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

Federal Clean Water Act Section 319

Proposal project workplan

Doc Type: Proposal

Project title: **Sweeney Lake Water Quality Improvement Project**

1. Project summary:

Organization: Bassett Creek Watershed Management Commission
Contractor contact name: Laura Jester
Title: Administrator
Address: 16145 Hillcrest Lane
Eden Prairie, MN 55346
Phone: 952-270-1990
Fax: NA
Email: Laura.jester@keystonewaters.com

Proposed Subcontractor(s)/Partner(s):

Organization: Barr Engineering Co. (and their subcontractors: Carp Solutions and a firm specializing in alum treatments)
Project manager: Greg Wilson, PE
Address: 4300 MarketPointe Dr. Suite 200
Minneapolis, MN 55435
Phone: (952) 832-2672
Fax: NA
Email: gwilson@barr.com

Project information

Latitude/Longitude: 44.993135 -93.338771
County: Hennepin
Total project cost: $550,000 total grant funds: $330,000 total match funds: $220,000
***Full time equivalents:**

Project location:

a) Basin (check all that apply):

☐ Lake Superior ☐ Lower Mississippi/Cedar ☒ Upper Mississippi ☐ Minnesota ☐ Rainy
☐ Red River ☐ Des Moines ☐ Missouri ☐ St. Croix

b) Watershed name: Bassett Creek Watershed HUC8:

c) Waterbody names and Assessment Unit Identification numbers (AUIDs): Sweeney Lake (#27-0035)

d) Listed 303(d) impairment including parameters, e.g., phosphorus, total suspended solids, etc., other documented water quality problem, or other (explain): Impairments (2): chloride, phosphorus

e) Reports addressing water bodies of concern (must have an EPA-approved TMDL by February 26, 2018): Sweeney Lake Total Phosphorus TMDL (June 2011; approved by EPA, August 2011)
Twin Cities Metropolitan Chloride TMDL Study (Feb 2016)

f) Is there an EPA-approved Nine Element Plan approved for this watershed? (30 points) Waived in Minnesota

Organization type: ☒ Local/Regional government (county, SWCD, WD, etc.)
☐ State government
☐ Joint powers organization of local government

Interested in this proposal being scored for 0% Interest Clean Water Partnership Loan funds (no obligation)?

☐ **Yes** ☒ **No**

2. Statement of problems, opportunities, and existing conditions

Project background (15 points)

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, MN (Figure 1) 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 (see Figure 2). 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 (see Figure 3). 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 TMDL was completed and approved by 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 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 Bassett Creek Watershed Management Commission (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 (25 points)

We believe 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.

Organization (10 points)

- Overall Project Management: Laura Jester, Administrator, Bassett Creek Watershed Management Commission.

Ms. Jester has over 25 years of experience in water resources management including the successful management and completion of multiple county, state, and federal grant-funded projects over her career. In just the past 6 years as BCWMC Administrator she has managed a total of $1.8 million in grant funding. Ms. Jester will be the primary contact for the project, will track the project's timeline and budget, and will develop and submit interim and final grant reports.

- Technical Project Management: Barr Engineering Co.

Lead staff with Barr Engineering for this project will be Greg Wilson, PE, Senior Water Resources Engineer. Other staff with Barr Engineering may also assist with this project, as needed. Mr. Wilson has more than 29 years of experience that include water quality modeling; TMDL/watershed restoration and protection strategy (WRAPS) preparation and reporting; one

watershed, one plan and U.S. Environmental Protection Agency nine-element plan development; geographic information systems (GIS); limnology; water-resources design applications; watershed and lake management planning; implementation of in-lake water quality treatment; and public education and outreach. Barr has engineered/implemented more than half of the in-lake alum treatments in Minnesota. Mr. Wilson will be the technical leader for the project, will oversee the alum treatment and carp management activities, and will analyze and report all pre and post monitoring data.

- Communications and Outreach: City of Golden Valley staff

Staff with the City of Golden Valley are continually reaching out to their residents on a variety of issues. They have successfully engaged the Sweeney Lake Homeowners Association and the residents around the lake over the years on various issues including invasive species, lake aeration, shoreline management, water level management, the Sweeney Lake TMDL, and the Schaper Pond Diversion Project. The city will be an important partner to help communicate about the project and expectations for future water quality and aquatic vegetation.

