**SCOPE OF WORK – WORK PLAN**

**Phase 1**

**SWEENEY LAKE TMDL PROJECT**

February 20, 2007

## APPLICANT INFORMATION

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| *Name of Organization:* | Bassett Creek Watershed Management Commission | |
| *Type of Organization*: | Watershed Management Organization | |
| *Project Lead*: | Len Kremer, PE | |
| *Contact Information:* | Watershed Engineer<br>Bassett Creek WMC | |
| *Project Consultant:* | Ron Leaf, PE<br>Project Manager<br>SEH | Bernard Lenz, PE<br>Project Technical Lead<br>SEH |
| *Cooperating Partner:* | City of Golden Valley, Minnesota<br>Jeannine Clancy<br>Public Works Director | |
| *Project Partner/Sponsor*: | Minnesota Pollution Control Agency | |
| *Project Manager:* | Tim Larson | |

## PROJECT INFORMATION

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| *Project Title*: | Sweeney Lake Excess Nutrients TMDL Study |
| *Impaired Waterbody*: | Sweeney Lake |
| *DNR Lake ID#:* | 27-0035-01 |
| *Impairment:* | Excess nutrients (swimming) |
| *Affected Use:* | Aquatic Recreation |
| *Target Start Date*: | 2006 |
| *Target Completion Date:* | 2007 |
| *Project Dates:* | February 1, 2007 to April 1, 2008 |

## PROJECT SUMMARY

**The objectives and tasks outlined in this work plan represent the components of Phase 1 of the Sweeney Lake TMDL project. Efforts are described relative to the contract executed in March 2007. The remaining portions of work excluded from Phase 1 and not specifically described or assigned task efforts herein will be completed in Phase 2 and will be contracted for separately.**

Sweeney Lake was a 2004 "new" listing in the Final EPA-Approved MPCA 2004 CWA 303(d) List of Impaired Waters (2004 303d List). Sweeney Lake was listed for excess nutrients with a target start and completion schedule of 2009/2012 according to the 2004 303d List. The City of Golden Valley is interested in accelerating the schedule for the TMDL to be positioned to begin improvement efforts and activities prior to the 2004 list target completion date of 2012. By completing the study now, the City also gains the ability to incorporate implementation projects and activities into other public works projects within the watershed. Sweeney Lake is currently listed on the 2006 303(d) list, where the target start and completion dates are 2006/2007. The outcome of the project will be to develop a TMDL for Sweeney Lake in cooperation with the Bassett Creek Water Management Commission.

## PROJECT BACKGROUND

Sweeney Lake is a 67-acre water body within the City of Golden Valley. Sweeney Lake has a contributing drainage area of approximately 2,360 acres that is essentially fully-developed. The watershed boundaries are located primarily in Golden Valley, but also extend to portions of St. Louis Park. Sweeney Lake has been subject to fairly extensive previous study including a Watershed and Lake Management Plan completed for the Bassett Creek Watershed Management Commission (Barr Engineering, 1994) and water quality monitoring dating back to at least 1977.

The City of Golden Valley's annual pavement management program serves to repair and upgrade degraded streets and/or utilities throughout the City. One of the recent efforts was the streets within the Sweeney Lake watershed. Specifically, the City completed a drainage plan improvement effort and extensive public input process for the first segment of street reconstruction projects in the Sweeney Lake watershed. The intent and goal of the drainage study was to identify locations and types of best management practices (BMPs) that could be installed as part of the pavement management program and achieve improvements in water quality treatment in the Sweeney Lake watershed. The second segment is schedule for 2014.

Another important consideration of this study is the recent transportation system improvements by MnDOT along Trunk Highway 100. Recent construction activities along TH100 date back to at least 2001. Because recent water quality data represents watershed conditions during these extensive construction activities, a portion of this study effort will incorporate MnDOT construction activities into the analysis and attempt to quantify/anticipate the longer-term impacts and improvements in Sweeney Lake resulting from the TH100 work. MnDOT has substantial water quality monitoring data for both pre and post construction conditions for areas draining to Sweeney Lake.

