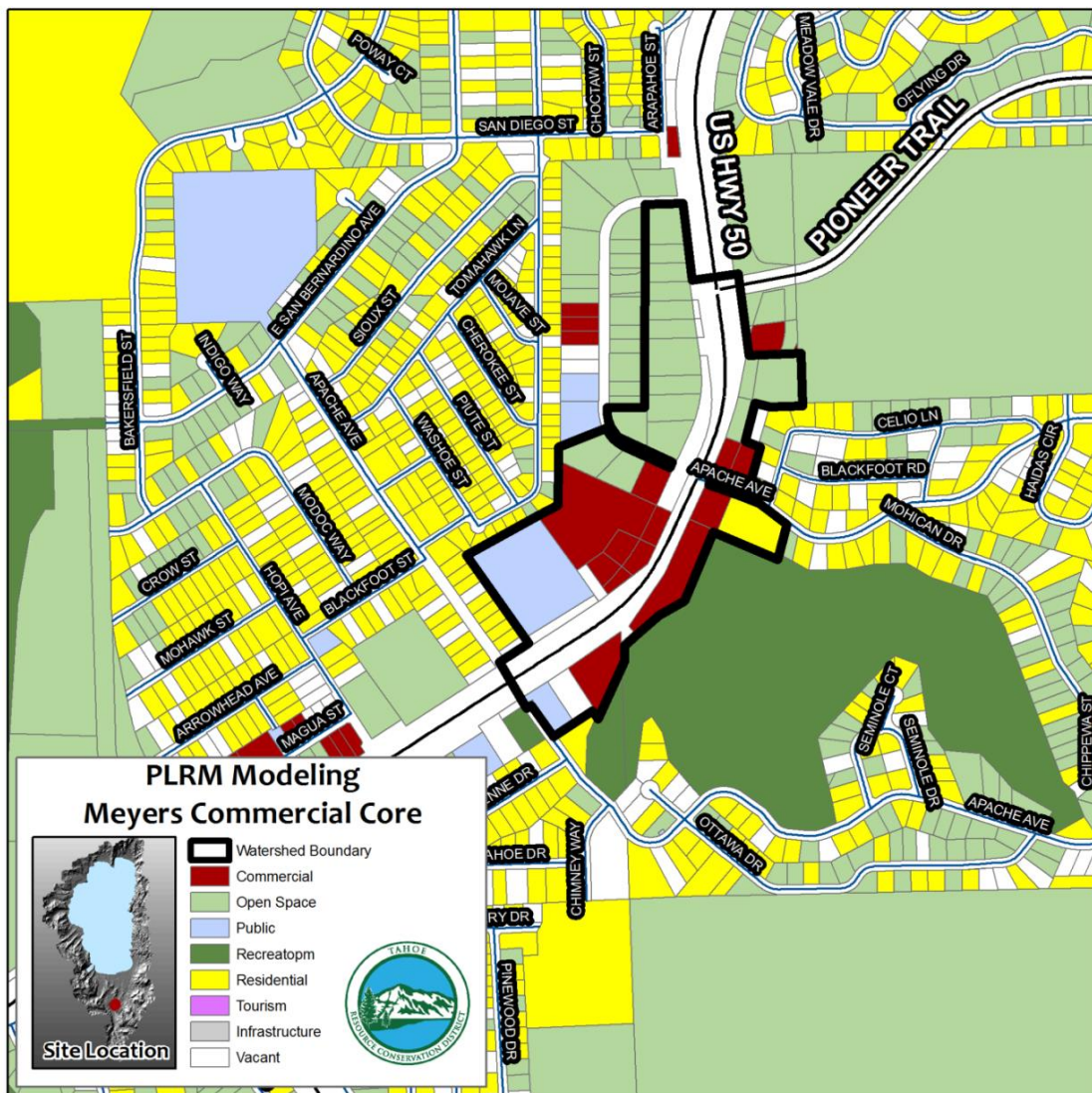


Figure 8. Meyers Commercial Core modeled with PLRM

PLRM Modeling: Discussion

This modeling exercise clearly demonstrates the advantages of a strategy that achieves BMP implementation in commercial corridors over individual SFR BMPs. The total number of Lake Clarity Credits that could be obtained through 100 percent SFR BMP implementation is approximately 4.5 credits, while an estimate of potential Lake Clarity Credits for area-wide treatment in the Meyers Commercial Core is approximately 20 credits; four times the amount of credits for 100 percent SFR BMP compliance. These numbers are not surprising in that the PLRM model assumes that pollutant loading from SFR parcels is relatively low when compared to commercial properties, and therefore much more credit can be gained through BMP implementation on commercial properties.

This study also illustrated the level of effort necessary to receive Lake Clarity Credits. Treating the commercial core is a much more efficient way to attain TMDL credits. Of course it would be necessary to get most of the CICU property owners on board with the plan, which would no doubt require a certain level of information sharing, coordination and commitment. In contrast, to obtain 100 percent SFR BMP compliance would require between 88 to 241 BMP certificates *per catchment; approximately 750 in total*. Single family residential property owners have been slow to comply with the TRPA ordinance, and it would be no small task to achieve this goal.

Finally, implementation of the Lake Tahoe TMDL is still in its early stages and jurisdictions are focused on the most cost-effective way to attain credits required by TMDL permits. In the future, however, as credits become harder to obtain, jurisdictions may take a second look at how SFR BMPs can help them achieve their pollutant reduction goals.

These models have been built as a planning exercise to understand the potential credits that could be claimed with SFR BMP implementation versus Meyers' commercial core area-wide treatment. It should be noted that these models *should not be considered finalized estimates of Lake Clarity Credits for the following reasons*. First, these models do not include stormwater infrastructure, as the plans are only in the concept phase. Additionally, these models were run using PLRM version 1.1, which was the version available at the time of modeling. Since the time modeling exercise was completed, PLRM version 2.1 was released.. Potential Lake Clarity Credits should not change substantially between PLRM version 1.1 and PLRM version 2.1, but results will be slightly different.

TAHOE VALLEY GREENBELT PROJECT SCOPE

The Tahoe Valley Greenbelt CWP strategy is to provide useful TMDL implementation information to Basin managers, regulators, and stormwater jurisdictions. The Tahoe Valley Greenbelt study area within the Tahoe Valley Area Plan was identified as a priority watershed for development of a Community-based Watershed Strategy through a CWP ranking process that evaluated proximity to the lake, slope, soils, precipitation, and modeled pollutant load contributions. The development of the CWP Strategy was guided by a Technical Advisory Committee (TAC) led by the Tahoe RCD, and in partnership with EPA, the City of South Lake Tahoe, the California Tahoe Conservancy and the Lahontan Regional Water Quality Control Board to ensure the project was well coordinated and relevant to other projects implemented in the watershed. The TAC also helped identify project goals, and provided input on project execution.

The Tahoe RCD and its partners outlined the following goals for this project:

- Concepts developed and agreed upon demonstrate the multiple benefits of area-wide stormwater management when it is successfully integrated with other public/private benefits (i.e., scenic, recreation, transportation/circulation, economic development).

- Demonstrates how in-lieu fees may be employed for BMPs.
- Demonstrates public/private partnership opportunities.
- Demonstrates pollutant load modeling (area-wide vs parcel by parcel).
- Demonstrates integrated approach to implementing the Environmental Improvement Program (EIP).
- The grant funded project is closed out by December 30, 2015.

The TAC was engaged in work sessions to explore strategies for assisting private property owners, commercial businesses, and local jurisdictions with TMDL implementation through a community-based watershed approach. The goal of EPA's Community Based Watershed Strategy grant is to explore approaches that integrate strategies for public and private partnerships using education, information sharing, and project implementation. Through a community-based approach it is expected there will be an increase in general knowledge of restoration objectives, opportunities for improving environmental stewardship, and enhancements to the Lake Tahoe Basin's BMP and TMDL programs.

Many of the Tahoe Valley Area Plan property owners (Greenbelt Advisory Group) within the study area were individually interviewed and all were invited to participate in three work sessions that took place over a year's time. The purpose of the work sessions was to share with the Advisory Group the Tahoe Valley Area Plan updates as it moved towards approval, solicit Greenbelt amenity ideas that will bring value to the businesses and the community, and discuss the interest in a public/private partnership to financially support the implementation of the Greenbelt vision. The Greenbelt Advisory Group was engaged to identify opportunities that bring economic, social and environmental benefit to the Tahoe Valley property owners and the City. The sessions included frank conversations about a public/private partnership between the property owners and the City of South Lake Tahoe to financially support an area-wide stormwater retention and treatment system, integrate additional connectivity, and include recreation amenities.

