memo

Project Name |	Brewer's Pond Water Quality Improvement Feasibility Study Proposal	**Date** |	5/8/2026
To / Contact info |	BCWD Board of Managers		
Cc / Contact info |	Karen Kill, District Administrator		
From / Contact info |	Anne Wilkinson, PhD, Camilla Correll, PE		

Background

Brewer's Pond is classified as a Lake in the BCWD Rules, with the BCWD function and value category of Manage 1 (high and medium MnRAM ratings). Over the past several years, Brewer's Pond has received water quality grades ranging from F+ to C- as reported by the Brown's Creek Watershed District Water Monitoring reports. The pond consistently exceeds impairment thresholds for chlorophyll-α, Secchi disk transparency, and total phosphorus. Residents living on Brewer's Pond have expressed concerns about declining water quality and have requested that the BCWD explore options to improve conditions.

Key Points of Concern:

- Chlorophyll-α: Eutrophic to hypereutrophic levels observed in 2017-2018, 2022-2025.
- Secchi Disk Transparency: Lower than threshold in 2017-2018, 2022-2025
- Total Phosphorus: Above threshold 2017-2018, 2022

Recent watershed improvement projects have been completed to improve pond functioning and water quality. In 2025, BCWD partnered with the City of Stillwater to install a stormwater device to remove sediment entering Brewer's Pond to improve water quality. Given the small drainage area and limited opportunities for further external loading control, EOR is recommending a feasibility study to determine the phosphorus budget, specifically to quantify the internal load in Brewer's Pond as the possible driver for historically poor water quality.

Scope of Services

The following is a proposed scope and budget for the water quality improvement feasibility of Brewer's Pond. The following sections outline the proposed tasks.

Task 1. Sediment Sampling

One of the key causes of poor water quality in lakes and ponds is a process called **internal loading** which is the release of phosphorus that has accumulated in the bottom sediments back up into the water. Phosphorus is the primary nutrient that fuels algae blooms, and in many water bodies the sediment at the bottom acts as a hidden reservoir of phosphorus that can continue feeding algae growth even after external sources like stormwater runoff have been reduced. Understanding how much phosphorus is stored in Brewer's Pond sediments and how readily it is being released into the water is essential to designing an effective long-term management strategy.

To assess this internal load, EOR will collect sediment cores at three locations on Brewer's Pond. Each core will be sent to the University of Wisconsin Stout where lab analysis will be completed for phosphorus (P) fractions and P release rate. Cores will be divided into six depth segments ranging from the very surface down to 20 centimeters. Each segment will be analyzed for four different forms of phosphorus: loosely-bound phosphorus, which is the most easily released into the water; iron-

bound phosphorus, which is tied to iron in the sediment and can be released when oxygen levels in the water drop; labile organic phosphorus, which comes from decomposing plant and animal material; and aluminum-bound phosphorus, which is generally more stable and less likely to be released. Understanding how much phosphorus exists in each of these forms helps determine not just how much phosphorus is stored in the sediment, but how much of it is likely to be released under different conditions and therefore how significant the internal load problem is in Brewer's Pond.

At one of the three core locations, EOR will measure the rate at which phosphorus is being released from the sediment into the water above it. This release rate measurement provides a real-world check on the laboratory analysis and helps quantify how much phosphorus internal loading is contributing to the pond on an ongoing basis.

The results of this sediment analysis will be used to calculate the total internal phosphorus load in Brewer's Pond and determine whether internal load treatment is needed. Common treatment options include aeration systems that keep oxygen levels high enough to lock phosphorus in the sediment, or the application of aluminum-based compounds (alum) that bind phosphorus and prevent its release.

Task 2. BATHTUB model

To understand why Brewer's Pond is struggling with water quality and what it will take to improve it, EOR will develop a comprehensive phosphorus budget for the lake. External (watershed) phosphorus loads have been estimated for water quality modeling (P8) that was conducted previously for the Long Lake subwatershed. The internal load will be estimated by the sediment release data collected from the sediment cores (Task 1), pond bathymetry, and historic dissolved oxygen (DO) dynamics.

Once both the external and internal loads are quantified, they will be combined into a lake response (BATHTUB) model that predicts how the pond's water quality will respond to different management actions. This modeling will help determine which treatment options are feasible, how effective they are likely to be, and how long improvements can realistically be expected to last before additional management may be needed.

Task 3. Feasibility Report

EOR will analyze all data collected during this study and prepare a summary report identifying the most promising options for improving water quality in Brewer's Pond.

A central focus of this analysis will be evaluating whether an alum treatment is appropriate for the pond. To determine whether alum is the right tool for Brewer's Pond and how it should be applied, EOR will:

- Review historical and current water quality data and long-term phosphorus trends to understand how nutrient conditions in the pond have changed over time.
- Use sediment phosphorus data to calculate the appropriate alum dose and estimate treatment cost.
- Use phosphorus release rates and oxygen level data to determine where in the pond alum treatment would be most effective.

