



Memorandum

To: Bassett Creek Watershed Management Commission
From: Barr Engineering Co.
Subject: Item 5D – Consider Approval of Proposal for Study of Chloride Extraction/Dilution from Parkers Lake
BCWMC September 15, 2022 Meeting Agenda
Date: September 8, 2022

5D. Consider Approval of Proposal for Study of Chloride Extraction/Dilution from Parkers Lake (PL-7)

Recommendations:

1. Consider approving the scope of work and \$45,000 budget presented in this memorandum and direct the Engineer to complete the study of chloride extraction/dilution from Parkers Lake.
2. Direct the Engineer to consult with Metropolitan Council Environmental Services to obtain a Special Discharge Permit for discharge of the high chloride lake water and/or reverse osmosis concentrate.
3. Direct the Engineer to consult with Minnesota Department of Natural Resources on permit considerations for downstream discharge of high chloride lake water and/or the return flow of treated water.

Background

The proposed option to remove chloride from Parkers Lake was identified as one of the possible capital projects to further analyze for the Parkers Lake Chloride Reduction Project (PL-7). Parkers Lake is impaired for chloride, which collects at the bottom of the lake. During normal conditions, there are no outflows from the lake—in very high-water conditions, water flows from the lake to a lift station and a stormwater system that eventually discharges into Medicine Lake. Three Rivers Park District (TRPD) and the City of Plymouth monitor the watershed stormwater inflows into Parkers Lake. Land uses south of the lake are primarily residential, northwest of the lake are primarily park and multifamily, and northeast of the lake are industrial/ commercial. In-lake chloride monitoring, which has been ongoing since 2006, confirms that it is common for the lake to exceed chloride standards. Watershed monitoring shows the area northeast of the lake contributes the highest amount of chloride to the lake.

The Commission approved a feasibility study in May of 2020 with one approved project for chloride reduction in the northeast portion of the lake's watershed. The city partnered with the Hennepin County Chloride Initiative, cities, and watersheds to convene a technical cohort to investigate chloride reduction projects and education strategies. Data was pooled and analyzed for similarities to better target best

management practices (BMPs), risks and opportunities for Parkers Lake. Three primary recommended BMPs resulted from the technical cohort's work: 1) develop a grant program that targets chloride reduction through private applicators and private property, 2) construct a pilot program for an on-site collection system to capture chloride effluent for disposal or reuse, 3) perform in-lake chloride removal through dilution or effluent removal.

At the July 21, 2022, Commission meeting, the City of Plymouth reviewed more specifics of each BMP option including pros and cons, general cost, general level of effort, and presumed efficacy. Commissioners discussed the options and a previous engagement with Metropolitan Council Environmental Services (MCES) regarding whether they would allow the discharge of chloride-laden stormwater to the sanitary sewer and noted that the discussion with MCES may need to be revisited for some of the options. During the Commission meeting, it was noted that discharge to the sanitary sewer bypasses other resources like Medicine Lake, which is on the cusp of being impaired for chlorides. It was also noted that the Mississippi River is still far from exceeding chloride standards and occasional discharges to the river through the sanitary sewer are unlikely to impair the river; thus, this strategy may be a cost effective, removal tool to protect the environmental health of a lake. The City of Plymouth proposed that they bring back to the Commission a scope of work for the Commission Engineer to perform an initial study of Parkers Lake to determine how practical in-lake removal could be. The Commission consented to this approach.

The proposed study will involve sample coordination and testing with TRPD, review and discussion of targeted constituent sample analysis with MCES, review of permitting requirements for water withdrawal from the lake and discharge of raw and/or treated water (including reverse osmosis concentrate), estimating costs and amount of chloride removal for each removal method, possibility of Parkers Lake delisting and/or estimated time to return to current state without additional source control measures, meetings and technical memorandum to discuss and document study results, and presentation at a Commission meeting. The chloride extraction/dilution project will likely require a Special Discharge Permit from MCES for discharge of the high chloride lake water and/or reverse osmosis concentrate. The project may also require a Public Waters permit for downstream discharge of high chloride lake water and/or the return flow of treated water.