In support of the goals above, this report includes two separate conceptual drawings for an area-wide stormwater system with integrated community amenities. Also included in the report are the Pollutant Load Reduction Model (PLRM) estimates for single family residential (SFR), multi-family residential (MFR), and Commercial-Industrial-Communications-Utilities (CICU) BMPs at the current rate of implementation and theoretical rates of 50, 75, and 100 percent implementation and PLRM estimates that represent potential benefits of area-wide treatment in a selected area of the Tahoe Valley Area Plan. A little later in this report, the Tahoe Valley Greenbelt Case Study is presented to outline the steps taken to engage property owners and the results of those efforts.

Traditional technical services related to SFR, MFR and Commercial development BMP implementation, as well as landscape conservation assistance were also provided throughout this project.

HISTORICAL INFLUENCES

The area in and around the South Lake Tahoe “Y” has remained an important travel corridor and meeting place going back in history to the Washoe peoples’ interactions within the Lake Tahoe Basin. A portion of the old Pony Express Trail ran through the Tahoe Valley Area Plan. Ranching was an important industry at the turn of the last century on the South Shore, supplying fresh meat, dairy products and vegetables to the burgeoning resorts. The Barton Ranch was located within the boundaries of today’s Tahoe Valley Area plan. The ranch consisted of a ranch house (built in 1890) and several outbuildings. These buildings remained within the Tahoe Valley Area Plan until their recent removal in August 2015.

CURRENT COMMUNITY CONTEXT

The Tahoe Valley Area Plan is bounded on the north, west, and south primarily by residential subdivisions dating back to the 1960s. The plan area is bordered by the Upper Truckee Marsh and the South Lake Tahoe Airport on the southeast.

Today, the Tahoe Valley area is dominated by commercial development abutting U.S. Highway 50 and State Route 89. The Highway right-of-way lines meander inconsistently as do existing development setbacks.

Parcel sizes vary and development is fragmented. New development, consistent with design, materials, and landscaping standards contrast with the many older motor lodges built in the 1960s. In addition to discontinuous landscape improvements, the lack of uniform connectivity of pedestrian and bicycle paths is a problem for both mobility and aesthetics.

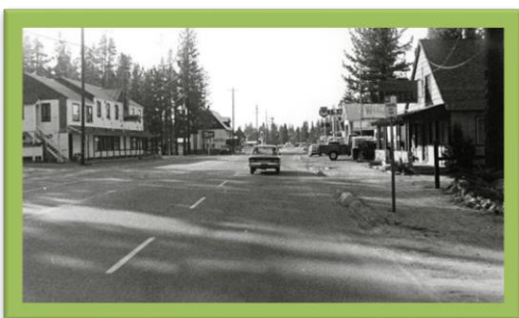
Our study area land uses include residential, commercial, tourist accommodation and industrial. Tahoe Valley is the gateway neighborhood for South Lake Tahoe. Its commercial uses serve both the South Shore residents and visitors stocking up on their Tahoe-stay provisions. The commercial uses include clothing stores, factory outlets, drug stores, restaurants, and a supermarket. These uses occupy structures ranging in age and physical condition from the 1890’s to present day construction.

Over the last century, the Tahoe Valley area has been heavily disturbed and its natural resources have been manipulated and reduced to a few vegetated and undeveloped parcels found behind the Highway 50 commercial “strip”. An ephemeral stream (Tahoe Valley Creek) runs through the Greenbelt study area.

The plan area includes three drainage basins including the Tahoe Valley system that runs south of the “Y” intersection, which is directly connected to the Upper Truckee River. The other two drainage basins drain into the Tahoe Keys Lagoons before being released into Pope Marsh. Many properties contain excess coverage over the Bailey land capability limitations and approximately 50% of the commercial parcels have BMPs installed.



Tahoe Valley Commercial-Core; US Highway 50 & State Route 89 (Source: Google Earth 2015 and U.S. Geological Survey approx. 1969)



(Left) Tahoe Valley Commercial-Core; Heading east on US Highway 50 early 1960s (Source: Don Lane)
(Right) Tahoe Valley Commercial-Core; At B Street and US Highway 50 (Source: Bill Kingman)

TAHOE VALLEY GREENBELT – A CASE STUDY

The first stages of this project were focused on convening a Technical Advisory Group (TAC) including agency representatives from the Tahoe RCD, EPA, City of South Lake Tahoe, and the consultant team from RO Anderson. The project was initiated with a kick-off session (July 14, 2014) that included a discussion detailing the purpose of the project and development of critical success factors.

Project Critical Success Factors

The listed critical success factors below represents the agreed upon outcomes to be realized with the completion of this study.

- Property owner/business and public outreach achieves buy-in on concepts and potential assessment district.
- The process identifies multiple benefits that can result from the greenbelt concept; benefits include an integration of water quality, recreation, transportation/connectivity, visual enhancement and economic development.
- Boundaries are assessed and adjustments are made to support watershed functions.
- The identified concepts/strategies are actionable (they can be feasibly implemented).
- This process builds capacity to assist implementation opportunities.
- Process and deliverables will set the stage for moving forward with local TMDL goals (potential area to be treated, number of potential certifications, etc.).

Project Summary Information

Based on the TAC discussions, the consultant team was directed to prepare a site plan of the Greenbelt project area and Greenbelt amenity sample boards. In preparation for the first Advisory Group work session, property owner interviews were conducted to inform the work session process and to find out the property owners' level of interest in an area-wide stormwater treatment system. The interview results found that there were a high percentage of property owners interested in exploring the possibility of creating a public/private partnership for the purpose of implementing an integrated Greenbelt stormwater treatment system.



Informal and formal Trails south of Lampson Plaza (Source: Coleen Shade)

At the first Advisory Group work session, held September 30, 2015, the participants were facilitated through a Strengths, Weaknesses, Opportunities, and Strengths (SWOT) activity to inform the Greenbelt design process. In small groups, lists were developed that addressed:

- What are the strengths of the Tahoe Valley Area Plan and Greenbelt?
- What are the weaknesses?
- What are the opportunities for the area plan?
- What are the threats or risks that create barriers to implementing the Greenbelt project?

The following lists the feedback received from the Advisory Group members:

Strengths

- Community has endorsed a great idea (i.e., a Greenbelt stormwater system that is integrated with amenities)
- This collaborative effort will achieve multiple community goals

- The area provides strolling area for nearby higher density/mixed use residential
- CTC lands adjoin City's Greenbelt parcels expanding opportunities to meet infiltration capacity
- The area includes water features
- It is the entrance to Lake Tahoe's public assets such as beaches, campgrounds, trails, historic sites, wilderness areas, and open space
- It has a Gateway identity
- Local uses at the "Y"
- There are existing bike paths
- Adjacent to fulltime residential neighborhoods
- Great restaurant-row area

Weaknesses

- No visual access into Greenbelt; the current Greenbelt access is not welcoming
- Need to install environmentally-friendly access through wet areas where they don't exist (ie, boardwalks, bridges)
- Currently no wayfinding signage; no welcoming improvements for visitors
- Winter access/X-country skiing not accommodated
- Snow is currently stored at Greenbelt entry points
- The area is treated like a dump
- There is a bike path to nowhere; no formal connectivity to Barton Hospital, surrounding neighborhoods and Meyers
- Area has a number of vacancies and undeveloped parcels
- Existing situation doesn't encourage multi-use/passive activities
- Existing situation doesn't allow for enough or comfortable outdoor restaurants and seating
- Lack of lighting; safety issues are very immediate
- Crossing Highway 50 is "deadly" – lack of safe pedestrian and bike crossings
- Speed limit must be reduced – "Please!"
- Lack of family entertainment in the Tahoe Valley Area (movie theater replaced by CVS)

Opportunities

- Creation of a well-connected commercial core with sidewalks and bike trails that connect to neighborhoods
- Lose the "Y" name and go to "Gateway" or "Southgate"
- Creation of an area-wide stormwater system serving public and private properties
- Invest in community appeal
- Creation of spaces/places for gathering at the locals' end of town
- Create community vegetable garden in a sunny spot
- Use of the CTC parcel on Highway 50 (adjacent Factory Stores) Greenbelt for a gathering area
- Utilize area behind Pier 1 as a front (door) rather than the backdoor – community space for businesses
- Design better use of CalTrans right-of-way space
- Create safe pedestrian crossing (using Hwy median/islands)
- Create a permanent place to display banners for local events (over Hwy)
- Outdoor scenery/landscaping
- Development of a theater/outdoor or indoor venue
- Increase public safety, include well-designed lighting for safety

- Implement area-wide BMPs
- Create a pedestrian friendly area – park once/public parking
- Present the area with lighting so visitors know that they have arrived in South Tahoe (the HUB).
- Vehicle access to back of businesses for deliveries
- Decommission Barton Avenue
- Walk-up restaurant access from back of buildings and outdoor seating away from the highway
- Design lighting that is compatible with surrounding uses and non-impactful to night sky
- Control run-off and flooding through an area-wide designed system

Barriers to Success

- Achieving the necessary buy-in to gain political support
- Acquiring the necessary funds to implement the Greenbelt vision
- City able to support on-going maintenance costs
- Getting CTC to get over “Asset Lands” mindset
- Purpose for which CTC originally purchased properties (needs to be consistent with CTC Board authorized purchase purpose)
- Attempt to meet multiple town center goals – Integrate infill with Greenbelt
- High ground water (shallow aquifer at Ken’s)
- Accommodations for mixed-use parking
- Caltrans/Permitting coordination and cooperation
- Open space for central plaza needs visual exposure from Hwy
- Multiple agencies and stakeholders
- Caltrans right-of-way varies; no consistent geographic setback to uniformly design within
- Within the Area Plan there are no Hwy 50 crosswalks except at the traffic light
- Speed limit does not promote safety or gathering

Greenbelt Integrated Area-Wide Stormwater Concept Plan

The second and third Advisory Group work sessions (July 16, 2015 and August 20, 2015) focused on soliciting ideas and preferences for the types of community amenities to integrate into the area-wide Greenbelt stormwater treatment system. Advisory Group participants were provided with two concept scenarios; one focused on amenities to support passive activities and the other on amenities to support active ventures. The group selected a combination of both active and passive activities to integrate.

