MINNESOTA POLLUTION CONTROL AGENCY
520 Lafayette Road North
St. Paul, MN 55155-4194

Federal Clean Water Act Section 319

Project workplan

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Project title: Sweeney Lake Water Quality Improvement Project

1. Project summary:

Organization: Bassett Creek Watershed Management Commission (BCWMC)
Contractor contact name: Laura Jester
Title: Administrator
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Eden Prairie, MN 55346
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Subcontractor/Partner:

Organization: Barr Engineering Co. (and their subcontractors: Carp Solutions, a firm specializing in alum treatments—TBD, and a firm specializing in aquatic herbicide treatment—TBD)
Project manager: Greg Wilson, PE
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Minnesota Pollution Control Agency (MPCA) contact:

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Project information

Latitude/Longitude: 44.993135, -93.338771
County: Hennepin
Start Date: 12/20/2019 **End Date:** 08/31/2023
Total project cost: Grant: $330,000, Match: $238,080, Total: $568,080

Project location:

a) Basin:

☐ Lake Superior ☐ Lower Mississippi/Cedar ☒ Upper Mississippi ☐ Minnesota ☐ Rainy

☐ Red River ☐ Des Moines ☐ Missouri ☐ St. Croix

b) Watershed name: Bassett Creek Watershed (Mississippi River – Twin Cities) HUC8: 07010206

Organization type: ☒ Local/Regional government
☐ State government
☐ Joint powers organization of local government

2. Statement of problems, opportunities, and existing conditions

Project background

This project aims to significantly improve the water quality and reduce total phosphorus in Sweeney Lake by 1) removing and managing carp in Schaper Pond, immediately upstream of the lake; and 2) performing an alum treatment within the lake.

Sweeney Lake is a 67-acre lake in the City of Golden Valley, Minnesota, with a maximum depth of 25 feet and an average depth of 12 feet. The lake provides recreational value for fishing, boating, and swimming; and it harbors a variety of panfish, a limited game fishery, and an average plant community. The lake is the receiving waterbody of a 2,400-acre fully developed watershed. Nearly all of the flow to the lake enters through the Sweeney Branch of Bassett Creek. The creek flows from the south and through Schaper Pond, which is immediately upstream of Sweeney Lake. The creek exits the lake through a natural outlet to the north. Sweeney Lake was added to the 303(d) list of impaired waters in 2004 due to excess phosphorus. A Total Maximum Daily Load (TMDL) was completed and approved by the Environmental Protection Agency (EPA) in 2011 and identified the need to reduce internal phosphorus loading by 32% or 175 pounds per summer season.

Despite numerous best management practices (BMPs) installed or implemented in its watershed over the years, water quality in Sweeney Lake has not improved significantly. Regular monitoring from 1985 to the present indicates that total phosphorus concentrations exceeded the state standard of 40 ug/L 74% of the time. Further, the lake has a history of Harmful Algae Blooms, negatively impacting the lake's recreational usability.

In order for an alum treatment to be most effective, watershed loading of phosphorus should be reduced to the greatest extent possible before carrying out the treatment. To that end, in 2015 the BCWMC and the City of Golden Valley implemented the Schaper Pond Diversion Project in Schaper Pond, immediately upstream of Sweeney Lake. The project diverted water, via a 380-foot floating water baffle, within the pond along a longer flow path, allowing water to remain in the pond for a longer period of time, providing for a greater amount of sediment, phosphorus, and other suspended solids to settle out before flowing into Sweeney Lake. Unfortunately, post project monitoring indicates that phosphorus levels leaving the pond are still elevated. Upon further study, it was determined that a large population of common carp in the pond (estimated at 368 kg/hectare; nearly four times the recommended threshold for carp management) is likely responsible for the elevated phosphorus levels in Schaper Pond. The BCWMC is currently tracking the movements of the carp in order to implement a carp removal and management plan.

Project impact

BCWMC believes the combination of carp management in Schaper Pond and an alum treatment in Sweeney Lake will effectively "flip" this lake from a eutrophic, algae dominated system, to a healthy, clear water system that can fully support aquatic recreation and a balanced ecosystem for aquatic biota. More than 35 watershed BMPs were constructed or improved between the mid-1980s and 2011. The city of Golden Valley recently inventoried more than 17 BMPs that have been implemented within the direct drainage to Sweeney Lake, alone. Watershed modeling completed for the TMDL study confirmed that the Schaper Pond outflow is the most critical source of watershed phosphorus entering Sweeney Lake and in-lake water quality modeling confirmed that the internal phosphorus load (from sediment phosphorus release) accounts for approximately 320 pounds of the summer phosphorus budget for the lake. Implementation of the proposed improvement options will address the final critical sources of internal and external phosphorus loads needed to meet the TMDL wasteload and load allocation objectives, and attain the State and BCWMC goals and standards for Sweeney Lake.