Content and Scope of Study

The study will address and include the following work scope for analyzing two alternatives: 1) pumping lake water directly to the sanitary sewer, and 2) discharging backwash from reverse osmosis treatment to the sanitary sewer with the return of treated water to the lake.

- Analysis of the two alternatives within the context of the study objectives, including the following for each alternative:
 - Parkers Lake water and chloride mass balance modeling

- Pros and cons analysis
 - Capital cost estimate and a “30-year cost” to repeat each alternative based on mass balance modeling
 - Analysis of life expectancy of each alternative based on mass balance modeling
 - Summary of each alternative for the Commission to judge its merits
 - Cost estimate for annualized cost per pound of pollutant removal
- Analysis of in-lake chlorides will confirm assumptions that discharging water directly downstream to Medicine Lake could result in other environmental impacts to the watershed and volume of water that would need to be trucked to an off-site location is cost prohibitive.
 - Identification of environmental review and permitting requirements

Below is a summary of the work scope components for this study:

1) Sample Coordination and Water Quality Modeling/Analysis

- a) Project kick-off meeting with BCWMC and City of Plymouth staff and preparation of meeting notes.
- b) Coordinate lake water sample testing and analysis of targeted constituents with TRPD staff and a contract laboratory.
- c) Prepare and calibrate Parkers Lake water and chloride mass balance modeling to historical lake and watershed monitoring data.

2) Review of Permit Requirements

- a) Review and discuss targeted constituent sample analyses and lake water quantity/quality modeling of each alternative with MCES staff.
- b) Summarize permit requirements.

3) Evaluation and Concept Design

- a) Conceptually design lake bottom water pumping and discharge system, including water treatment technology (where applicable). Develop two alternative concept plans for pumping, discharge, and treatment, as appropriate.
- b) Identify environmental review and permitting requirements for each alternative, based on one (1) meeting with MCES staff, followed by one (1) meeting with MDNR area hydrologist.
- c) Use the Parkers Lake water and chloride mass balance modeling to estimate long-term impacts to lake chloride concentrations and pollutant removals, following implementation of each alternative. Estimate lake water volume removed, and long-term frequency of pumping events required to ensure lake water chloride standards are met.

- d) Develop cost estimates for the project, including a “30-year cost,” analysis of life expectancy, and annualized cost per pound of pollutant removal for each alternative. Summarize pros and cons of each concept, based on cost-benefit and permit implications.

4) Project Meetings and Technical Memorandum

- a) Coordinate meeting with BCWMC administrator and City of Plymouth staff to discuss preliminary results and recommendations.
- b) Prepare draft technical memorandum for review by City and BCWMC staff; revise report based upon review comments.
- c) Prepare final report for approval at Commission meeting and for use in the presentation to the Commission.
- d) Present final study findings at BCWMC meeting.

Cost Estimate

The table below summarizes our cost estimate for the scope of work outlined above. These costs include the cost of additional sampling by TRPD and analytical testing by a contract laboratory. Samples will be collected in fall, 2022. Additional samples may need to be collected in spring, 2023, depending on draft study results. Fall 2022 sampling/analysis costs are estimated to be \$2,000. The Commission will reimburse the City of Plymouth for these costs. Spring 2023 sampling/analysis costs, if necessary, are estimated to be \$3,000. Either the Commission Engineer or the City of Plymouth will contract with TRPD for this work. If the City of Plymouth contracts with TRPD then they will be reimbursed for these costs.

Tasks	Estimated Total
1) Sample coordination and water quality modeling/analysis	\$15,000*
2) Review of Permit Requirements	\$5,000
3) Evaluation and Concept Design	\$10,000
4) Project Meetings and Technical Memorandum	\$15,000
Total	\$45,000

* includes TRPD sampling/analysis costs

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 Plymouth staff	September 2022
Lake water sample coordination and water quality modeling/analysis	September/October 2022
Meeting with MCES to discuss permit requirements/options	November 2022
Develop concept alternatives and cost estimates	November/December 2022
Meeting with City and BCWMC staff to discuss preliminary results	December 2022/January 2023
Submit draft technical memorandum for City and BCWMC staff review	January 2023
Submit final technical memorandum for BCWMC review at Commission meeting	May 2023
Final Technical Memorandum – BCWMC approval at Commission meeting	June 2023