## PROBLEM STATEMENT

In 2004, the lake was designated as an "impaired water body" by the Minnesota Pollution Control Agency for phosphorus based upon its water quality history. Previous work by the Bassett Creek WMC described in the *Sweeney Lake Watershed and Lake*

*Management Plan* (Barr, 1994) identified priorities and guidelines for the Cities of St. Louis Park and Golden Valley and residents in these cities for meeting BCWMC water quality goals for Sweeney Lake. Recommendations of the 1994 Plan were established in two phases: Phase 1 included shutting the aeration system down and monitoring lake response along with implementation of several watershed-wide BMPs (i.e., wet detention basins for new and redevelopment projects; phosphorus fertilizer ban; education efforts; and ordinance enforcement). This work plan assumes the aeration system will not be running during data collection phases of the study.

## PROJECT ACTIVITIES AND SCHEDULE

The activities covered in this contract involve completing Phase 1 objectives and tasks for the TMDL for nutrients in Sweeney Lake. The process outlined in this work plan follows the Guidance from MPCA on Lake and Reservoir Nutrient TMDL Submittals. The study will be approached in two Phases. Phase 1 is focused on the following.

1. Beginning Public Involvement Process to inform stakeholders of the study plans, set up mechanisms to keep stakeholders abreast of on-going work, and build creditability early.
2. Beginning monitoring and loading analysis to quantify the most significant source(s) of phosphorus and attribute the portion of the total in-lake phosphorus mass to those sources.
3. Modeling watershed Best Management Implementation scenarios to determine the expected impact on lake loading
4. Beginning response modeling of Sweeney Lake to evaluate the likely impact of changes in loading rates on the in-lake water quality.

Phase 2 will focus on the following.

1. Continuing Public Involvement Process to keep stakeholders abreast of on-going work and results. Seek public input on the implications of various management scenarios.
2. Complete monitoring and loading analysis and quantify the most significant source(s) of phosphorus and attribute the portion of the total in-lake phosphorus mass to those sources.
3. Complete response modeling of Sweeney Lake and evaluate the impact of changes in loading rates on the in-lake water quality.
4. Complete development of the TMDL Implementation and Monitoring plans
5. Prepare final TMDL Report with study results, Implementation plan and Monitoring plan.

### Work Plan Overview

We will first collect and assemble existing historical in-lake monitoring data to estimate the current temporal trend of in–lake phosphorus mass and identify gaps in the existing data. This information and the work plan will be presented at the first public involvement

meeting. Public involvement includes educating the public, and specifically lakeshore residents, on the goals of the work plan and learning from local residents about present sources and concerns over future sources of nutrients in the watershed. Based on this give-and-take approach, minor adjustments to the work plan maybe necessary to establish broad support of the work plan.

A large component of phase one is monitoring of the in-lake water quality parameters, collection of in-lake sampling, monitoring and sample collection of stormwater run-off to estimate external loading and collecting lake sediment core samples and the lab analysis of cores to estimate internal loading based on sediment release rates. These rates and the physical properties of the lake will be used to estimate and evaluate the impacts of nutrient loading to Sweeney Lake. The summer season is chosen for this sampling and analysis because temperature and light become the limiting factor of algae formation during the rest of the year. The sampling plan and data collected in Phase 1 will be used to determine a detailed mass balance budget of the lake and calibrate the lake response model in Phase 2.

One of the critical components of the TMDL will be to compare the internal loading of the lake with the aeration system on and with the system off. The *Sweeney Lake Watershed and Lake Management Plan* (Barr, 1994) completed for the Bassett Creek WMC, previously recommended that aeration system be temporarily shut down from April through October for a period of one to two years and monitored in its natural condition. This work plan also assumes the aeration system will be off during the 2007 growing season and includes an attempt to estimate internal loading (with and without aeration) using sediment release rates and in-lake water quality parameters. Both internal and external loading estimates will be used to establish the quantitative relation of internal loading to all other sources and to allocate overall load reductions as part of the TMDL plan. Specific monitoring parameters to be collected are presented in sub-item 1 below.

The scope of Phase 1 includes one summer season of monitoring (April through October 2007) with the aeration system off and should allow collection of sufficient data to draw conclusions on the effects the aeration system on internal loading to the lake. However, a second year of monitoring may be necessary if the aeration system is determined to have a significant impact and the predicted impacts of the aeration system need to be confirmed with monitoring. Additionally, basing a study on one year of data can be a problem if extreme wet or dry climatic conditions occur, especially the external loading data. A second year of data collection to offset unusual climatic effects that impact the quality of data could be possible. For the purposes of this work plan, it is our assumption that this additional data will be required and it has been included in the Phase 2 timeline. If needed, this additional monitoring would be part of the Phase 2.
In Phase 1, a BATHTUB model will be set-up using the physical attributes of the system and available historical water quality data. In Phase 2 this model will then be calibrated to the monitoring data and used to identify factors controlling algae production in the lake, to assess the effects of changes in loading rates, and to aid in the TMDL planning by predicting trophic conditions consistent with potential water quality objectives.

