Appendix B-8

LAKE TAHOE RESTORATION PROJECTS
ESTIMATED DIRECT COSTS & KEY MILESTONE DATES

Project Name: Integrated BMP Modeling Agency: U.S. Geological Survey (Sponsor)
Prepared by: Dave Roberts Phone: 530-542-5469 EIP #: 10109-11n
SNPLMA Project #:_____

Identify estimated costs of eligible reimbursement expenses:

1. **Planning, Environmental Assessment and Research Costs** (specialist surveys, reports, monitoring, data collection, analysis, NEPA, etc.)	$ none anticipated	_____	%
2. **Direct Labor (Payroll) to Perform the Project**	$ $15,000	_____	%
3. **Project Equipment** (tools, software, specialized equipment, etc.)	$ none anticipated	_____	%
4. **Travel** (including per diem where official travel status required to carry out project, such as serve as COR, experts to review reports, etc.)	$ 20,000 [a]	_____	%
5. **Official Vehicle Use** (pro rata cost for use of Official Vehicles when required to carry out project)	$ 440,000	_____	%
6. **Cost of Contracts, Grants and/or Agreements to Perform the Project**	$ none anticipated	_____	%
7. **Other Direct Costs** (direct labor for agency personnel to do project procurements; COR; PI; personnel assigned as NEPA lead; personnel assigned to review contracted surveys, designs/drawings, reports, etc.; project manager and/or project supervisor; and contracted costs for project manager and/or project supervisor if contracted separately	$ $25,000 [b]	_____	%
TOTAL*:	$ 470,000 [c]	_____	%

Estimated Key Milestone Dates: **<u>Refer to Project Duration by Task Chart on Following Page</u>**

Milestones/Deliverables:	Date:
Project Start Date: *can start at any time*	
Complete BMP Inventory data collection	+ 3 months
Adaptation of BMP model for Tahoe needs	+ 6 months
Create GIS-based inventory system	+ 6 months
Update of BMP effectiveness data for model calibration	+ 9 months
Complete calculations of area treated by landed	+ 10 months
Integration of BMP module with Tahoe watershed model	+ 12 months
Initiate model runs based on management scenarios	+ 14 months
Provide fully documented model with user interface	+ 16 months

Conduct training workshops on model application	+ 20 months
Final Completion Date: *20 months from notice to proceed*	

COMMENTS:
Because of the level of technical expertise needed to conduct this project, a contractor will be required for the majority of this project. However, a project manager will be needed to oversee project and facilitate interactions with stakeholders and the BMP Inventory will require some in-basin agency work.
[a] Site visits by contractor, coordination, training series
[b] Agency over site and project management
[c] Includes all direct and indirect costs, i.e. final dollar request

Tasks refer to those presented on page one and two of the proposal narrative.

SCIENCE, RESEARCH & MONITORING
TAHOE PROJECT PROPOSAL

Project Name: Integrated BMP Modeling: Application to Tahoe TMDL **EIP #** 10109-10111
Lead Agency: U.S. Geologic Survey
(requested by LRWQCB/NDEP – TMDL)
Threshold: Water Quality
Threshold Standard: WQ-2A,B; WQ-4; WQ-5,

Contact: Dave Roberts
Phone Number: 530-542-5469
Email Address: Droberts@rs6s.swrcb.ca.gov

Total Project Cost: $500,000
Round 6 Funding requested: $345,000
Is this a multi-year project? Yes

Project Description (Include a specific list of tasks and subtasks to be accomplished that will facilitate Basin agencies in writing a detailed scope of work):

The primary deliverable of this project will be the customization of a basin-scale BMP model/module with subsequent incorporation into the LSPC watershed, land-use based, pollutant loading model (Load Simulation Program in C++) that is currently being used in the Lake Tahoe TMDL. This is necessary for effective water quality planning, determination of BMP priorities, evaluating progress towards meeting the TMDL and, providing a quantitative and science-based focus to the Environmental Improvement Plan (EIP). As stated, the objective of this proposal is not to create a new BMP model, but rather to adapt an existing model for use at Lake Tahoe.