At the last work session, the participants worked in smaller groups to identify six (6) amenities from their previously crafted list that best fit the landscape, and the project’s environmental, social and economic revitalization goals. They were given the option to choose more than six (6) if they felt more amenities were warranted. Once they chose the amenities, they were asked to identify the geographical location for each within the Greenbelt study area. They could apply their chosen amenities to more than one location. At the end of the activity, each group shared their maps with the entire group. With very few exceptions, the groups’ preferred design concepts were quite similar.

The Advisory Group participants were asked if they could come to a consensus on the preferred amenities. There was a consensus on the amenities which included a public plaza, a small community amphitheater, naturally designed playgrounds, community garden, multi-use paths, and recreational activities that flowed through Greenbelt (par course or Frisbee golf). Safety features were also integrated into all of the preferred concepts. These features included lighting and highway pedestrian and bicyclist crossings. Gateway features, art and wayfinding were also identified as important features

that should be used to unifying and brand the Greenbelt. The geographical locations obtained about an 80% agreement. Without knowing the exact configuration of the stormwater features, preferred locations were a bit imprecise. Figure 9 and Figure 10 illustrate the Advisory Group's preferred concept.

The following lists the three (3) groups' preferences for community amenities.

Group A

"Green Belt opportunities include things that flow from one end of the Greenbelt to the other."

1. Amphitheater at the 'Y' corner
2. Gathering plaza/place behind Factory Outlet Stores
3. Community garden at both ends of Greenbelt
4. Playgrounds by community gardens and amphitheater
5. Lighting through Greenbelt, lighting trails and activities (safety)
6. Activities that flow through Greenbelt like jogging path, par course, Frisbee golf

Group B

"Gateways will be an important feature and should entice people into the Greenbelt."

1. Gateway and signage placed at entry points that draw attention and enhance the whole area
2. Lighting located through Green Belt to make it safe
3. Art, including permanent, temporary, and cultural events
4. Amphitheater/gathering place/cultural areas located behind Factory Outlet Stores
5. Passive seating areas located throughout the Greenbelt
6. Playground located near amphitheater and pharmacy

(The group had concerns with connecting to other side of U.S. Hwy 50 at B Street and crossing at 3rd Street to connect with bike path on Eloise.)

Group C

"Amenities should be integrated with art."

1. Playgrounds located as bookends to the Greenbelt and at the amphitheater
2. Amphitheater located behind and to the north of the Factory Outlet Stores
3. Gateways into Greenbelt integrated with art, as a part of enticing people to enter
4. Community garden integrated with art located off of B Street behind Pier One
5. Footbridges connecting people on both sides of detention basins with foot paths and trails
6. LED lighting throughout Greenbelt
7. Public restroom near amphitheater

Prior to the close of the third work session the participants were asked to indicate, by a show of hands, if they were interested in continuing to explore a public/private partnership with the City of South Lake Tahoe to financially support the implementation of the Greenbelt integrated area-wide stormwater project. All indicated they were interested in continuing the exploration. A few individuals wanted to make it clear that until the numbers were available (total cost and property owners' fair share) they could not commit to anything else at this point.



Figure 9. Advisory Group's Preferred Concept Plan

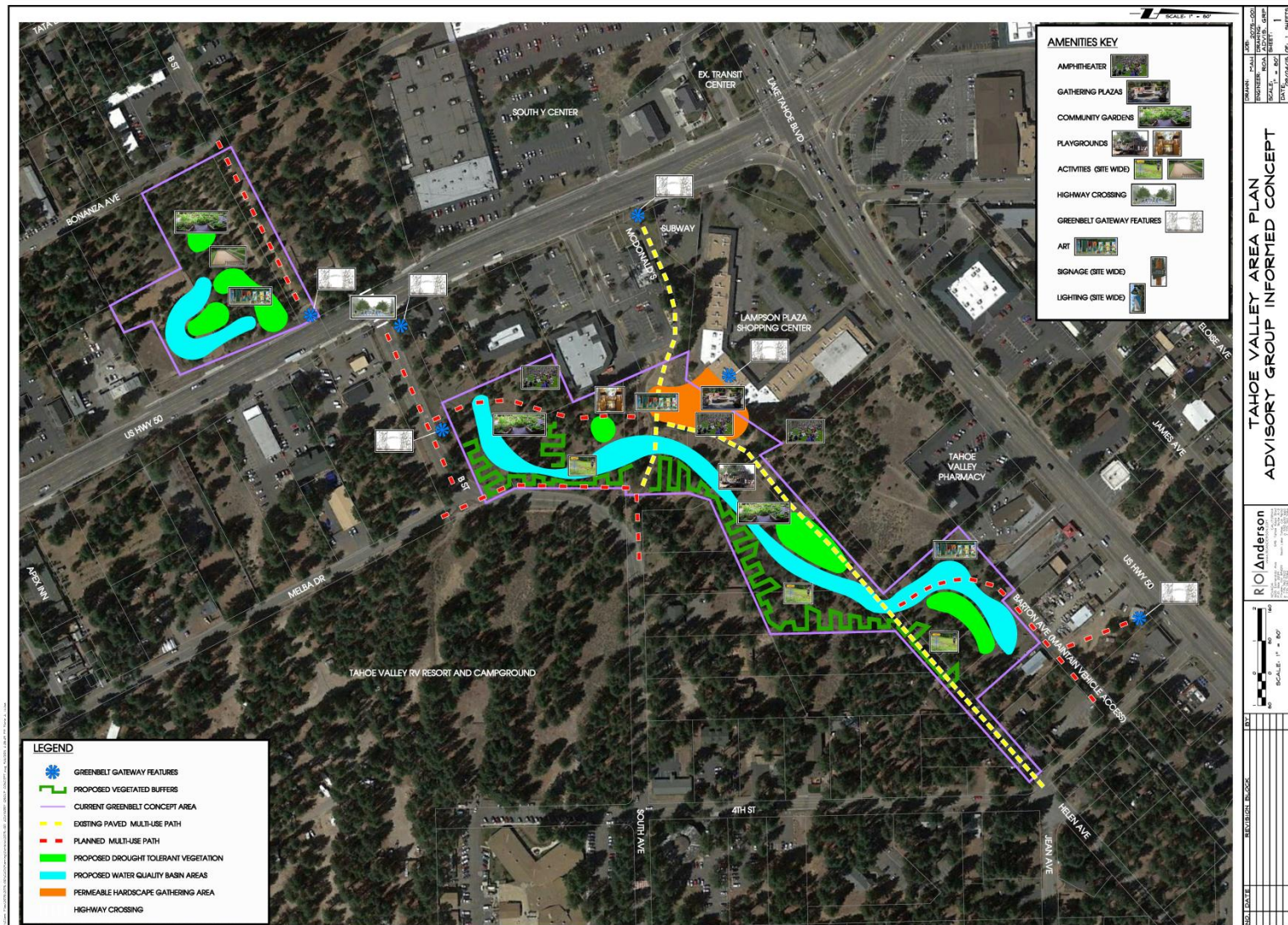


Figure 10. Advisory Group's Preferred Concept Plan with Amenities

MODELING RESULTS

The Tahoe Valley Greenbelt Community Watershed Partnership project also focused on presenting a model approach to developing a benefit assessment, or community facility district, that could be used to support future stormwater projects or infrastructure in the study area.

Pollutant Load Reduction Modeling

The Lake Tahoe TMDL requires that Tahoe jurisdictions reduce pollutant loading of FSP, TN, and TP to improve water clarity in Lake Tahoe. The Pollutant Load Reduction Model version 2.1 (PLRMv2.1) was developed as a tool to estimate pollutant load reduction to the lake based on the implementation of water quality improvement projects and management actions in a watershed. Using methods described in the Lake Tahoe Clarity Crediting Program Handbook Version 2 (LCCP Handbook v2 (2015)), pollutant load reductions are translated into Lake Clarity Credits used to track TMDL progress. All PLRM models in this were established using the approach described in the PLRM user's manual (NHC 2015) and the LCCP Handbook v2 (2015).