In Phase 1, an existing P8 model of the watershed will be updated and calibrated using existing MnDOT monitoring data. The P8 model will be used to identify and evaluate the effectiveness of potential BMP practice and the amount potential load reduction that could be expected from various BMP types and locations within the watershed. The lake's response to the expected load reduction determined in the P8 analysis will be evaluated with the calibrated BATHTUB model in Phase 2.

The development of this work plan is an example of the level of coordination needed to involve the many stakeholders and build trust with the TMDL study and process. Public involvement is critical to the successful implementation of a TMDL. When stakeholders have a say in the development of the work plan and are kept informed of the progress of the project, they are more likely to accept the results, leading to wider spread acceptance and implementation. Public Involvement in phase one involves educating the stakeholders, addressing concerns, and coordinating the work between multiple entities. It also includes setting up the mechanisms to keep the stakeholders informed of the progress of the TMDL study and facilitate implementation.

As part of Phase 1 public awareness efforts, all Phase 1 monitoring and modeling results will be presented to the public; educating them on sources of nutrients, process that make those nutrients available to the lake, and expected level of reductions that can be obtained with various Best Management Practices (based on P8 model results). Informing the public on the lakes current condition, and how current conditions fit into the historical perspective will also be included in the Phase 1. Additional public involvement presentations in Phase 2 will present BATHTUB model results showing the change in algae bloom frequency and trophic status that can be expected with various load reductions and management efforts that can be used to establish realistic and obtainable TMDL goals for the basin. The Implementation and Monitoring Plan development will follow, with the culmination of Phase 2 being the final TMDL report.

Semi-Annual summary reports on the project's progress will be provided to the MPCA by February 1st and August 1st first of each year throughout the duration of the project. These reports will include a description of completed or ongoing tasks and preliminary findings, as well as a budget summary detailing the amount of money spent on each task. Water quality data will be submitted to the MPCA in a format which will allow entering into the STORET data base or its replacement.

Several Attachments are included at the end of the work plan that provide more detailed estimates of task efforts, monitoring efforts and related costs including Attachments: A - Sediment Core Sub-consultant work plan; B – Barr/Three River Monitoring Program Summary; and C – Hourly Rates and Expenses.

## TASK LIST

### Objective 1 - Collect / Assemble Existing Data

The project will use existing data available for Sweeney Lake to the extent the data meets the quality standards necessary to complete the TMDL. Water quality data for the lake is currently available from various sources including MPCA, MnDOT and Bassett Creek WMC. Additional watershed characteristic data is available from the City and Bassett Creek. These data will be compiled and a summary memorandum describing the extent of data and any gaps in data will be prepared and provided to the MPCA.

**Objective 2 – Nutrient Loading Analysis**

The TMDL study requires all significant sources of nutrient loading to be evaluated. External loading sources including stormwater run-off, direct overland flow, and groundwater contributions will be monitored and/or estimated. An accurate accounting of internal loading in this TMDL study is important for two reasons: this load has the potential to be the largest contributor of phosphorus to the lake, and the impact of the operation of a private aeration system in the lake has been hotly debated by the lake residents and resources managers. An overall nutrient budget will be developed using both internal and external loading sources. An effort will be made to quantify internal load associated with and without the aeration system operating in developing this nutrient budget.

In addition, in-lake water column monitoring will track the nutrient mass balance change in the lake and allow the limnologist to calculate the change in total mass of phosphorus in the lake. This will be the "balance sheet" to check that all source of phosphorus have been accounted for in the study. If the loading that is calculated in the TMDL study does not match the change in total mass of phosphorus in the lake determined by this additional sampling, it would indicate significant sources of loading coming into the lake were missed and a more accurate accounting of the loading sources is required; while a balanced mass calculations will confirm the significance of the measured loading to Sweeney Lake. The ability to confirm loading factors with a mass balance calculation adds a significant scientific reliability to the overall project.