3. Goals, objectives, tasks, and subtasks

Goal: Reduce total phosphorus concentrations in Sweeney Lake to meet water quality standards

Objective 1: Perform in-lake alum treatment in Sweeney Lake

Task A: Communicate with lake residents and other stakeholders

This task includes engaging and communicating with the Sweeney Lake Homeowners Association, lake residents, lake users, and other stakeholders about the alum treatment itself and expectations for changes in water quality and aquatic vegetation.

Responsible Party: BCWMC Administrator

Task B: Survey and treat curly-leaf pondweed in Sweeney Lake

This task includes an early spring survey of curly-leaf pondweed (CLP) in Sweeney Lake, applying for a Minnesota Department of Natural Resources permit for herbicide treatment of CLP, treating up to five acres of CLP with diquat or similarly effective herbicide, and performing a post treatment survey of CLP, as needed. Treating CLP before the alum treatment is expected to reduce the chances of significant expansion of CLP with improved water clarity. If left untreated, a CLP expansion would interfere with recreational opportunities, reduce the effectiveness of the alum treatment by introducing phosphorus into the water column during summer senescence, and would be even more costly to manage in the future.

Responsible Party: BCWMC Administrator (permit coordination), Barr Engineering Co., and herbicide treatment subcontractor (TBD)

Task C: Engineer and perform in-lake alum treatment

This task includes the development of contract documents, along with a bid-procurement process with an experienced contractor, to apply the appropriate dose of alum and buffering agent to the sediment of Sweeney Lake in two separate phases of work, both at the beginning and towards the end of the grant agreement; receiving MPCA permit for treatment; and overseeing treatment activities to ensure that chemical is properly and safely applied for each phase of the alum treatment.

Responsible Party: Barr Engineering Co. and their subcontractor (TBD)

Task D: Perform post treatment monitoring

This task includes lake water quality monitoring during the summer season following each phase of the in-lake alum treatment to quantify water quality response to phosphorus reductions associated with internal load control. Monitoring methods and data evaluations will follow BCWMC's Quality Assurance Project Plans (QAPP) for water quality parameter testing and follow requirements as outlined in the Grant Agreement.

Responsible Party: Barr Engineering Co.

Objective 1 Timeline: January 2020 – August 2023

Objective 1 Cost: Grant: $300,000, Match: $217,000, Total: $517,000

Objective 1 Deliverables: Completed curly-leaf pondweed herbicide treatment (if needed), completed in-lake alum treatment and summary of pre- and post-treatment lake water quality monitoring results.

Objective 2: Control carp biomass in Schaper Pond

Task A: Design and permitting of carp removal activities

This task includes the final design and permitting of the recommended carp control option(s) including removing a significant biomass of carp from the pond.

Responsible Party: Barr Engineering Co.

Task B: Implementation of carp removal and control options for Schaper Pond and Sweeney Lake

This task includes the drawdown and electrofishing of Schaper Pond to remove carp under low flow, as well as the installation of four baited box nets for the removal of carp from the shallow areas of Sweeney Lake.

Responsible Party: Barr Engineering Co. and their subcontractor (Carp Solutions)

Objective 2 Timeline: April 2020 – October 2021

Objective 2 Cost: Grant: $30,000, Match: $20,000, Total: $50,000

Objective 2 Deliverables: Completed carp removal and summary of pre- and post-treatment carp population monitoring results, including assessments of changes to the overall populations and migration between Schaper Pond and Sweeney Lake.

Objective 3: Manage project

Task A: Manage project and perform grant reporting

This task includes maintaining communication and coordination among subcontractors; monitoring of project budget and timeline; regular updates to the BCWMC Commissioners; and preparation and submittal of semi-annual and annual grant reports.