Private parcel and area-wide best management practice (BMP) credit potential was modeled using the PLRM v2.1 in the Tahoe Valley catchment. PLRM v2.1 modeling determined the credit potential for installing BMPs on single family residential (SFR), multi-family residential (MFR), commercial-industrial-communications-utilities (CICU) private parcels, along with the equivalent credit potential for an area-wide treatment system for CICU parcels (i.e., the Tahoe Valley Commercial Core). The area modeled is shown in Figure 11. According to the LCCP Handbook v2 (2015), BMP performance tends to decrease with time, and therefore LCCP modeling protocol states that BMPs older than 5 years must be modeled as though they treat only half the original BMP'ed area. It is possible to recertify the BMPs on an MFR or CICU property to receive full credit; however, the level of effort this will take on the part of the jurisdiction and land owner is unclear. In order to simplify interpretation of PLRMv2.1 results, the following discussion assumes all CICU and MFR BMP certificates are greater than five (5) years old, and therefore, treating only half the original BMP'ed area. According to the LCCP Handbook (2015) SFR BMPs are always worth their full value, regardless of age. An area-wide treatment system does not lose credit potential based on age but rather needs a score of greater than 2.5 (on a scale from 1 to 5) for a BMP Rapid Assessment Methodology (RAM) measurement to be considered fully functioning (BMP RAM is the LCCP (2015) approved method for assessing the function of BMPs).

To determine credit potential of private parcel BMPs at different rates of implementation, SFR, MFR, and CICU land uses were modeled using the current percentage (by area) of private parcel BMPs as well as hypothetical BMP'ed areas of 50%, 75%, and 100% (with MFR and CICU land BMPs treating only half capacity because they are assumed to be greater than 5 years old). The current rate of BMP implementation was calculated with GIS using the data included in the PLRM v2.1 download (<https://www.enviroaccounting.com/TahoeTMDL/Program/Display/ForUrbanJurisdictions>), which is the 2014 BMP status provided by the TRPA. The equivalent credit potential for an area-wide treatment system for the Tahoe Valley Commercial Core was determined by modeling CICU parcels with hypothetical BMP'ed areas of 50%, 75%, and 100% (treating full capacity because it is assumed the area-wide treatment system would be maintained at a BMP RAM score of 2.5 or greater). Results of these modeling efforts are shown in Table 6. For the LCCP, baseline BMP'ed areas were standardized for the entire Tahoe Basin at 5% for CICU, 19% for MFR, and 7% for SFR. The current BMP'ed area (assuming BMPs on MFR/CICU private parcels are greater than 5 years old) was determined with GIS for the three separate subcatchments in the Tahoe Valley catchment (TVToOutlet, TVHelenDB, and TVLindaWB; Figure 11 & Table 7). The greatest credit potential came from a hypothetical area-wide treatment of 100% of the Tahoe Valley Commercial Core at 168 credits (or 33,722 lbs/year FSP reduction). The

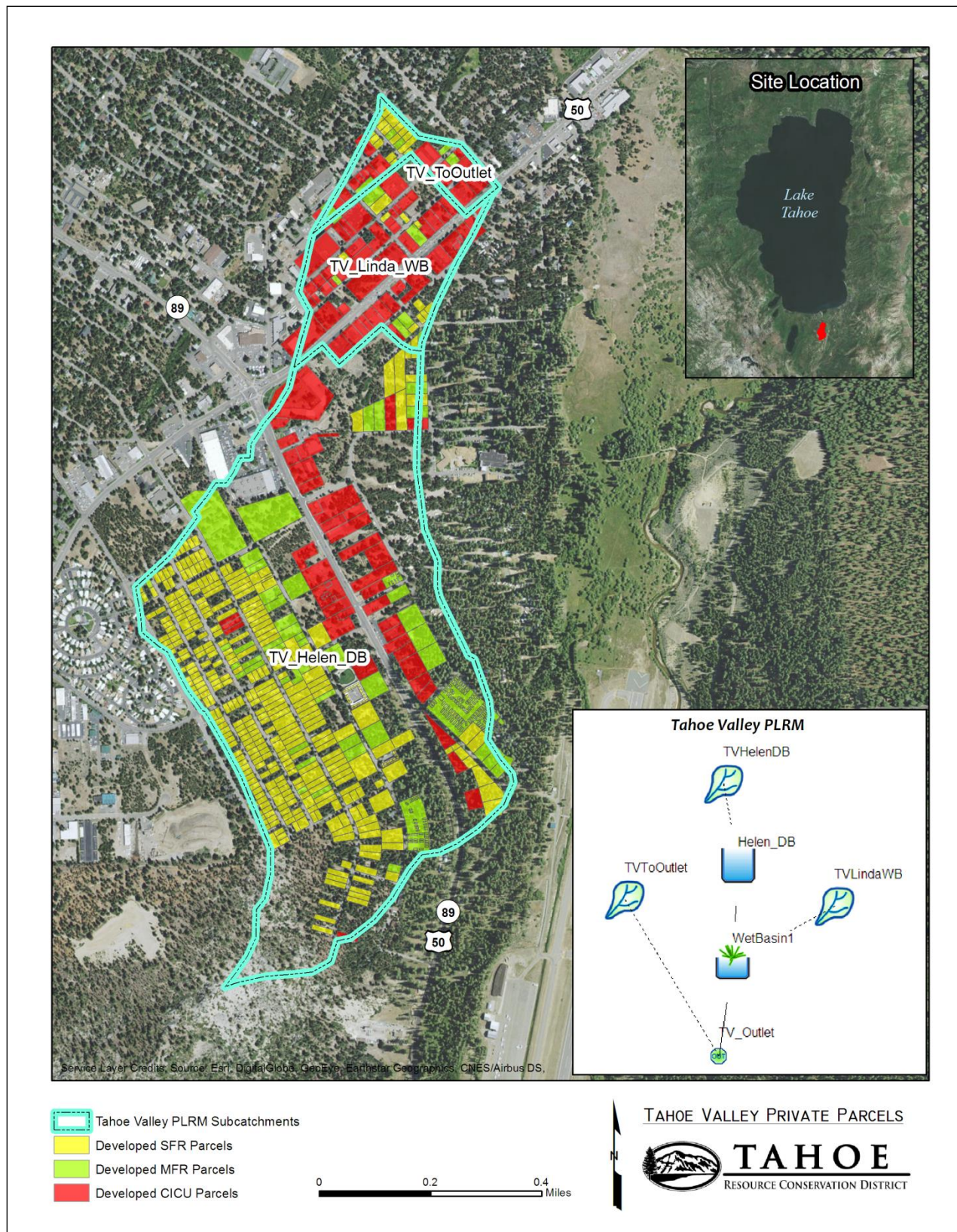


Figure 11. Project Area (Tahoe Valley Modeled Area), City of South Lake Tahoe, California

According to the Lake Clarity Crediting Program Handbook v2 (2015), MFR/CICU BMPs greater than 5 years old only treat half the original BMP'ed area, SFR parcels are always worth their original value, regardless of age, and area-wide treatments are worth original value if the BMP RAM score is > 2.5. Table 6 summarizes the results.

PLRM Annual Pollutant Loading and Credit Potential for BMPs in Tahoe Valley							
BMP'd Area	Runoff Volume (ac-ft/year)	Annual Pollutant Load				FSP Load Reduction (lbs/year)	Clarity Credits (#)
		TSS (lbs/year)	FSP (lbs/year)	TP (lbs/year)	TN (lbs/year)		
Baseline (SFR 7%; MFR 19%; CICU 5%)	155	106,697	68,002	250	954	-	-
Single Family Residential (SFR) BMPs (BMP age doesn't influence credit potential)							
Current Area (3.0 to 21.1%)	154	106,464	67,855	249	951	146	1
50%	153	105,941	67,529	248	945	473	2
75%	152	105,484	67,243	246	940	759	4
100%	151	105,020	66,951	245	935	1,051	5
Multi-Family Residential (MFR) BMPs (> 5 years old)							
Current Area*0.5 (0 to 7.0%)	156	107,747	68,651	253	967	-649	-3
50%	154	106,219	67,706	249	948	296	1
75%	152	105,214	67,083	246	936	918	5
100%	150	104,201	66,456	243	924	1,546	8
Commercial-Industrial-Communications-Utilities (CICU) BMPs (> 5 years old)							
Current Area*0.5 (18.25 to 30.6%)	146	100,112	63,801	235	900	4,201	21
50%	140	94,932	60,486	223	857	7,516	38
75%	131	87,676	55,844	206	797	12,158	61
100%	122	80,570	51,294	189	737	16,708	83
Area-Wide Treatment (BMP RAM Score influences credit potential, assuming BMP RAM > 2.5)							
50%	122	80,570	51,294	189	737	16,708	83
75%	103	66,890	42,518	157	621	25,484	127
100%	85	54,082	34,280	126	509	33,722	168

Table 6. Volume of runoff, pollutant loading, and credit potential for SFR, MFR, CICU, and Area-Wide Treatment at hypothetical BMP'ed areas of 50%, 75%, and 100% (and current BMP'ed rate included for SFR, MFR, and CICU) in the Tahoe Valley catchment

According to the Lake Clarity Crediting Program Handbook v2 (2015), MFR/CICU BMPs greater than 5 years old only treat half the original BMP'ed area. SFR parcels are always worth their original value, regardless of age. Table 7 and Figure 8 present these results.