LSPC is one of the watershed models currently in the US EPA TMDL Toolbox – a collection of models, modeling tools, and databases that have been used over the past decade in the development of many TMDLs (Wool 2004). It is a watershed modeling system that includes streamlined Hydrologic Simulation Program Fortran (HSPF) algorithms for simulating hydrology, sediment, and general water quality pollutants on land as well a simplified stream transport model. LSPC is designed to handle large-scale watershed applications such as the Tahoe basin and the system is tailored for source representation and TMDL calculation. Of importance for this proposal is that LSPC has a highly adaptable design and programming architecture that allows for future modular additions and/or improvements (Tetra Tech 2002). The integration of BMP models and watershed load simulation models is at the forefront of a national effort to develop quantitative stormwater management decision support systems. Such a system, needed in the Tahoe basin, is the focus of this proposal.

The Environmental Improvement Plan (EIP) has enabled expenditures of over $104 million on water quality projects in the Lake Tahoe Basin since 1998 (USFS Erosion Control Grant Program Tracking, July 2004). Due to the collaborative nature of the EIP and the multiple agencies active in the Basin, the real assets constructed (structural BMPs) have not been tracked in one

central information repository. This crucial information is spread between funding agencies, project implementers and the TRPA. This proposal also outlines a method to collect all relevant information and organize it into a highly accessible format. This information will be used to track the implementation rate for the EIP, to answer questions regarding BMP effectiveness on a Basin wide scale, to provide data for an environmental indicator on the percent of runoff treated by BMPs (by specific land use, and as a guide to maintenance needs.

Specific tasks include:

1. Critical review of existing watershed-scale BMP models.
    a. Build upon existing and ongoing watershed and BMP modeling reviews performed for the USEPA (ISMDSF Task 2 Report, 2004; Bowie, 1985)
    b. Perform additional literature review with an emphasis on cold weather hydrology and BMPs.
2. Adaptation of the BMP module for specific management needs at Lake Tahoe.
    a. Add specialized features for cold weather BMPs
    b. Add new techniques/practices suitable for fine sediment/nutrient control
3. Complete/update a very preliminary BMP GIS layer to geographically locate and identify treatment areas
4. Integration of the BMP module with Lake Tahoe Watershed Model.
    a. Perform GIS data summarization within proposed BMP treatment areas (i.e. land use, flow path delineation, identify proposed BMP sites)
    b. Link modeled runoff and pollutant time series by land use and hydrologic attributes specific for each proposed treatment area.
5. Update existing database on BMP effectiveness at Lake Tahoe for use in model calibration. Consider alternative techniques for representation of BMPs, functional relationships, seasonal or climate associated factors, or use of explicit modeling functions in the BMP module.
6. Use existing monitoring data on channelized and unchannelized runoff (i.e. streams and urban overland flow) for model validation at site-level BMP areas.
7. Perform a watershed level or smaller scale management scenario
    a. Use linked modeling system
    b. Examine the optimal “suite” of BMPs and land management techniques for the selected watershed
    c. Evaluate the management benefits for several scenarios
    d. Identify any needed refinements before basin wide application
8. Examine management scenarios
    a. Identify key management options/scenarios to be consider (check TRPA, other stakeholders) – could include meeting/forum

   b. Use linked modeling system to test management scenarios based on stakeholder input.
9. Incorporate BMP cost information with proposed management scenarios to develop trade-off curves for each proposed development project.
   a. Develop cost basis – local information where possible
   b. Evaluate trade-off for selected scenarios
10. Develop user interface for small scale/site scale evaluation
   a. Building on the linked modeling system develop simplified system for alternatives analysis or smaller scale evaluation of scenarios.
   b. Modifications might include new data setup or entry screen or other stand-alone packages.
11. Provide fully documented model
   a. User files
   b. Documentation
12. Conduct a series of workshops on model application. Provide user workshops with hands on application, example studies, and discussion of data input needs and output evaluation.
13. Develop a GIS-base BMP inventory including area treated and/or percent runoff treated.