2. A. In-Lake Data Collection

A multi-parameter probe (HydroLab or comparable instrument) will be used to determine profiles of the dissolved oxygen, temperature, and pH at two locations within the lake, one location in each of the north and south deeper basins. Monitoring will be conducted on a biweekly basis for a period of up to 22 weeks starting in mid-to-late April and ending in September of 2007. (Additional parameters of Conductivity and oxidation reduction potential should be collected if available on the multi-parameter probe.)

Monthly phosphorus samples will be collected and include a top integrated sample, a sample near the lake sediment interface, and multiple samples at discrete intervals in the water column. For this scope we have estimated that 72 samples will be taken (4 each biweekly at each of the two monitoring locations for 22 weeks). Additionally, total chlorophyll and total nitrogen will be analyzed from the top integrated samples. Samples

will be sent to a certified lab for analysis. Care must be taken during sample collection to avoid stirring of sediments on bottom samples and in obtaining the exact interval required; therefore, sampling will be completed by staff experienced in these sampling methods. Water column samples will be used to calculate the total in-lake mass increase of phosphorus. Bottom samples will be used to insure that the sediment interface release is controlling the sediment release rate and not the chemical concentration.

In-Lake water quality data will be submitted to the MPCA in a format which will allow entering into the STORET data base or its replacement.

2. B. Runoff Monitoring

Two continuous stream flow monitoring stations will be set-up to monitor flow rates at the main inflow point on the south end of the lake and at the outlet on the north. Weekly water quality samples and 7 to 10 additional runoff event samples will be collected at the inflow during 2007. Event sample will include 3 to 4 samples collected over the entire hydrograph. Both data sets will be formatted for input into a loading analysis software program (such as FLUX or similar).

The connection between Sweeney Lake and Twin Lake will be visually inspected for flow each time Sweeney Lake is sampled. If flow between the lakes is observed it will be measured and a water sample collected from Twin Lake up to five (5) times.

Runoff water quality data will be submitted to the MPCA in a format which will allow entering into the STORET data base or replacement. All sampling and monitoring locations will be located by GPS coordinates by Three Rivers Park District. Three Rivers will provide SEH with GPS locations for use in reports and figures, electronic version of the continuous flow at both stream gages, a database of water quality results, the results of flow and water quality monitoring between Twin and Sweeney Lakes, and monitoring locations. Data will be provided to SEH in a format that can be immediately entered into STORET.

2. C. Sediment/Core Samples of Lake Sediments for internal loading

Attachment A describes the subcontractors work plan and cost estimate to complete the sediment coring work.

2. D. Phosphorus Loading Analysis

The results of this task will provide the basis for the phosphorus loading budget to Sweeney Lake. The budget components are discussed individually below.

*Internal Loading*

Internal loading is essentially the release of phosphorus from the lake sediment. In the summer, a thermocline develops in most lakes such that the water at the surface of the

lake is much warmer and lighter than the water below, forming a physical barrier separating the two. Sediments and containments carried into a lake as well as algae and zooplankton die and sink to the bottom of the lake. Decomposition of these organisms uses oxygen, resulting in a depletion of oxygen at the bottom of the lake. The thermocline prevents mixing of the warm oxygen rich water resulting in a period of time where anaerobic (without oxygen) chemical reactions occur in the lake sediment interface. These reactions result in larger amounts of phosphorus being released from the sediment than under aerobic (with oxygen) conditions. In some lakes with high internal loading, the concentration of phosphorus in the water below the thermocline can build to a point that the water can not hold any more dissolved phosphorus and the chemical concentration gradient become the controlling factor and overrides the sediment water interface release rates. Based on the Lake Management Plan, determining if this occurs in Sweeney Lake is an important portion of this study. Internal loading without aeration will be calculated based on the measured oxygen level and then applying the appropriate release rates as determine from the sediment core analysis (objective 2-c-2). If phosphorus concentration indicates a chemical concentration gradient exists, these rates will be adjusted based on that gradient.

SEH will evaluate internal loading from the lake bottom samples using sediment release rates, lake profile data, the bathometric lake map, and in-lake sample data. Lake profile data collected in the field will be used to determine the time period(s) the lake is anoxic below the thermocline. The bathometric mapping will be used to create a depth/area relationship for the lake. These data will then be used to determine the area of anoxic release (area below thermocline) and the area of aerobic release (area above thermocline). The lake water quality samples will be used to determine if the phosphorus sediment release rates are controlled by the water sediment interface or the phosphorus concentration gradient. Sediment release rates based on the appropriate condition throughout the summer season will be determined and applied and the internal load calculated.