Current BMP'ed Area			
Subcatchment	SFR (%)	MFR (%)	CICU (%)
*Assuming > 5 years old			
TVToOutlet	5.4	7.0	21.6
TVHelenDB	21.1	6.1	18.3
TVLindaWB	3.0	0	30.6

Table 7. Current BMP'ed area for SFR, MFR, and CICU land uses

second greatest credit potential came from a hypothetical 100% CICU private parcel BMP'ed area at 83 credits, which is equivalent to a 16,708 lbs/year reduction in FSP. In contrast, a 100% MFR private parcel BMP'ed area resulted in 8 credits (1,546 lbs/year FSP reduction), while a 100% SFR private parcel BMP'ed area resulted in 5 credits (1,051 lbs/year FSP reduction). The current CICU private parcel BMP'ed area is higher than baseline conditions (baseline CICU BMPs implementation rate is 5%) for all three of the subcatchments (21.6% for TVToOutlet, 30.6% for TVLindaWB, and 18.3% for TVHelenDB); registration of this catchment with the current CICU BMP'ed area could provide 21 credits (4,201 lbs/year FSP reduction). Conversely, the current MFR BMP'ed area (7.0% for TVToOutlet, 6.1% for TVHelenDB, and 0% for TVLindaWB) is lower than baseline conditions (baseline MFR BMPs implementation rate is 19%), and therefore results in negative credit potential. SFR BMP'ed area varies among the subcatchments – it is higher than baseline conditions (baseline SFR BMPs implementation rate is 7%) at 21.1% in the TVHelenDB subcatchment, yet lower than baseline conditions in both TVToOutlet (5.4%) and TVLindaWB (3.0%). Because two of the subcatchments are lower than baseline and the TVHelenDB subcatchment drains to an existing dry basin, very little credit potential can be realized from registering the Tahoe Valley catchment at the current SFR BMP'd area (registration would result in 1 credit, which is equivalent to 146 lbs/year FSP). Figure 12 shows the FSP reduced/credit potential versus hypothetical BMP'ed areas in the Tahoe Valley catchment. For all land uses, the relationship is linear, and the large credit potential for CICU BMPs (both private and area-wide) over MFR and SFR BMPs is readily apparent.

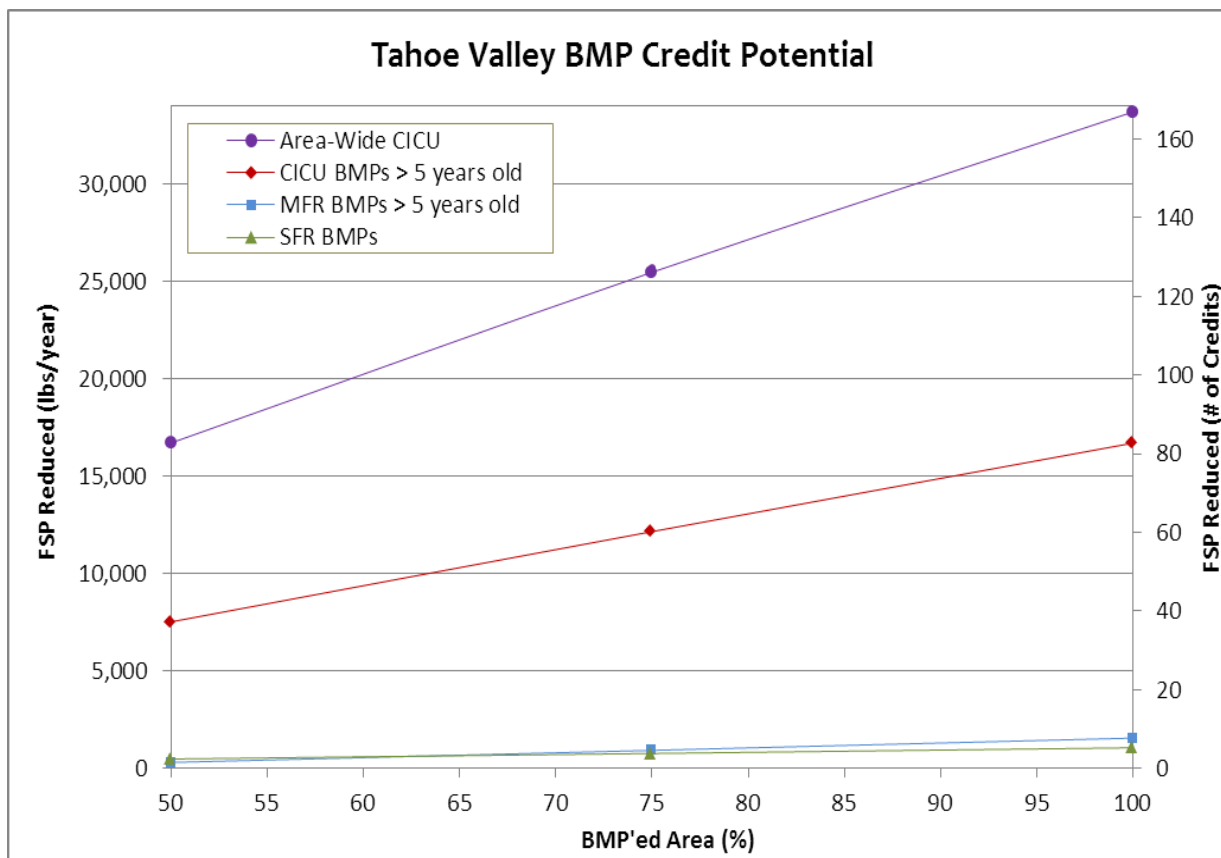


Figure 12. FSP reduced versus BMP'ed area for Area-Wide BMPs, CICU BMPs > 5 years old, MFR BMPs > 5 years old, and SFR BMPs in the Tahoe Valley catchment

While overall credit potential is important, understanding the total cost and cost-efficiency of different water quality improvement actions is essential for effectively managing resources. In order to better understand the installation cost of private parcel BMPs, total cost and cost per credit were calculated for 100% BMP'ed area on each land use using installation cost estimates provided by the TRPA (\$5,000 for SFR and MFR; \$50,000 for CICU). Cost estimates are provided in Table 8 and maps of current BMP'ed area in the Tahoe Valley catchment for SFR, MFR, and CICU are shown in Figure 13, Figure 14, and Figure 15, respectively. The highest total cost for private parcel BMPs was for CICU BMPs at \$3,300,000 followed by SFR BMPs at \$1,730,000 and finally MFR BMPs at \$985,000. The lowest cost per credit came from a 100% CICU BMP'ed area at \$53,226 per credit. A 100% MFR BMP'ed area came in at \$89,545 per credit; however 3 of these credits would be needed just to bring the Tahoe Valley area up to baseline condition. The highest cost per credit was for 100% SFR BMP'ed area at \$432,500. Since these numbers don't straightforwardly convey the level of effort required to achieve 100% BMP'ed area, the number of BMP certificates needed for 100% BMP'ed area are also shown in Table 8. The number of BMP certificates required to achieve 100% BMP'ed area is 66 for CICU, 197 for MFR, and 346 for SFR. Although cost-estimates for area-wide treatment are not provided in this study, cost-savings and project efficiency would likely be two benefits of treating runoff from CICU land uses in an area-wide treatment system since area-wide treatment systems are often more straight-forward to construct/maintain than BMPs on each individual parcel.

For SRF, MFR, and CICU parcels, a cost estimate is provided for total cost and cost per credit (Table 8). The lowest cost per credit potential exists for installing CICU BMPs. According to the Lake Clarity Crediting Program Handbook v2 (2015), MFR/CICU BMPs greater than five (5) years old only treat half the original BMP'ed area. SFR parcels are always worth their original value, regardless of age.