For Science & Research Projects briefly summarize the current state of knowledge of this subject matter:

It is widely acknowledged among water quality scientists and technical practioners that BMPs are often not the "*best*" approach for pollutant treatment. Most often constraints such as land availability, cost, permit requirements, etc. have more to do with BMP selection than does absolute treatment effectiveness. With the planned expenditure of approximately $1 billion dollars in the Tahoe basin for environmental restoration there must be a clearly defined, scientifically based approach of accounting for such a basin-wide implementation plan.

In the Lake Tahoe Watershed Assessment, Reuter and Miller (2000) clearly stated that the lack of comprehensive and unambiguous data on BMP implementation presented a barrier to a clear understanding of their effectiveness. They also reported that levels of funding for BMP research and monitoring were inadequate to meet the demands of adaptive management. This stark evaluation helped spawn a series of more comprehensive investigations.

In 2000, Reuter et al. (2001), for the first time, assembled a database of individual projects, detailing the results of previous BMP effectiveness monitoring at Lake Tahoe. Furthermore, that study provided a database for pollutant concentration in stormwater runoff demonstrating that nutrients and sediment levels in general increased as follows:

highway>commercial>residential> undisturbed. A similar, albeit less detailed, summary was also provided by HydroScience (2000). In a related study, Dogrul et al. (2001) first used the US EPA's SWMM model (Storm Water Management Model) to simulate flow and sediment yield in the Carnelian Bay intervening zone under varying degrees of urbanization.

Since then, BMPs and their effectiveness have received significantly more attention in the Tahoe basin (e.g. Bachand and Heyvaert (2004); Caltrans (2003a,b); CTC (2002); Heyvaert and Reuter (2002); Heyvaert et al. (2004); Strecker and Howell (2003); Prudic and Wood (2002); Swanson Hydrology and Geomorphology (2003)). Most recently, Strecker and Howell (2004) submitted a study on stormwater BMP evaluations in the Tahoe basin as part of the TMDL Program. This study was unique in that it approached BMP effectiveness from a basin-wide perspective, using SWMM to evaluate the potential overall load reduction that could be achieved if all runoff from the intervening areas (areas which directly drain to the lake, i.e. not contained in the Basin's 63 tributaries) was treated to a defined effluent concentration.

Currently there are several databases that are tracking EIP water quality progress, but they are primarily focused on either project status or financing. These two quantities are important for creating and maintaining a program (like the EIP) but do not provide the level of data needed for water quality models and to assess the basin-wide effectiveness of load reduction. provide answers to questions about implementation or effectiveness. A project similar to the WQ BMP Inventory was recently undertaken by the CTC. Their staff created a GIS layer that shows all water quality basins located on the California shore of Lake Tahoe. The basins are clickable to display a photo and updated information about size, and condition. This project is a model for the Inventory and shows how effectively modern information systems can assist resource managers.

The BMP inventory task is a product that is needed to centralize information on BMPs both for the purpose of inclusion into the BMP model and as an indicator of EIP accomplishment. Much of the data currently exists, albeit spread out among many organizations and in many forms (hard copy, electronic, project reports, etc.). This project will collate this information and provide it in a user friendly form for eventual placement on the TIIMS network.

Note: Hundreds of technical research and monitoring reports/journal papers have been published nationally. No attempt was made to review these here do to space limitations and the importance of review relevant Lake Tahoe-related studies.