Objective 3 Timeline: January 2020 – August 2023

Objective 3 Cost: Grant: $0, Match: $1,080, Total: $1,080

Objective 3 Deliverables: Semi-annual and annual grant reports

4. Measurable outcomes

Lake ID or stream AUID	Sweeney Lake (#27-0035)					
Phosphorus	350	lbs/yr	943	$/lb	35	%

The Sweeney Lake TMDL total phosphorus load reduction goals call for 274 pounds of total phosphorous load reduction during the critical summer season, which was split between the potential watershed (wasteload) and internal (load allocation) phosphorus loads reductions to meet the assimilative capacity of Sweeney Lake. Implementation of both of the project objectives are expected to exceed 100% of the needed phosphorus load reduction prescribed in the TMDL report. It is expected that restoration of the water quality treatment capacity of Schaper Pond will result in a 100-pound reduction of total phosphorus delivered to Sweeney Lake (Barr, 2012). It is expected that the initial lake response to an in-lake alum application will exceed 250 pounds per summer season, which will slowly recede over the lifespan of the treatment.

The Sweeney Lake Aeration Study (Barr, 2018) included the updated analyses necessary to perform TMDL-equivalent assessments and re-confirm the water quality improvement benefits and feasibility of an in-lake aluminum treatment, including sediment core sampling analyses for phosphorus, alum dose and cost determinations. All of these recent analyses were compiled and described, with respect to the state standards and water quality goals, in the report. Recommendations were made based on overall BMP effectiveness, feasibility, practicality and public acceptance of changes to aquatic plant growth. Since 2017, water quality monitoring and carp population surveys have been conducted to quantify phosphorus export from Schaper Pond and the potential benefit of controlling carp on the water quality of the inflow to Sweeney Lake.

Post-treatment lake water quality monitoring will occur following each phase of the alum treatment and pre- and post-treatment carp population monitoring results will be summarized for the semi-annual and final grant reports.

Deliverables of this project include a completed in-lake alum treatment, carp removal and a summary of pre- and post-treatment lake water quality monitoring results.

5. Project budget (attached)

Sweeney Lake Water Quality Improvement Project
Bassett Creek Watershed Management Commission (BCWMC)

Objective	Cost category	Unit cost	Rate	Quantity	Grant	In kind match	Cash match	Total match	Budget total
Objective 1: Perform Alum Treatment in Sweeney Lake									
Task A: Communicate with lake residents/stakeholders									
BCWMC Administrator	Project Manager	$72.00	/hour	40.00			$ 2,880.00	$ 2,880.00	$ 2,880.00
Printing and Postage	Materials	variable					$ 500.00	$ 500.00	$ 500.00
Task B: Survey and treat curly-leaf pondweed									
Barr Engineering Company	Subconsultant	variable					$ 12,000.00	$ 12,000.00	$ 12,000.00
Herbicide Treatment Contractor	Subcontractor	variable					$ 5,000.00	$ 5,000.00	$ 5,000.00
Task C: Engineer and perform in-lake alum treatment									
Barr Engineering Company	Subconsultant	variable			$ 40,000.00		$ 26,620.00	$ 26,620.00	$ 66,620.00
Alum Treatment Contractor	Subcontractor	variable			$ 240,000.00		$ 160,000.00	$ 160,000.00	$ 400,000.00
Task D: Perform post treatment monitoring									
Barr Engineering Company	Subconsultant	variable			$ 20,000.00		$ 10,000.00	$ 10,000.00	$ 30,000.00
Objective 1 - Total					**$ 300,000.00**		**$ 217,000.00**	**$ 217,000.00**	**$ 517,000.00**
Objective 2: Control Carp Biomass in Schaper Pond									
Task A: Design and permitting of carp control options									
Barr Engineering Company	Subconsultant	variable			$ 6,000.00		$ 4,000.00	$ 4,000.00	$ 10,000.00
Task B: Implementation of carp control options									
Carp Solutions	Subcontractor	variable			$ 24,000.00		$ 16,000.00	$ 16,000.00	$ 40,000.00
Objective 2 - Total					**$ 30,000.00**	**$ -**	**$ 20,000.00**	**20,000.00**	**50,000.00**
Objective 3: Manage Project									
Task A: Manage project and perform grant reporting									
BCWMC Administrator	Project Manager	72.00	/hour	15.00			$ 1,080.00	$ 1,080.00	$ 1,080.00
Objective 3 - Total					**$ -**		**$ 1,080.00**	**$ 1,080.00**	**$ 1,080.00**
	TOTAL				**$ 330,000.00**	**$ -**	**$ 238,080.00**	**$ 238,080.00**	**$ 568,080.00**