Cost of Install for 100% Private Parcel BMPs in Tahoe Valley			
Certificates Needed (#)	Clarity Credits (#)	Install Cost TOTAL	Install Cost PER CREDIT
Single Family Residential (SFR) BMPs (BMP age doesn't influence credit potential)			
346	5	\$1,730,000	\$432,500
MFR BMPs (>5 years old)			
197	8	\$985,000	\$89,545
CICU BMPs (>5 years old)			
66	83	\$3,300,000	\$53,226

Table 8. Cost of installation and number of certificates needed to achieve 100% private parcel BMP'ed area in the Tahoe Valley catchment

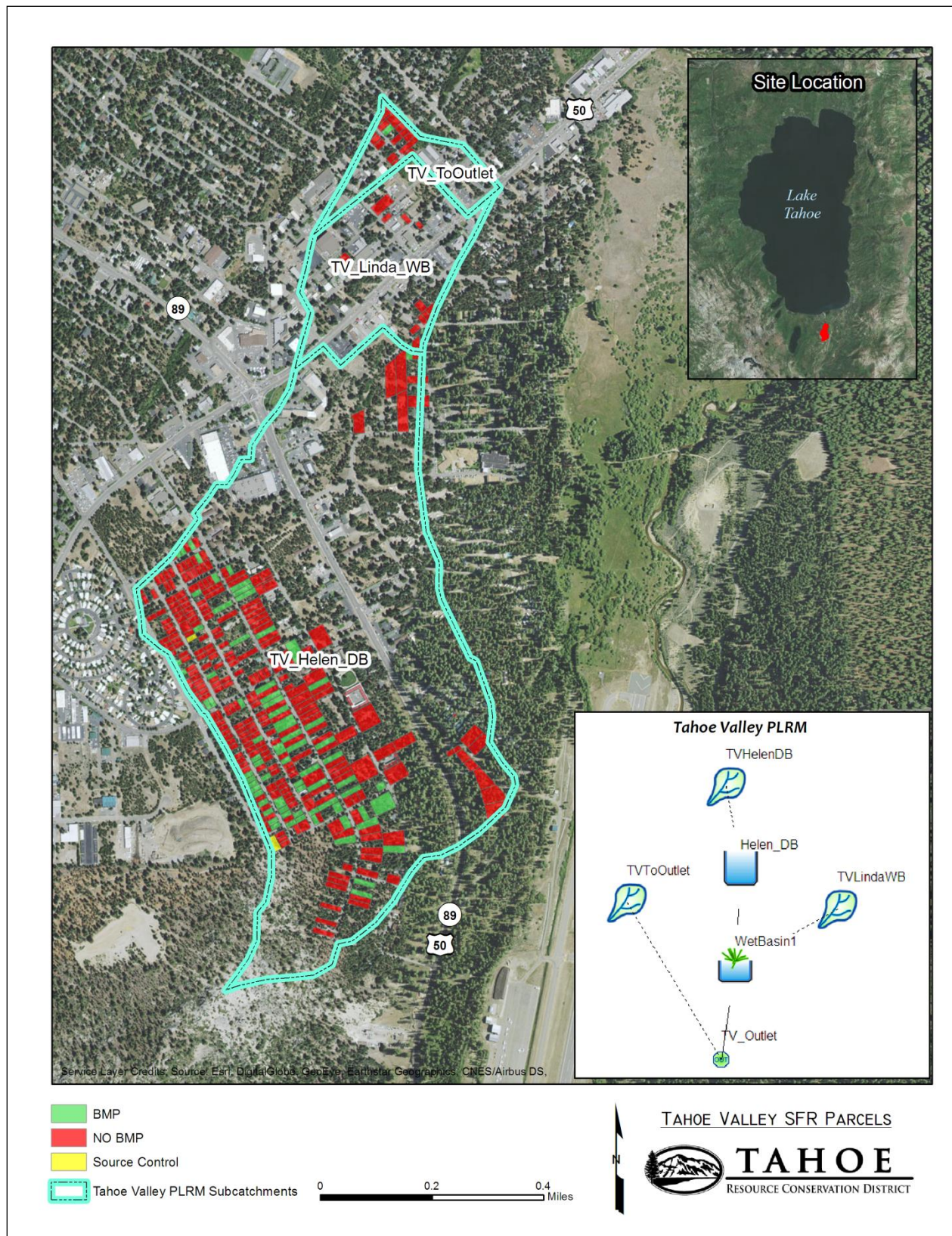
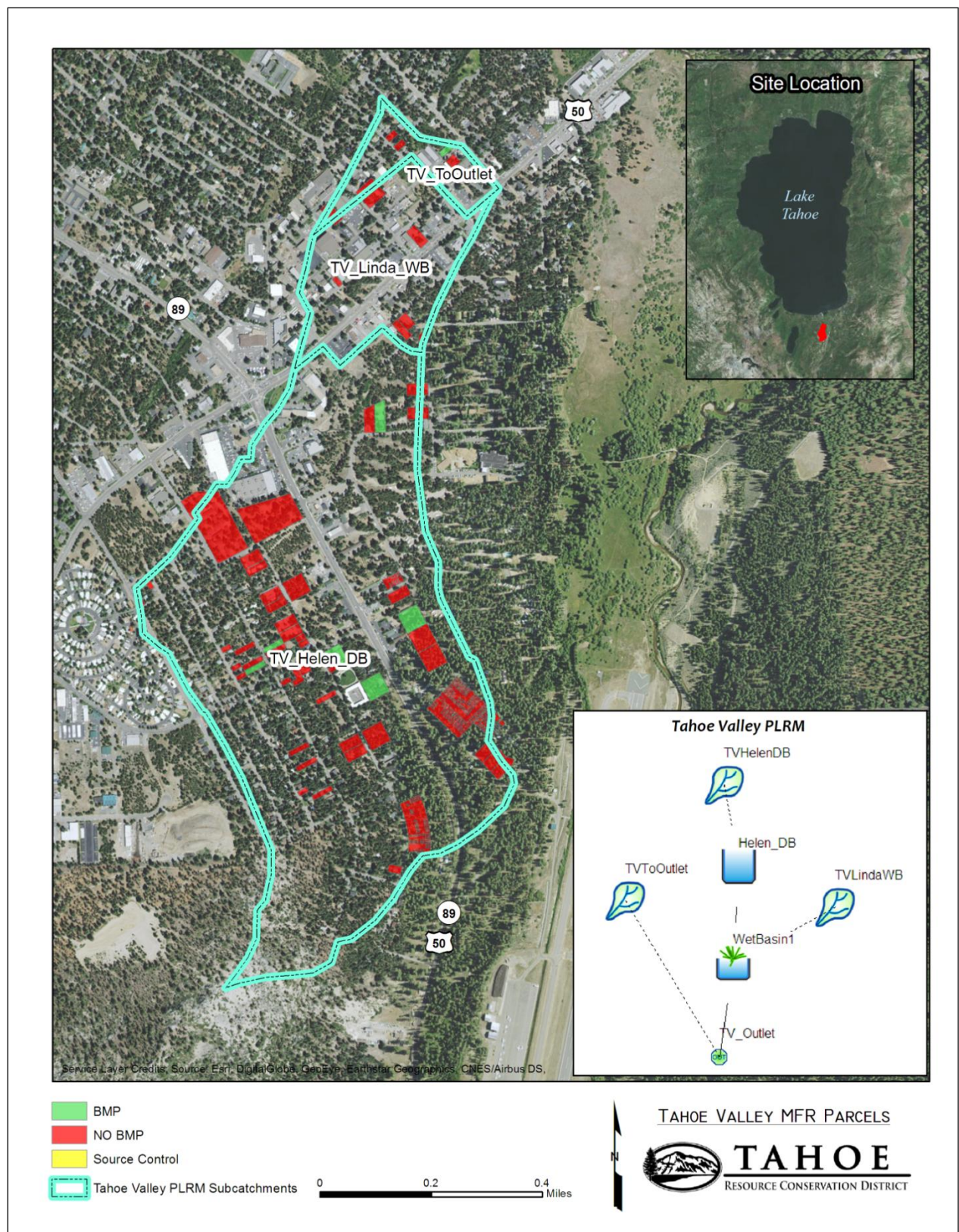


Figure 13. Current SFR BMP'ed area in the Tahoe Valley catchment (2 source control certificates)