Describe the purpose and need for the project: (Describe how this project will guide future management activities**.** This description should include a quantitative estimate of the anticipated gain in management information and describe how the research and/or monitoring project may inform

the development and understanding of additional Key Management Questions (one page recommended)**:**

The Lake Tahoe Total Daily Maximum Load program (TMDL) has become the foundation for a basin-wide water quality management system. The TMDL process has been divided into two interrelated phases:

Phase 1 (largely funded by California, Nevada, and the US Army Corps of Engineers (US COE); with technical assistance from a number of agencies active in the Tahoe basin, includes determination of current loading and determination of basin-wide load reduction needs to achieve the Basin's water quality standards for clarity. Development of a land-based loading model and a lake response model are key management tools that have been developed to date. A Technical TMDL report is scheduled for publication during the Spring of 2005.

Phase 2 (funded to date by the US EPA Targeted Watershed Program and SNPLMA Round 5) is currently under development to identify load reduction possibilities, allocate pollutant load reduction opportunities, and set forth an implementation plan. Phase 2 is unlike any previous water quality management plan for the Tahoe basin in that its primary focus centers on a basin-wide evaluation of Best Management Practices (BMPs) for load reduction. Prior to this time, attention has primarily been directed towards the effectiveness of individual BMPs. The format of the TMDL necessitates a new, basin-wide approach.

As an eventual part of the TMDL, the BMP-watershed model (LSPC) will be a factor in most water quality management decisions ranging from the State's basin Plans, the 208 Water Quality, future Regional Plans, water quality permitting, will give guidance to the EIP. Equally important is the issue of receiving credit of EIP implementation. Decision-makers at all levels will want to know that the considerable federal, state local funding of the EIP is being done in a responsible manner – this includes the SNPLMA contribution. The Basin is significantly beyond a time when EIP success can be evaluated on the basis of number of projects completed or amount of money spent on projects. Science-based, engineering tools must be available to help to assist in executing the EIP. The proposed BMP-watershed model is such a tool. The ability to place proposed BMPs on a GIS map, simulate their likely effectiveness, and calculate a quantitative load reduction (for application with the requirements of the TMDL) will be a major step in water quality management and planning and is particularly well adapted to adaptive management.

The Key Management Questions (KMQ) for lake clarity, air quality and water quality at Lake Tahoe were divided into two general categories. The first focuses on sources, transport and fate of nutrients and fine sediment. An extensive evaluation was started with funding provided by California, Nevada and the US COE (TMDL Phase 1). Last year SNPLMA Round 5 helped fund additional projects. The second KMQ appropriately addresses the issue of

BMPs and what methods are available for reducing pollutant loading to the Lake. This BMP modeling proposal will specifically address KMQ sub-questions: 1.2.10 - What is the feasibility that the pollutant reduction goals determined by the TMDL process can be achieved?; 1.2.11 – What level of BMP implementation is needed to affect a change in water quality?; and 1.2.12 – How do we effectively prioritize BMP and restoration projects? All other BMP-related KMQ sub-questions are related to the BMP model.

The WQ BMP Inventory will guide management activities by unlocking basic information that is currently stored in unusable formats. The Inventory database will provide the information to determine what percentage of a watershed has been "treated" by water quality or source control projects. At the most basic level, the database will allow funders to track which implementers are most efficiently converting money to treatment. The information gained through the WQ Inventory will provide a major upgrade in useable management information. This paragraph provides an unscientific, quantitative estimate of the management information that the Inventory will provide through a theoretical example. New key management questions are very likely to come from analysis of the WQ BMP Inventory database. Since cost information will be part of the database, managers will be able to determine which BMPs are most cost effective. The cost effectiveness information could be combined with pollutant removal efficiencies to form a design prioritization method for selecting BMPs in future EIP projects. The total quantity of each BMP implemented in the Tahoe Basin will also be available. Managers would also be likely to focus future KMQs on BMPs that are most often utilized.

Describe the goals and objective of the project (Describe Key Management Questions being addressed--Recommended 2-3 pages):

1.Objectives: List the objectives of the proposed research being tested during the project, and briefly state why the intended research is important.

