



Memorandum

To: Bassett Creek Watershed Management Commission
From: Barr Engineering Co. (Greg Wilson, PE, and Karen Chandler, PE)
Subject: Item 5C – Consider Approval of Feasibility Study Scope for Crane Lake Chloride Reduction Demonstration Project (CL-4)
BCWMC July 18, 2024 Meeting Agenda
Date: July 11, 2024

5C. Consider Approval of Feasibility Study Scope for Crane Lake Chloride Reduction Demonstration Project (CL-4)

Recommendations:

1. Consider approving the scope of work and \$117,900 budget presented in this memorandum and direct the Engineer to complete feasibility study to demonstrate chloride reduction requirements and recommendations for Crane Lake.

Background

Crane Lake is a BCWMC priority 2 shallow lake in the City of Minnetonka, adjacent to the Ridgedale Mall area. It is impaired for chloride (concentrations doubled between 2016 and 2021) and it drains to Medicine Lake. The Bassett Creek Watershed Management Commission's (BCWMC) 2019-2020 Crane Lake Water Quality Improvement Project, constructed by the City of Minnetonka in conjunction with the reconstruction of Ridgedale Drive from Plymouth Road to I-394, had the goal of improving water quality and addressing pollutant loads to Crane Lake, including chloride. The project included water quality improvements and now all drainage areas within the Ridgedale Drive and Ridgedale Mall area will be treated with a best management practice (BMP) before draining to Crane Lake. Unfortunately, while the project reduces total phosphorus and solids loadings, it was preliminarily unsuccessful in identifying a feasible solution to address the chloride levels in Crane Lake. The City of Minnetonka explored several chloride management options, including working with the Metropolitan Council Environmental Services (MCES) to dispose of the chloride contaminated effluent in the sanitary sewer system. Despite the extensive review of chloride management options, no solution was identified, and the project schedule required moving forward without the chloride management component.

In 2020 and 2022, the city sampled and monitored chloride concentrations in the Ridgedale Center south and north ponds (RDG-N and RDG-S, shown in the attached image). The monitoring results provided an understanding about seasonal chloride levels and relative source variability from the Ridgedale Center area, as well as potential chloride treatment/improvement options. Chlorides are a growing concern in Crane Lake, as 2021 monitoring indicates that chloride levels are trending up and may pose a risk to

aquatic life. Medicine Lake downstream is listed as threatened in the Twin Cities Metro Area Chloride TMDL and Management Plan.

As is required for BCWMC CIP Projects, a feasibility study must be completed prior to BCWMC holding a hearing and ordering the project. The feasibility study would examine methods to reduce chloride and restore the water quality of Crane Lake. This project in the City of Minnetonka is intended to further quantify all the chloride sources in the Crane Lake watershed and identify/prioritize opportunities or practices for reducing chloride levels. Results of these investigations would be used to inform the implementation of a demonstration project to advance chloride reduction measures in Crane Lake and other parts of the watershed. This project would also inform options and methods for salt application and materials used, removal of chlorides prior to reaching Crane Lane, and partnerships with Ridgedale Center and other road authorities.

The proposed study will involve watershed and in-lake chloride monitoring, watershed source load assessment and mass balance modeling, estimating the chloride load reduction needed and analyzing multiple alternatives to meet the project goals, identifying permit requirements, meetings, preparing a report to discuss and document study results, and presenting the draft and final study results at Commission meetings.

Content and Scope of Study

The feasibility study will address and include the following work scope.

1) Project Planning and Kickoff Meeting

- a) Compile background information on potential monitoring sites and perform site reconnaissance.
- b) Hold project kick-off meeting with BCWMC and City of Minnetonka staff and prepare meeting notes.
- c) Send project email updates every two weeks to BCWMC and City of Minnetonka staff.

2) Chloride Monitoring

- a) Purchase/program/install equipment and perform chloride sampling of discharges from Ridgedale north pond (RDG-N), Ridgedale south pond (RDG-S), Crane Lake outlet (CL-OUT) and the two MnDOT pond (DOT-NE and DOT-NW) discharges to Crane Lake. A monitoring probe will be installed at each site to collect continuous conductivity and temperature readings that will be translated to chloride concentration estimates. Outflow volumes will be based on water level observations or water balance modeling estimates (where necessary).
- b) Monthly field visits for an eight-month period to collect/coordinate chloride sample analysis, perform routine equipment maintenance, manage data, and complete periodic data quality checks. Remove and store equipment at project conclusion for use on future projects.