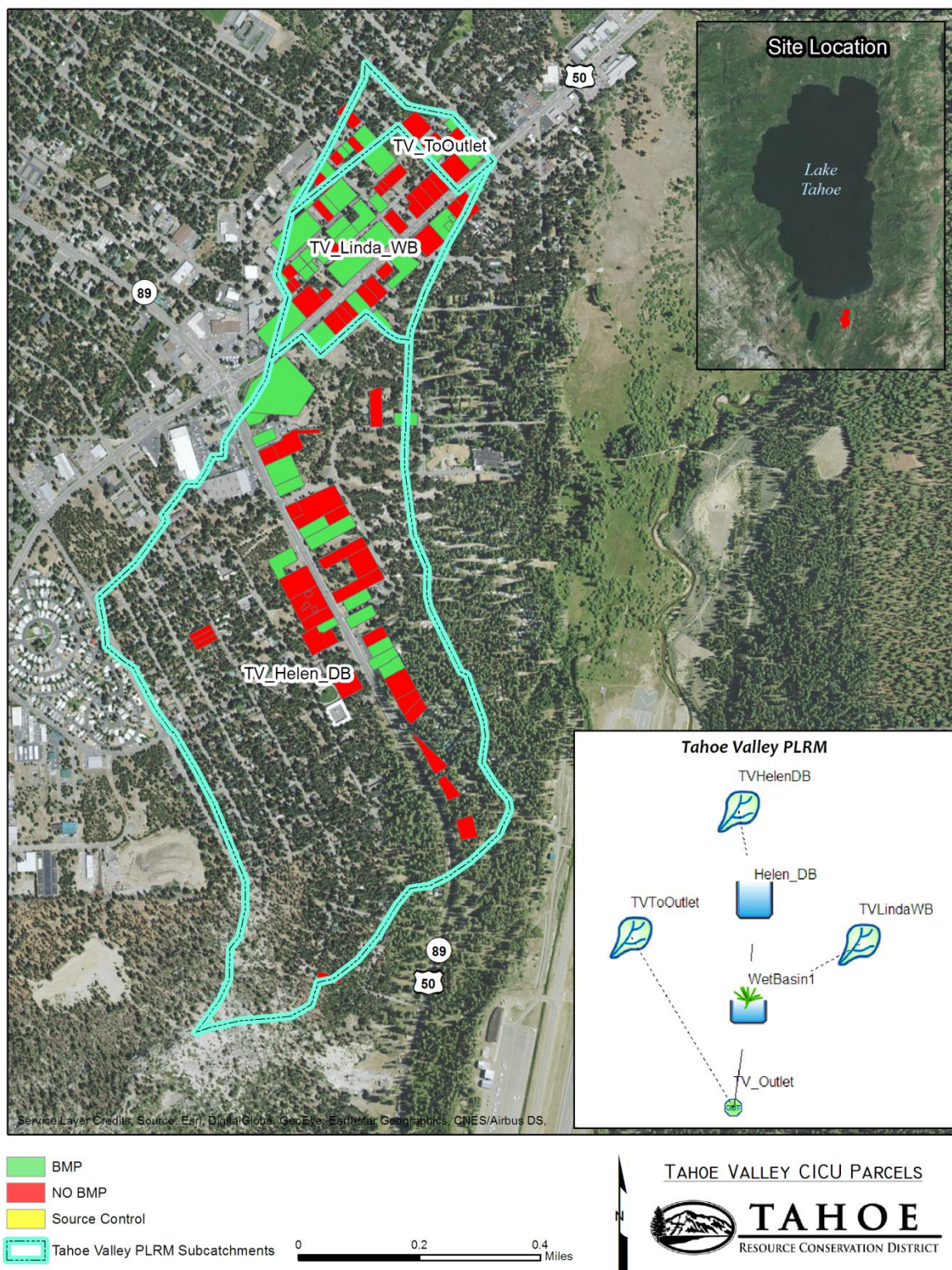


Figure 15. Current CICU BMP'ed area in the Tahoe Valley catchment (0 source control certificates)

Pollutant Load Reduction Modeling Discussion

This modeling exercise clearly demonstrates the advantages of private parcel BMP implementation in commercial corridors over individual SFR/MFR BMPs. The total number of Lake Clarity Credits that could be obtained through 100% private parcel BMP implementation is 5 credits for SFR, 8 credits for MFR, and 83 credits for CICU. Meanwhile, Lake Clarity Credits for area-wide treatment in the Tahoe Valley Commercial Core is estimated to be 168 credits; approximately 34 times the amount of credits for 100% SFR private parcel BMPs, 23 times the amount of credits for 100% private parcel MFR BMPs, and 2 times the amount of credit for 100% CICU BMPs. For MFR/SFR parcels, these numbers are not surprising in that the PLRMv2.1 model assumes that pollutant loading from SFR/MFR parcels is relatively low when compared to commercial properties; therefore much more credit can be gained through BMP implementation on commercial properties. The BMP'ed area, and in this case, the number of credits, decreases by half for CICU private parcel BMPs greater than 5 years old; to obtain full credit would require continual recertification of these properties, which would likely require a large effort. In contrast, maintaining an area-wide treatment system would likely be a simpler process than requiring maintenance/recertification for each individual CICU private parcel owner on a 5-year basis.

This study also illustrates level of effort and the potential cost necessary to receive Lake Clarity Credits. To obtain 100% BMP implementation on CICU parcels would require 66 BMP certificates. In contrast, to obtain 100% BMP implementation would require 346 SFR BMPs and 197 MFR BMPs. Single-family residential and multi-family residential property owners have been slow to comply with the TRPA ordinance, and it would be no small task to achieve this goal. The cost benefit of BMP installation for private parcel CICU is clear, with CICU private parcels costing \$53,226 per credit, compared to \$89,545 per credit for MFR, and \$432,500 per credit for CICU. An area-wide treatment system for the Tahoe Valley Commercial Core would likely be even more cost efficient than individual parcel-level BMPs since an area-wide treatment systems may be simpler to construct and maintain than installing BMPs on each individual parcel. Treating the commercial core is a much more efficient way to attain TMDL credits; of course it would be necessary to get most of the CICU property owners on board with the plan, which would no doubt require a certain level of information sharing, coordination and commitment.

In closing, implementation of the Lake Tahoe TMDL is still in its early stages and jurisdictions are focused on the most cost effective way to attain credits required by TMDL permits. In the future however, as credits become harder to obtain, jurisdictions may take a second look at how SFR/MFR BMPs can help them achieve their pollutant reduction goals.

BENEFIT ASSESSMENT –A CASE STUDY

In the 1995 Bijou/Al Tahoe Community Plan (a City of South Lake Tahoe and TRPA land use document), the Harrison Avenue project had been identified as an important capital and environmental improvement project. In the preceding years there had been multiple attempts to design and implement a project in the Harrison Avenue commercial core. In December, 2011 the City of South Lake Tahoe's Council identified the Harrison Avenue commercial core improvements as its top priority project and hired a consultant team to design, engineer, obtain environmental clearance and permits, facilitate the formation of an assessment district, and provide public engagement. The key to the City Council's prioritization of this project was a timeline in which implementation would occur. The project, constructed in 2014, includes an area wide storm water system to improve water quality, streetscape, and mobility improvements.

Prior to the January 2012 project kick-off meeting, every property owner within the project area was contacted, interviews were conducted, and a personal invitation to the January kick-off meeting was extended. Of the fourteen private property owners, twelve owners or their representatives were in attendance. The first critical milestone achieved by this group was agreement on a design concept. This agreement led to preparation of the 20 percent engineered plans and a cost estimate. The engineer's cost estimate garnered more discussion about the design and what the property owners might be willing to finance as their fair share to implement the project. Assessment district best practices from other areas were presented.

Under the provisions of Proposition 218, property assessments may only charge for improvements that confer a special benefit to the property included in the district. This is based on the theory that the general public should not have to pay for the benefits that accrue to the few. The benefit analysis that was employed in the "fair" share calculations addressed the following:

- That an equitable method be used to identify the special benefit received from improvements.
- That all parcels receiving a special benefit, including publicly-owned parcels and utilities, had been identified and included in the district.
- The cost of the improvement had been reasonably apportioned among the benefitted parcels.
- Costs attributed to general benefits to the public at large (federally-owned parcels) were not paid from special assessments.

The amount of impervious surface on each parcel contributes storm water runoff to the area-wide BMP. With this in mind, owner costs were based on the amount of impervious land coverage existing and future potential for each parcel. Streetscape costs were calculated separately from the water quality improvements. The following four steps summarize the assumptions made in calculating the individual property owner water quality assessments:

1. Perform calculations for existing and build out scenarios for impervious land coverage for all private parcels and for the public's right of-way and parcels. This step provided a private/public ratio to be used in determining the private versus public share. Potential land coverage or built out scenarios were considered for two reasons: to assure the facilities built would have capacity to support runoff under future development conditions, and to ensure the private property owners who had undeveloped or underdeveloped parcels would be assessed appropriately for future BMP needs. Impervious land coverage outside of the public right of way and parcels (for which a land survey was completed) was determined based upon Google Earth images.

2. Based on the engineer's estimate at the 50 percent design level, an impervious land coverage analysis was prepared that first identified the coverage ratio for public/private ownership.
3. There were three parcels within the project area that had already installed BMPs and the property owners did not feel they would gain a benefit from the water quality portion of the project. With a BMP certificate of completion from TRPA these three properties were excluded from the assessment calculations. With the above considerations, the private fair share per square foot of existing and potential land coverage was estimated.
4. A maximum of 50 percent land coverage was used in the individual private parcel calculations for undeveloped or underdeveloped parcels.

Streetscape improvement cost apportionments were similarly assigned. Although the improvements benefit the commercial properties directly in terms of enhancing their attractiveness and accessibility for customers, the Harrison Avenue improvements also create a general benefit to the City, its citizens, and visitors to the City by improving the attractiveness of the US Highway 50 corridor where it meets the lake front and providing on-street parking that will be used by visitors to the lake as well as to the commercial businesses. In reviewing the cost of the improvements in relation to the commercial value of the properties and the potential increase in business from the more attractive environment created by the improvements, it was determined that the special benefit conferred upon the property owners would not be more than half of the total cost of streetscape improvements in the area.