- Evaluate the best timing for treatment, which is typically when aquatic plant growth is at its lowest, to maximize effectiveness.

The findings will be compiled into a technical memorandum summarizing the pond's internal loading conditions, the preliminary alum dosing plan, and recommended next steps for improving long-term water quality in Brewer's Pond.

Fee Summary

Table 1 summarizes the labor, lab fees, and associated costs for the tasks described above.

Table 1. Scope of Services for Brewer's Pond Water Quality Improvement Feasibility

Task	Description	EOR Estimated Hours	Lab fees	Estimated Cost
1	Sediment Sampling	28	$5,184	$9,877
2	BATHTUB modeling	44	-	$6,898
3	Feasibility Report	44	-	$8,164
	Total	**116**	**$5,184**	**$24,939**

Requested Action

1. Approve this scope of services not to exceed $24,939 with Emmons & Olivier Resources of which $5,184 will be subcontracted with UW-Stout for sediment analysis, all from account 967-0000.

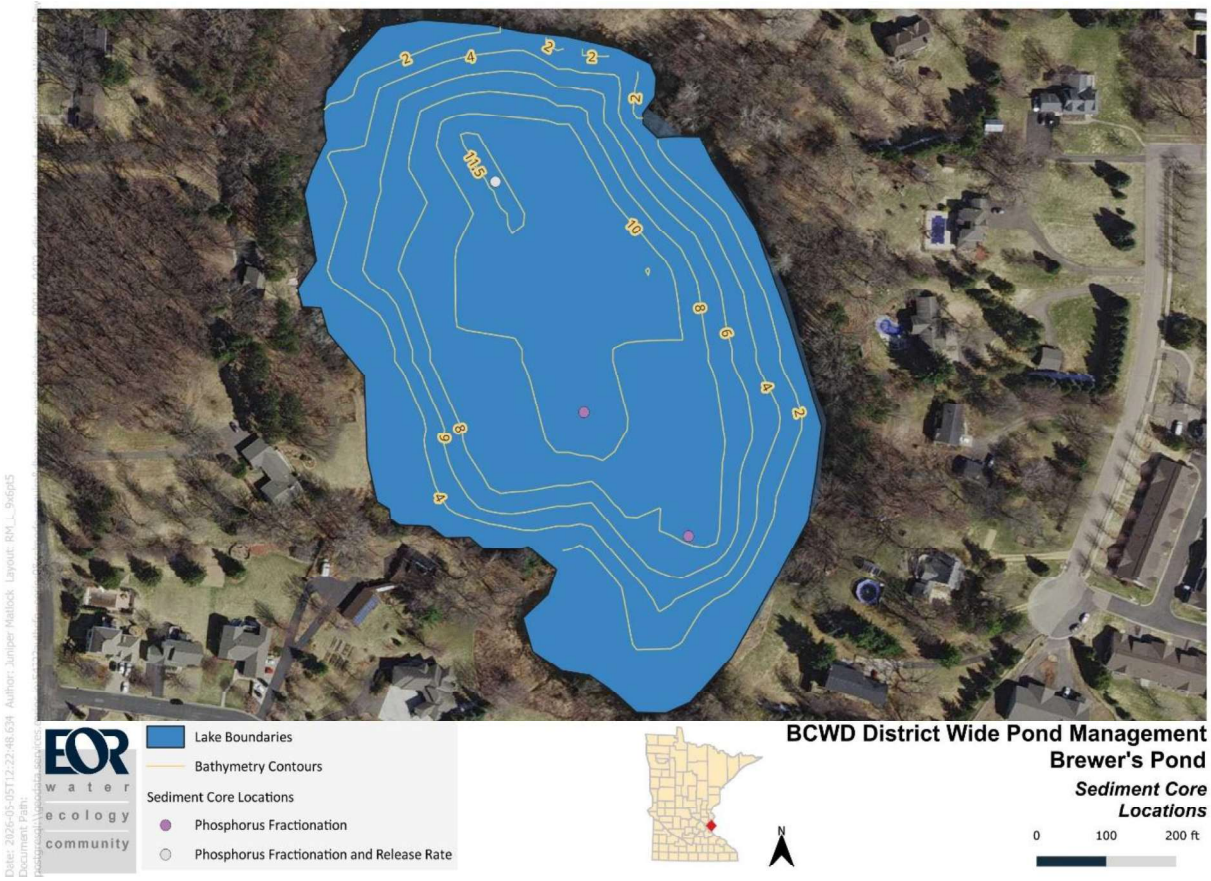

Figure 1: Proposed monitoring sites.