The primary objective of this work is to quantify the effectiveness of the EIP program for lake water clarity restoration at a basin-wide scale. Simulation modeling, informed by field data on individual BMP effectiveness is the most effective way to conduct water quality planning at the watershed scale. This is needed to evaluate pollutant load reduction, vis-à-vis, TMDL requirements to meet water quality standards. This type of quantitative modeling approach has never been attempted for the Tahoe basin and will now dovetail well into other modeling tools being developed as part of the TMDL.

As discussed above, Phase 2 of the TMDL addresses the fundamental

question of "how do we achieve the required load reduction to restore clarity?" Without a clear focus, the EIP risks being a simple list of implementation projects with no quantitative linkage to desired future conditions or a logical roadmap for getting there. Arguably, the question posed above is one of the most important facing the Tahoe basin today. While assessing individual BMP effectiveness is, and should be continued by project implementers, long-ranging planning must be done on the basis of the entire 800 km^2 watershed. This is a very large and complicated area and a BMP model is required to simulate the various land-use/restoration options that stakeholders will face.

The TMDL program is currently developing a Tahoe TMDL Tool Box that will include models and other tools that can be used by agencies, resource managers, planners and EIP project implementers to help achieve TMDL load reduction goals. The BMP model will be an important element of this Tool Box.

The BMP model will act in concert with two other tools that the TMDL is currently developing. The first, a Load Reduction Matrix is intended to specify a wide range of BMPs for each of major pollutant sources (i.e. stormwater, channelized flow (stream and shoreline erosion), groundwater, atmospheric deposition, etc.). The matrix will include current BMPs, techniques for enhancing current BMPs (e.g. chemical treatment) and new, more technologically advanced BMPs (e.g. engineered stormwater treatment facilities, electrocoagulation, etc.). The matrix will include effectiveness data for individual BMPs that can be updated as new data is available following an adaptive management approach. The matrix will also include an identification of opportunities in the Basin for implementation. This work is currently funded. The second of the three interacting tools is a methodology to estimate pollutant load reductions. This is also currently funded and is developing a quantitative approach to assigning a pollutant load reduction credit to EIP projects that typically contain many different types of individual BMPs. This is an important tool to link EIP proposals with TMDL load reduction requirements. Lastly, the BMP model links there other tools with basin hydrology and land-use characteristics to quantify load reduction at the watershed and basin scales. In concert, they provide the basis for a very powerful planning-management approach.

2.Approach: Outline the research design, methods, and techniques that you intend to use in meeting the objectives stated above.

This is not a hypothesis-driven research project. Rather, it is intended to develop sound, quantitative tools that can be applied to management questions. A detailed description of a recently developed BMP model is presented below. This and other possible models will be evaluated in Task 1. The narrative below focuses

on one such model, it is intended to provide an example of the technical aspects and current thinking on the functionality of BMP modeling.

To assist stormwater management professionals in planning for BMP implementation, the US EPA funded development of a modular BMP assessment system. This was done with sponsorship from EPA Region 3 and Prince George's County in Maryland. This module uses process-based algorithms to simulate BMP control of modeled flow and water quality time series generated from runoff simulating watershed models like HSPF, LSPC, or SWMM. These algorithms include standard engineering methods for weir and orifice control structures, storm swale characteristics, flow and pollutant transport, flow routing and networking, infiltration and saturation, evapotranspiration, and a general loss/decay representation for a pollutant (Linsley 1992; Maidment 1993). It offers the user the flexibility to design retention style or open-channel BMPs, define flow routing through a BMP or BMP network, simulate IMPs such as reduced or discontinued imperviousness through flow networking, and compare BMP controls against some defined benchmark such as a simulated pre-development condition. Since the underlying algorithms are based on time-variable physical process simulation, BMP effectiveness can be evaluated and estimated over a wide range of storm conditions, BMP designs, and flow routing configurations (Prince George's County 2003). It has been tested and validated to both field and laboratory bioretention BMPs, and is currently being applied for BMP evaluation in a proposed BMP retrofit site in Washington, D.C. Such a tool provides a quantitative medium for assessing and designing TMDL allocation scenarios and evaluating the effectiveness of a proposed management approach. There is a need to further expand the testing and application of the system to a national level, and to investigate its application to cold-weather conditions and BMPs.