Most of the streetscape improvements are located on Harrison Avenue; however the project also included new alignments to incorporate diagonal parking, sidewalks and lighting on the side streets. The benefit assessment was calculated based on the amount of linear feet each parcel had on Harrison Avenue and the linear footage on a side street. It was negotiated that the benefit associated with the side streets was 25 percent that of the benefit gained from being on Harrison Avenue. As discussed above, the City deferred the assessments for residential and undeveloped parcels until such time as they develop into commercial uses.

The City agreed to a deferral of all assessments for undeveloped and residential parcels (there are two parcels with residences and four undeveloped parcels within the project area) and until which time the parcels are commercially developed. At such time the property owner will be responsible for the full assessment. This negotiated deferral was key to gaining support and passing the ballot vote by property owners which required, based on individual percent of assessment, at least 2/3 approval. Of the total amount assessed per parcel, the ballot vote for approval represented eighty-seven percent of the total assessment.

The successful progression of the Harrison Avenue project relied on the following planning elements:

- The City Council identified the implementation of this project as a high priority.
- An elected official and City administrator attended most of the advisory group meetings.
- Real time feedback, support and decision making allowed negotiations to move along quickly.
- A financial public-private partnership between the City and the property owners was key to moving this project forward.
- The process with the property owners was transparent and inclusive with room to negotiate.
- Public workshops informed the design and highlighted potential implementation issues.

The Harrison Avenue planning successes can be replicated at other locations around the Lake Tahoe Basin. Though each location is unique in its landscape and community character, economic and environmental values are similar. Commercial property owners at Lake Tahoe, in general, want to be seen as good environmental stewards of their property, contribute to their community's sustainability while insuring the viability of their own businesses and livelihood. In the process of building a public – private partnership the City of South Lake Tahoe provided strategic leadership and vision to move the project to construction. Replicating the Harrison Avenue public/private success in other places can happen when the property owners and community members trust their local leaders enough to make the investment in a vision that is shared.

MEYERS AND TAHOE VALLEY AREA PLAN GREENBELT CWP - LESSONS LEARNED

In the commercial core areas around the Lake Tahoe Basin there is a need to provide a concentrated education effort focused on strategies for improving water quality. The efforts have to make it very clear what the potential benefits and values will be to a private property owner when they become a financial participant in an area-wide stormwater project. Educating business and property owners about how implementing BMP's demonstrates good stewardship is not enough. The installation of BMPs on commercial properties cost tens of thousands of dollars if not hundreds of thousands of dollars.

From the planning and regulatory side it is important to demonstrate the value a comprehensive storm water system can bring to a commercial district and the value it can add to individual property owners. For example, a large piece of commercial property may individually cost a half million dollars to adequately BMP, but as a partner in an area-wide system the property owner's contribution assessment could be less than half that cost. In addition, where usable space is a premium, a commercial property owner may find value in not needing to remove parking spaces to install individual detention basins on site. In particular, when we are talking about commercial properties, systems that consider the integration of aesthetic enhancements, recreation benefits, parking and circulation improvements have a better chance of gaining investment (financially and politically) by commercial property owners.

On the other hand, for single family residences it is relatively less expensive to install BMPs. To ask the owner of a single family residence to pay more than a couple of thousand dollars into an assessment district in exchange for eliminating the requirement to install and maintain BMPs on the parcel will likely be challenging. An additional option for the Tahoe RCD and its stormwater partners is to explore an annual stormwater fee that would be relative to the average cost homeowners would pay to install BMPs, but spread out over a 40-50 year time frame. If implemented jurisdiction wide, stormwater managers would have a consistent annual budget to commit to infrastructure maintenance and BMP replacement; providing a long-term and reliable community-based restoration approach.

In both cases however, either a neighborhood benefit assessment or a jurisdiction-wide assessment, approximately 30 percent of individual private property owners on the California side of the Lake Tahoe Basin have already complied with TRPA's ordinance and installed BMPs. Although maintenance is an ongoing burden, these property owners would be less likely to volunteer to be financial partners in area-wide storm water projects.



Meyers Study Area – Looking West on US Highway 50 Across from Lira’s Market (Source: Coleen Shade)

The Meyers and Tahoe Valley Greenbelt CWP projects had two very different outcomes. Both community locations were working through the process of adopting an Area Plan within their separate jurisdictions (El Dorado County and the City of South Lake Tahoe). Both CWP Study Areas concentrated on the commercial core properties and both projects anticipated area-wide stormwater solutions to benefit both public and privately owned parcels. U.S. Highway 50 runs down the middle of both study areas creating safety and connectivity constraints. Approximately 50% of the developed commercial properties have installed BMPs.

Though the similarities are numerous, the two CWP projects can be differentiated by just a couple of dissimilarities which can be attributed to politics/ leadership and education. The Meyers Area Plan update process was in its second year when Tahoe RCD embarked on the CWP for the Meyers core area. The Area Plan process had created mistrust in the community for both the process and the agencies involved. The process did not include opportunities to inform the Area Plan participants with visual examples of development scenarios the plan was contemplating. This approach left room for individual interpretation for what the implementation of the plan might look like; not all accurate or factual. Neither the County’s Planning Director nor someone with experience in the preparation of Community Plans representing TRPA was engaged in the process. Planning staff assigned worked diligently to draft language that would be acceptable only to have it misrepresented by opposing views. Several meetings were facilitated by the County Supervisor for the Meyers area (District 5), which made the process more political than it needed to be. And, 2014 was an election year for the District 5 Supervisors seat.

In contrast, the City of South Lake Tahoe initiated its Tahoe Valley Area Plan process with a recap of where the process had been (the City had started the planning process in 2005) and asked participants to identify visual preferences based on examples of different types of development. In addition to planning staff, the City was represented at these meetings by the City Manager, Community Development Director and the Planning Director. At each subsequent meeting City staff made it clear both in the plan’s language and visual examples what changes had been made because of the feedback that was received. Participants gained investment in the plan and were excited about plan elements

such as the Greenbelt. The City's process nurtured trust and did not become political. Participants were educated along the way.

When individual interviews were conducted with the Meyers commercial property owners to explore their interest in an area-wide stormwater system, a common response heard was the mistrust for the County to do "right" by the property owners. When individual interviews were conducted with the Tahoe Valley Greenbelt property owners they were already excited about the Greenbelt element because of the City's Area Plan process. It should be added that at the time when the first Tahoe Valley Greenbelt interviews were being conducted (late summer 2014) the City was building the Harrison Avenue commercial district project.

Area-wide stormwater systems for the Lake Tahoe Basin's CICU development areas have been shown through modeling to provide the biggest bang for the buck. For the least amount of dollars per credit with the most pollutant load reduction it seems clear this is a tool local jurisdictions can use to achieve TMDL targets. However, there is significant work that needs to be accomplished up-front in order to establish the public/private partnerships that can be sustained through design development, the financial negotiations of an assessment district and implementation of the area-wide project.

RECOMMENDATIONS

One of the perceived benefits to working with the Meyers community is there was an established planning group (Meyers Community Advisory Council) working toward the adoption of the Meyers Community Area Plan. Like with any project however, timing is critical. Although the Tahoe RCD was successful at getting the area-wide stormwater treatment concept included in the Area Plan project list; there can be drawbacks to introducing another element, particularly an implementation element, if there are ongoing concerns from the community about the plan as a whole.

In order to continue our efforts in Meyers, the Tahoe RCD will stay connected to the community by providing continued Landscape Conservation education and technical services where possible. Tahoe RCD is also in the process of partnering with El Dorado County and the Lake Tahoe Environmental Magnet School to develop a rainwater harvest system that will serve as an innovative demonstration project to help highlight community stormwater projects and water conservation initiatives. Additionally, the Tahoe RCD is currently identifying grant opportunities that would assist with planning and implementing meadow restoration along Meyers Creek that would provide benefits to recreation, wildlife, water quality and aesthetics. By taking a leadership role in supporting conservation issues within the Meyers community, the Tahoe RCD and partner agencies can gain the trust of the community to ensure synergy with future collaborative endeavors.

Recommendations for Future Area Plan Collaboration

- Participants in the planning and design stages should be identified and engaged as early as possible in the process. Participants need to include: decision makers, property owners, and agencies with jurisdiction. Others to consider early in the process are utility providers, Caltrans, and potential funding agencies.
- If a financial partnership between public and private entities is a goal, the establishment of what the decision space will be (consensus, vote, public entity makes decision, etc.) is critical.
- Include an expert on assessment districts on the team who will clearly articulate financial requirements and opportunities under the law.
- Transparency is a critical piece to building trust and moving a process forward that depends on buy-in from property owners.

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