Since estimates of internal loading under natural conditions will be made based on the number of days the lake bottom is anoxic (without oxygen) and aerobic (with oxygen). Two estimates of internal loading with the aeration system running will be made based on the following assumptions: 1) the aeration system is able to break the thermocline and keep the sediment interface oxygenated, and 2) the aeration system causes enough mixing to keep a chemical concentration gradient from forming but does not keep the hypolimnion oxygenated allowing for a higher annual phosphorus release than without aeration. These assumptions are at the extreme ends of positive and negative impacts. There is existing data collected during aeration operation that includes lake profile and water quality samples. This data will be used, along with what is learned in this TMDL study about internal cycling of phosphorus in Sweeney Lake, to evaluate the validity of both assumption and determine the impacts of aeration on internal load.

Additional analysis of physical-chemical characteristics of the upper 10cm layer of sediment will be used to evaluate the sediment constituent characteristic related to internal load and include bulk density, loss of ignition organic matter, Total P, Total Fe,

and Redox-sensitive P. These parameters will be useful in determining what (and if) internal loading management options would work and will be used in making the TMDL implementation plan recommendations.

*Surface Water Loading*

The inflow samples and associated instantaneous flow at the inlet monitoring station will used in a regression analysis (FLUX or similar program) to determine the relation between flow and load at the inflow monitoring site. This relation and the continuous flow data will then be used to calculate the daily load at the inflow monitoring station. The monitoring station receives inflow from 88% of the watershed. Daily load from the remaining unmonitored 12% of the basin is assumed to similar to that of the monitored portion of the basin and will be estimated on an area weighted basis using the daily monitored load.

Loading at the outflow will be calculated by multiplying daily in-lake water chemistry concentration(s) times the measured daily outflow from the monitoring station. Daily in-lake phosphorus concentration will be estimated by interpolating between nearest measured concentration (in-lake data collection is described in section 1B-1 of this work plan).

Any flow between Sweeney and Twin Lakes and the associated measured phosphorus concentrations in the lakes will be used to correct the Sweeney Lake loading estimates as appropriate.

Additionally, an existing P8 model will be updated and calibrated with the monitored loading data. The P8 model will be calibrated using flow and water quality (phosphorus) data that were collected by the Minnesota Department of Transportation at the inlet to Sweeny Lake. This data was collected for three years prior to construction activities associated with Trunk Highway 100 improvements (data collected from 2001 through 2003). A P8 model and the required inputs (e.g., land use, soil types, and pond volumes) have already been developed and can be used in this current TMDL study with only minor modifications and the inclusion of recently constructed BMPs. The P8 model for the Sweeney Lake watershed was created in support of the development of a watershed and lake management plan for Sweeney Lake (Barr Engineering 1994).

The P8 model can be used to model runoff flows, the water quality (phosphorus concentration) of the runoff, and the removal of pollutants by different BMPs. The flows are modeled using precipitation and land use data. Water quality in P8 is modeled with a "build-up and wash-off" function to estimate the concentration of total suspended solids in the runoff. Water quality constituents other than TSS are modeled either as dissolved (unassociated with solids) or as particulate (associated with TSS). Water quality can be modeled on sub-watershed scale and to a limited degree the build-up and wash off model can be customized by sub-watershed. One of the strengths of P8 is that runoff from each sub-watershed can be routed to a BMP. Several BMPs can be modeled, including wet and dry detention basins, and infiltration basins (e.g., rainwater gardens).

Calibration for the Sweeny Lake watershed will be performed first to match the runoff data and then the water quality data that were collected at the inlet to Sweeny Lake. Calibration parameters for runoff will likely include percent impervious area by land use and the time of travel of runoff. Water quality calibration will be performed by adjusting one or more of the following parameters: (1) the coefficients in the build-up and wash-off function that dictate the peak or the first-flush aspects of pollutant runoff, (2) the particle distribution, (3) the ratio of pollutants to solids, and (4) the particle scale factor (affects the treatment capacity of ponds).