3) Watershed Source Load Assessment and Modeling

- a) Prepare and calibrate Crane Lake watershed source load assessment, and in-lake water and chloride mass balance modeling to historical lake and watershed monitoring data (including applicable City of Plymouth chloride monitoring data for Ridgedale Creek). Inform watershed source load assessment with input from Ridgedale, Minnesota Department of Transportation (MNDOT) and City of Minnetonka on existing deicing methods and salt application rates.
- b) Use the Crane Lake water and chloride mass balance modeling to estimate the chloride load reduction needed to meet the lake chloride goals, including source reduction measures, stormwater pond flushing volumes and/or long-term frequency of pond pumping/drawdown events required to ensure lake water chloride standards are met.

4) Develop and Evaluate Management Concepts

- a) Develop management concepts for the project, considering input from stakeholders. This includes developing separate management concepts for each source area or tributary to Crane Lake. To develop the management concepts, the tributary area will be evaluated to determine all sources/source areas that could potentially be controlled and/or management practices that could be used for chloride reductions (including pond drawdowns, infiltration practices, water reuse, etc.). Each concept will be optimized based on life-cycle cost-benefit and future assurances for project implementation and compliance.
 - i) Analyze the alternatives for addressing identified source areas within each tributary area.
 - ii) Develop potential management concepts for each of the major sources of chloride deicers.
 - iii) Refine concepts based on input from City staff, BCWMC Administrator and other stakeholders (see stakeholder input in task 5b).
- b) Identify permitting requirements for the management concepts, based on available field and desktop data, and the results of the agency communications.
- c) Develop cost estimates for each concept, including a "30-year cost," analysis of life expectancy, and annualized cost per pound of pollutant removal for both source control and/or water quality treatment portions of the project.

5) Project Meetings and Feasibility Report

- a) Prepare for and hold virtual a meeting with BCWMC Administrator and City of Minnetonka staff to discuss preliminary results and potential management concepts to evaluate.
- b) Coordinate with the BCWMC Administrator and City staff to determine the best means to gather stakeholder input including meetings, open houses, mailings, etc. Primary group for outreach and engagement will be Ridgedale Center, Hennepin County (site of Ridgedale library), MNDOT, and

property owners. The budget for this task includes time to prepare for and attend one (1) in-person stakeholder meeting early in the process, after the development of management concepts. This task also includes assisting with the stakeholder involvement process as necessary – preparing handouts, boards, and/or presentations, and recording and compiling comments. We assume that meeting coordination, expenses, and set-up will be largely completed by the BCWMC Administrator, with assistance from the City.

- c) Prepare draft feasibility report, including recommended management actions, and submit the draft report to BCWMC Administrator and Minnetonka staff for review.
- d) Hold virtual a meeting with BCWMC Administrator and Minnetonka staff to discuss the draft report; revise/prepare final draft report based upon review comments.
- e) Present draft feasibility study findings at Commission meeting.
- f) Prepare final report (revise draft report based on comments provided by the Commission) for approval at Commission meeting.
- g) Prepare presentation for Commission meeting; attend Commission meeting to present final report of study findings for Commission approval.

Cost Estimate

The table below summarizes our cost estimate for the scope of work outlined above. These costs include the cost of additional equipment purchase/installation, sampling by the Commission Engineer and analytical testing by a contract laboratory. Chloride samples and continuous conductivity measurements will be collected for approximately 8 months following Commission approval. The Commission Engineer will contract with a laboratory for the chloride sample analysis.

Tasks	Estimated Total
1) Project Planning and Kickoff Meeting	\$5,700
2) Chloride Monitoring	\$47,700*
3) Watershed Load Assessment and Modeling	\$15,500
4) Develop and Evaluate Management Concepts	\$20,200
5) Project Meetings and Feasibility Report	\$28,800
Total	\$117,900

* Includes \$18,000 equipment purchase, Barr’s sampling costs and the contract laboratory’s analysis costs for five sites

Schedule

We will complete the tasks and milestones outlined in the scope of work on the following schedule.

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Tasks and milestones	Estimated Schedule
Kick-off meeting with BCWMC and City of Minnetonka staff	August 2024
Water quality monitoring	November 2024-June 2025
Watershed source load assessment, lake modeling and analysis	July-September 2025
Meeting with BCWMC and City of Minnetonka staff to discuss preliminary results and potential management concepts to evaluate	October 2025
Develop and evaluate management concepts	November 2025
Stakeholder meeting	December 2025
Submit draft feasibility report for BCWMC Administrator and City of Minnetonka staff review	January 2026
Meeting with BCWMC Administrator and Minnetonka staff to discuss the draft feasibility report	February 2026
Submit draft feasibility report for BCWMC review at Commission meeting	February 2026
Present draft feasibility report for BCWMC approval at Commission meeting	February 2026
Submit final feasibility report for BCWMC review at Commission meeting	March 2026
Present final feasibility report for BCWMC approval at Commission meeting	March 2026