In a related project, the U.S. Environmental Protection Agency (USEPA) Office of Research and Development in Edison, NJ, has funded the development of a decision support system for selection and placement of BMP/LID at strategic locations in urban watersheds (Lai 2003). The BMP/LID assessment tools, based on sound science and engineering, helps develop, evaluate, select, and place BMP/LID options based on cost and effectiveness (Riverson 2004). The system is called the Integrated Stormwater Management Decision Support Framework (ISMDSF).

The major components of BMP assessment system include (1) a GIS interface that integrates data management, simulation models, optimization algorithms, and a model post-processor, (2) a watershed simulation model that generates flow and water quality time series data, or the ability to link to existing watershed model hydrology and loading time series results for routing to the BMP model at given locations in the watershed, (3) a process-based BMP simulation component that produces tangible assessment

outputs; and (4) an optimization tool for BMP selection and placement based on pre-selected potential sites and feasible BMP types.

The BMP assessment system provides a means for objective analysis of management alternatives among multiple interacting and competing factors. The expected outcome from application of the system is a thorough, practical, and informative assessment considering the significant factors in urban watersheds. The BMP module is currently being applied to an existing urban watershed with proposed BMP/LID retrofits to evaluate its predictive optimization ability. The initial phase of this research is expected to be completed in early 2005, with additional enhancements and site-specific applications planned. The Lake Tahoe watershed presents a unique setting, in terms of topography and climate, to apply the BMP assessment framework. Furthermore, the existence of a watershed loading model and detailed storm water monitoring data advances the progress and successful application of the system.

The Water Quality Inventory's goal is to convert existing information that is distributed among many agencies and in many formats, into a modern information structure that can be used as a tool by resource managers to make the best decisions about future water quality projects. The objectives include:

1. Collect Data- This work is important because the data is currently spread out over roughly 10 agencies and contained in files that are often three inches thick. It would be time-prohibitive for resource managers to attempt to answer questions about particular projects if they needed to search through this much information.
2. Create GIS Layer- This tool would show polygons that would signify WQ project areas and also show representations of major BMPs used in the projects. This map will be linked to database tables that will display information about each project and the BMPs used.
3. Create MS Access Database Tables- These two tables would provide the storage for the Inventory's data. The first table would contain information about WQ projects and the second table would contain data about BMPs used in the projects.

   Project Table 1- This table would contain information about individual WQ projects. Fields for this table would include:

Project ID#	Name
Data Source	State Funder Proj. #
EIP #	State Funder Proj.
EIP Name	Name
Implementer	Design Consultant
Implementer Proj. #	Construction
Implementer Proj.	Contractor

Federal Funder
Federal Amount
State Funder
State Amount
Local Funder
Local Amount
Monitoring Plan

BMP Table 2 - This table will contain information about the individual BMPs that have been installed in the basin. The fields stored in this table will include:

- BMP ID
- Associated Project
- Name
- Type
- Quantity
- Units
- Maintenance Plan

4. Analyze Data- Produce the queries that will provide analysis of the data. These queries will be aimed at determining how much of each BMP has been installed, when the BMPs were installed, how much BMPs cost, % watershed area treated, % flow treated and additional maintenance/monitoring information.
5. Produce Final Report- This report will contain easy to follow visual summaries of the analysis, narrative interpretations of the data, and recommendations to funders for implementer requirements that would keep the database current.
6. Locate Inventory On-Line- Find a suitable location to store the database on-line so that it can be updated by implementers of future projects and utilized by resource managers. The current intention is to place the Inventory on www.tiims.org.