Because the P8 model will be calibrated with flow and water quality data that was collected during a range of climatic conditions, the calibrated model will be well suited to predict flow, phosphorus, and phosphorus loads to Sweeny Lake during average climatic conditions.

The potential load reductions calculated by the P8 model will be put into the calibrated BATHTUB model to determine the expected response of Sweeney Lake. This process allows for the evaluation of the direct effect of a specific BMP on Sweeney Lake's water quality and will be used in developing an implementation plan for the watershed wide load reduction required by the TMDL. Barr will provide SEH with the estimated loading to Sweeney Lake expected from 5 -10 scenarios with a range of reduction in total load to Sweeney Lake of 10 to 90 percent.

*Groundwater Loading*

Groundwater contributions will be estimated based on the Golden Valley Groundwater Study completed by Barr Engineering. Annual groundwater inflows to Sweeney Lake will be calculated for normal precipitation and average groundwater levels and 2007 precipitation and groundwater levels using the regional MODFLOW groundwater model that was developed for the Golden Valley, New Hope Crystal Joint Water Commission. The model will also calculate net inflows by calculation outflows if appropriate. Barr will provide SEH with net flux of water and estimated phosphorus for the growing season from water supply alternatives study.

*In-Lake Mass Balance*

In-lake samples will be used to calculate the change in total mass of phosphorus in the lake. A mass balance calculation will be done to compare the mass increase to the estimated internal load, groundwater influx, and surface water influx. A large difference in these numbers would indicate significant sources of phosphorus were missed and result in the need for more detailed monitoring, while a balanced mass calculation will confirm the significance of the measured loading to Sweeney Lake.

*Additional Analysis-Aeration Impacts*

Additional analysis will be performed to compare the natural condition to an aerated condition. Two assumptions representing the best and worst case scenarios of aeration will be modeled using the monitored data. These assumptions will be contrasted to the loading of the lake in a natural state to quantify the range of potential impact that aeration can have on the internal load of Sweeney Lake. The assumptions are: 1) the aeration system is sufficiently sized to keep the hypolimnion oxygenated without breaking the thermocline; and 2) the aeration system does not keep the hypolimnion oxygenated and breaks the thermocline.

The first scenario represents the best condition with an aerator that is sufficiently sized to keep the lake completely mixed throughout the summer; the estimated internal load with aeration will be calculated using the sediment release rate for fully aerated conditions. The second scenario represents the worst condition with aeration that does not keep the entire hypolimnion oxygenated, allowing for anoxic release and "pumping" of nutrients into the epilimnion. If the natural state of the lake allows phosphorus concentrations to reach a level high enough that the concentration gradient becomes controlling, potential of aeration to alter that condition will also be considered as a third scenario.

Based on this analysis, the historical data will be examined to determine which state the lake aeration system currently operates under. If the estimated internal load during aeration is determined to be significantly higher or lower than the natural conditions monitored, additional study may be needed on the aeration system and its ability to keep the lake oxygenated and it's impact on stratification. This analysis can also be used to make management recommendations on the role of the aeration system for Sweeney Lake's TMDL and included in Objective 4 recommendations.

2. E. BATHTUB Modeling

Physical lake characteristics and measured water quality of lake and inflow samples will be used to set-up and calibrate a BATHTUB model representing Sweeney Lake. With a calibrated BATHTUB model we will predict the lakes response to increases and decreases in nutrient loading which will help determine how sensitive the lake is to changes in the watershed and the likely response of the lake to various proposed management scenarios. The output of trophic status and "number of days the lake will have an algae bloom" are understandable to the general public and useful in communicating the lakes response to loading change in the TMDL process.

Additionally, due to the complexity of internal and external loading interaction on in-lake water quality; if external loading is over or under represented in the initial monitoring data due to unusual climatic conditions, the model calibration could be impacted. A sensitivity analysis will be done to determine potential impacts on our predictive modeling. The coefficient of variation in the model output results can be used to calculate an estimate of certainty of the predicted results. If possible, we will use historical data to validate this estimated sensitivity. The result of this analysis and the climatic conditions experienced in the monitoring period will play a large role in determining if a second year of data is needed.