- Subcontractor, Alum Treatment Specialist, TBD

A qualified, licensed, and experienced lake service provider will be selected to perform both phases of the in-lake alum treatment on Sweeney Lake following a bid procurement process.

- Subcontractor, Carp Solutions

Carp Solutions is owned and operated by Przemek Bajer. As a faculty member at the University of Minnesota, Przemek has been at the forefront of common carp research and management since 2006. He has authored many of the most referenced scientific publications on carp management in North America. Przemek has a PhD in fisheries sciences and is experienced in many aspects of carp management, biology, and ecology. He, along with Jordan Wein, will oversee and manage the project components that pertain to carp control, particularly fish collection, analysis, and implementation of management actions.

Landowner readiness/willingness (15 points)

The City of Golden Valley and the Sweeney Lake Homeowners Association are extremely supportive of this project. This was most evident at a public meeting in August 2018 regarding the results of a study of aeration on Sweeney Lake. 26 lake residents and city staff attended the meeting to learn more about the lake and the needs for future lake management. There was a robust discussion on the lake's water quality and agreement among participants on the need for an alum treatment.

The Sweeney Lake Aeration Study (Barr, 2018) included the updated analyses necessary to perform TMDL-equivalent assessments of 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 TMDL goals, in the report. Recommendations were made based on the alum treatment and overall BMP effectiveness, feasibility, practicality and public acceptance of changes to aquatic plant growth.

Implementation of the necessary controls for carp within Schaper Pond will take place within parkland that is wholly owned and maintained by the City of Golden Valley. A variety of methods will be used to communicate with park users and nearby residents before, during, and after the project activities including public meetings or open houses, direct mailings to lake residents, newspaper and newsletter articles, and reports to the Bassett Creek Watershed Management Board of Commissioners.

The BCWMC has a history of successfully implementing large and complex water quality improvement projects including alum treatments (Twin Lake, 2015). Each year, the BCWMC implements approximately $1 million worth of capital projects throughout the watershed. If grant funding is awarded, the BCWMC is committed to providing matching funds through its capital improvement program and implementing the project effectively and efficiently.

3. Goals, objectives, tasks, and subtasks (5 points)

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 and Golden Valley Staff

Task B: 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: BCWMC Engineering staff (Barr Engineering Co.) and their subcontractor (TBD)

Task C: 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 with follow BCWMC's Quality Assurance Project Plans (QAPP) for water quality parameter testing.

Responsible Party: BCWMC Engineering staff (Barr Engineering Co.)

Objective 1 Timeline: April 2020 – August 2023

Objective 1 Cost: $500,000

Objective 1 Deliverables: 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: BCWMC Engineering staff (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: BCWMC Engineering staff (Barr Engineering Co.) and their subcontractor (Carp Solutions) and City of Golden Valley resources

Objective 2 Timeline: April 2020 – October 2021

Objective 2 Cost: $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.

4. Measurable outcomes (15 points)

List the specific measurable outcomes on the targeted waterbody(s) this project would achieve and project deliverables for the approved TMDL. Examples include number and brief description of BMPs to be completed, estimated pollution reductions, cost per pound of pollution reduction. Use requested grant funds for this calculation, not total project costs. Ranges of reduction and cost are acceptable. Note: these approved models may be helpful to estimate load reductions, STEP-L, BWSR eLINK.

Please fill out table for **each water body** (the table can be cut and pasted for multiple water bodies):

Lake ID or stream AUID	Sweeney Lake (#27-0035)					
Phosphorus	350	lbs/yr	943	$/lb	35	%
Sediment		tons/yr		$/ton		%
Nitrogen		lbs/yr		$/lb		%
Other (list): _____				$/		%
				$/		%

Project Impact, Evaluation, Deliverables:

The Sweeney Lake TMDL total phosphorus load reduction goals call for 274 pounds of TP 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 proposed 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 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. Proposed project budget *(see Attached Excel spreadsheet)*

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Budget

Sweeney Lake Water Quality Improvement Project
Bassett Creek Watershed Management Commission

Itemized project budget and expenditures

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: 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 C: 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**		**$ 200,000.00**	**$ 200,000.00**	**$ 500,000.00**
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:									
Task A:									
Objective 3 - Total					**$ -**	**$ -**	**$ -**	0.00	0.00
	TOTAL				**$ 330,000.00**	**$ -**	**$ 220,000.00**	**$ 220,000.00**	**$ 550,000.00**