3. Identify the Key Management Questions being addressed and/or how the project may inform the development and understanding of additional Key Management Questions.

Relation of this proposal to current KMQ's was discussed in the "Purpose" section above. The existing KMQ's for pollutant load reduction are broad in many cases, e.g. What is the feasibility that the pollutant reduction goals determined by the TMDL process can be achieved? When the KMQ's were first drafted, this was the level of our understanding. We have progressed over time and projects such as the BMP model will allow us to more clearly define the knowledge gaps behind this question.

Describe the anticipated project accomplishments (provide a qualitative description of how the results of each task will reduce the uncertainty of predicting the behavior of the environmental processes being studied and may lead to solutions to environmental problems (one page recommended) to improve the agencies' abilities to protect the environment and achieve the management objectives.):

This has largely been addressed in the narrative response to the previous questions. However; bulleted summary may be useful:

- The BMP model will directly be used in the Tahoe TMDL and future water quality plan updates.
- In concert with the Load Reduction Matrix and the Methodology for Estimating Load Reduction, the model provides agencies with a quantitative tool to help implement the EIP. As it stands, the expected outcome of the EIP projects, taken collectively, is very

uncertain. The BMP model will significantly reduce the current uncertainty.

- Provides a basis for assigning credit for restoration projects within a TMDL framework (i.e. progress towards meeting assigned load reduction allocations)
- This project will be integrated into the Tahoe Integrated Information Management System (TIIMS) and, as a result will provide a platform for tracking EIP effectiveness and TMDL goals.
- The BMP model will be a key feature in the Tahoe TMDL Tool Box and will be available for agency and implementer use.
- Nationally, the integration of pollutant delivery models and BMP models within a management framework are at the forefront of applied watershed science. This effort will also be transferable to watersheds outside of the Tahoe basin.
- Provide a working tool to inventory BMPs on a basin-wide scale.

Describe the "readiness" of this project to move forward (environmental documentation, etc.; for projects that are a continuation of previous projects, provide a quantitative measure of the actual gain in management information (one to two paragraphs recommended):

Watershed-based BMP models currently exist and are available for (1) adaptation/use for Lake Tahoe and (2) incorporation into the TMDL watershed model - LSPC. The LSPC watershed model for Tahoe Lake is complete. Representatives from agencies, including but not limited to the TRPA, USFS, CTC, NDEP, Lahontan and NTCD have participated as members of the TMDL Development Team for nearly 18 months and have reviewed the LSPC model at it being applied to Lake Tahoe. Progress on the BMP model could start immediately. Work on the BMP can also start immediate, and in fact some preliminary work is currently being done because of the need for this product.

Describe potential partnerships for this project and include supporting documentation.

Given the importance of this project to developing a basin-wide water quality management system, there will be numerous partnerships on many levels. First, the regulatory authorities (TRPA, Lahontan RWQCB and Nevada DEP) will be key partners through the TMDL/Regional Plan process. Second, there will be a significant scientific partnership with the universities, federal and state scientists, and consulting scientists. Third, those local entities that are directly charged with implementing projects under the EIP will be part of this work. Fourth, groups including the CTC, Nevada State Lands and the USFS who manage restoration funds and who direct projects will be critical partners.

Regarding the BMP Inventory three key partnerships already exist for this project. The strongest is between NTCD and the Lahontan Regional Water Board. Lahontan has provided significant in-kind labor for the initial development of the database and will use the completed product as part of its TMDL effort. More recently, NDEP has also dedicated

in-kind labor to collect data from NDOT. Most recently, the USGS has been contacted, and has agreed to work as a GIS advisor.

Describe how this project will guide future management activities:
The answer to this question has been presented throughout narrative above.

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A map with the project location was not included since this project covers the entire drainage area.