Monitoring not included in this work plan:

- A second year of continuous flow monitoring and water quality sampling
- Monitoring of atmospheric deposition
- Investigation into illicit discharge such as industry or illegal septic
- Continuous flow monitoring of connection to Twin Lake

This monitoring may or may not be warranted, based on the findings of the first year analyses. One year sampling data can be highly influenced by abnormal climate conditions during the year of sample collection. Following an evaluation of the first year data, a determination of the sampling year climate conditions as compared to "normal" will be made and sampling results will be compared to historic data. A need for more detailed study and suggested additional analyses will be part of the TMDL report.

**Objective 3 - Public Involvement Process**

The City will incorporate the TMDL study plan and goals into a comprehensive public involvement effort. The public participation process will be lead by SEH as part of this project under the direction of the Bassett Creek Water Management Commission. This process will be completed in close cooperation with the City and surrounding municipalities and MS4s. The focus of the early public involvement efforts will be to inform the stakeholders of the proposed work plan, address and incorporate their concerns, and seek by-in into the upcoming TMDL process. This will be done with public informational presentations that present not only the technical work plan, but also provide an explanation of the goals of each component, the questions the data is trying to answer, and how the data will be used to answer those questions. Additionally, the TMDL process as a whole will be explained, as well as informing the public on ways they can track the results and become involved.

The presentation will need to include a history of the watershed management to date including a re-visit water quality goals currently in-place for Sweeney Lake. An over view of the TMDL process and an introduction to the work plan, the entities involved in developing and implementing it will follow. The presentation can end with and introduction of possible programs and treatment options available to address the recommendations of a TMDL. The meeting will involve presentation by the technical, political, and legal aspects of the TMDL components and will be facilitated by a professional facilitator.

One of the key issues to be discussed at the public meeting will be the need to turn off the aerators for one summer to monitor the water quality and internal loading without the systems in operation. This effort involves preparation of meeting materials (poster boards, hand-outs, comment forms, etc.) and staff effort to prepare these materials and to attend and facilitate two public meetings. The public meeting is anticipated to inform residents of the study components and gather input from potentially affected individuals and the second meeting to focus on (preliminary) study results and recommended

implementation activities. The budget reflected below assumes that meetings are held separate from any other possible public meetings for projects in the area. SEH will also prepare informational flyers for distribution to area residents and interested persons and create a project webpage that will include regular updates of project progress. The webpage will be available as a link from the BCWMC and Golden Valley web pages.

While not part of this Phase 1 work plan, a second public meeting will be held as part of the Phase 2 effort and following the completion of analysis of the final year of monitoring data. If a one-year program is sufficient, the meeting would be held in approximately December 2007 or January 2008. If a second year is needed, the meeting would be delayed until Fall 2008.

**Objective 4 - Develop Details of Implementation Plan**

With the previous results of the Sweeney Lake Watershed and Lake Management Plan, results of the internal loading analysis and additional public input in hand, details of what will be done to reduce the nutrient/pollutant loads will be developed based on the results of the first year data collection and analyses. This effort will produce recommendations for when specific activities should be done, and who will do each respective activity or project. Cost estimates for budgeting purposes will also be developed.

*Schedule*: Phase 2
*Budget*: Phase 2

**Objective 5 - Prepare Recommended Monitoring Plan**

Recommend a monitoring plan to document progress toward achieving the load reduction and goal achievement identified in the TMDL program. This work is not included in Phase 1 efforts and will be incorporated into the draft and final TMDL reports as part of Phase 2.

*Schedule*: Phase 2
*Budget*: Phase 2

**Objective 6 - Prepare Draft TMDL Report in Proper State and Federal Format**

A draft TMDL report prepared using the draft guidance will be submitted to MPCA to meet the critical documentation needs of MPCA

*Schedule*: Phase 2
*Budget*: Phase 2

**Objective 7 - Prepare Final TMDL Report**

The final report is not part of Phase 1. In Phase 2 and based on comments and edits from previous tasks and input, a final report will be submitted to MPCA.

*Schedule*: Phase 2
*Budget*: Phase 2

**Objective 8 – Project Management Activities and Coordination Meetings**

Due to the complexity of the issues relating to this study, close and frequent coordination with the primary project team will be necessary. SEH will lead these efforts and will prepare and submit regular (monthly) project progress reports to the BCWMC and copy the other primary project contacts including the City, MPCA and adjacent MS4s. SEH will summarize work completed each month, critical issues and work to be conducted in the next month. Meeting minutes and significant findings will be posted on the website on a regular basis.