



## MEMORANDUM

Comfort Lake-Forest Lake Watershed District

Date: May 4, 2023  
To: CLFLWD Board of Managers  
From: Mike Kinney, District Administrator  
Subject: PUBLIC HEARING: Forest Lake Alum Treatment Project  
Ordering



Forest Lake  
Management District

### Background/Discussion

The purpose of this agenda item is to hold the Public Hearing for the Forest Lake Alum Treatment Project. This is a capstone project for Forest Lake's water quality and will result in a phosphorus removal of 527 pounds per year.

The Public Hearing shall consist of the following elements:

1. Opening of the Public Hearing
2. Presentation of the Project by District Staff
3. Opportunity for Public Comment
4. Closing of Public Hearing

Board action on the question of ordering the Project is a separate item later in the meeting agenda. It is suggested that other than questions of staff or the District Engineer, Board discussion be held for the later agenda item.

### Attached

- Project Basis & Funding Memo

**Project Name** | Forest Lake Alum Treatment  
Board of Managers

**Date** | April 20, 2023

**Cc / Contact info** | Mike Kinney

**From / Contact info** | Cecilio Olivier, PE / Joe Pallardy / Brian Rucker

**Regarding** | Project Basis and Funding

## Background

The District has been working to improve water quality in Forest Lake. Forest Lake is the largest lake in the Comfort Lake Forest Lake Watershed District (CLFLWD) and the largest lake wholly in Washington County. Forest Lake is an important recreational and ecological resource with three public access sites, good water quality, and a healthy fish and aquatic plant community. A 2018 Diagnostic Study and Implementation Plan Update identified that a Total Phosphorus reduction of 923 lbs./year was needed at Forest Lake to achieve a long-term, five-year average summer phosphorus concentration at or below 30 ppb as identified in the CLFLWD 2022-2031 Watershed Management Plan. Since 2018, the CLFLWD has achieved over 80% of the load reduction goal for Forest Lake through watershed practices. However, as past studies have indicated, there is still an internal reservoir of phosphorus in Forest Lake that continues to hinder the improvement of water quality in the Lake. Alum treatment is proposed to help achieve the internal load reductions needed to reach the 30 ug/L goal for each basin. The predicted load inactivated from an alum treatment to the Middle Basin was estimated to be approximately 527 lb./yr for an average year. The alum dosing should benefit all three basins in the lake with in-lake TP concentrations decreasing in each basin. With the full alum treatment in the Middle Basin, the predicted area average in-lake TP concentration for Forest Lake is expected to be very close to meet the District's goal of 30 µg/L. However, close monitoring of the actual effectiveness of the proposed split dosing in the Middle Basin needs to occur to inform any needed adaptive management.

## Project Feasibility

In 2022, the District completed a [Forest Lake In-Lake Management Feasibility Study](#) to review options to address internal loading on Forest Lake. This study concluded that a partial lake alum treatment of Forest Lake sediments to achieve the internal phosphorus load reductions was recommended for Forest Lake to meet District water quality goals.

As part of that study nine (9) sediment cores were collected by EOR staff on March 18, 2022 including two (2) cores from the West Basin, four (4) cores from the Middle Basin, and three (3) cores from the East Basin. Two (2) additional cores, including one (1) from the East Basin, and one (1) from the Middle Basin were collected on May 29, 2022. The 2 additional cores were used to validate a decrease in Redox-Sensitive Phosphorus (RP) concentrations below the first 6 cm in the sediment. Each core section was analyzed by the University of Wisconsin-Stout Center for Limnological Research and Rehabilitation for sediment total phosphorus and phosphorus fractions. Sediment cores were sectioned in 2-cm increments to a sediment depth of 12 cm. Statistical analysis were performed to identify the presence or absence of trends in RP content based on sediment depth within the sediment core (0-2 cm, 2-4 cm, 4- 6 cm, and 6-12 cm). Analysis of the sediment cores was required to achieve the following three objectives: 1) Determine the pool of RP in the lake sediments that is

available to migrate into the overlying water column. 2) Measure the release rate of sediment phosphorus. 3) Determine the amount of alum required to inactivate sediment phosphorus and reduce internal phosphorous loading. A total dose of approximately 73,390 gallons of liquid aluminum sulfate is recommended. This equals an application rate of 667 gallons per acre at all depths greater than 15 feet on the middle basin (106 acres) to mitigate excess internal sediment phosphorus load in Forest Lake (Figure 1). Due to the high amount of alum that needs to be applied per acre, the treatment is being proposed to be split over two doses, two years apart (fall 2023 and fall 2025). Low alkalinity levels in Forest Lake also indicate that a buffer agent will need to be applied concurrently with the liquid alum to prevent pH levels from dropping to unsafe levels for fish and other aquatic life (less than pH of 6.0).

Access and staging for the alum treatment will be located at Forest Lake #3 Boat Launch located at 9467 N Shore Trail. Forest Lake MN 55025. The District has obtained a Special Use Permit for the use of the Forest Lake #3 Boat Launch for access and equipment staging. The District received an approval letter from the Minnesota Pollution Control Agency (MPCA) on April 4<sup>th</sup> 2023, for application of alum to Forest Lake. To meet the requirements for alum application stated in the MPCA letter, the District will monitor pH during application to insure that the lake pH does not drop below 6.0, and notify local DNR staff and citizens in advance of the planned treatment to avoid confusion during the application.

### Project Costs & Funding

Table 1 below itemizes the estimated project cost and funding sources (CWF Grant & Match/In-kind).

**Table 1: Summary of Project Costs & Funding**

Project Activity	Activity Cost	CWF Grant	Match/In-kind
Alum Treatment	\$590,000	\$533,600	\$56,400
Engineering Services (EOR)	\$38,200	\$0	\$38,200
Project Administration/ Coordination	\$2,000	\$0	\$2,000
Project Development	\$21,800	\$0	\$21,800
Education and Information	\$15,000	\$0	\$15,000
<b>Total</b>	<b>\$667,000</b>	<b>\$533,600</b>	<b>\$133,400</b>

### Summary

Implementation of the Forest Lake Alum Treatment will improve water quality in Forest Lake and downstream receiving waters. The project is expected to reduce internal phosphorus loading to Forest Lake by approximately 527 lbs per year. The total project cost is estimated at \$667,000 with an assumed lifespan of 10 years. This equates to roughly \$124 per pound of phosphorus over the project lifespan. The project is being funded by \$533,600 in CWF grant dollars. The total expected cost to the CLFLWD is \$133,400.

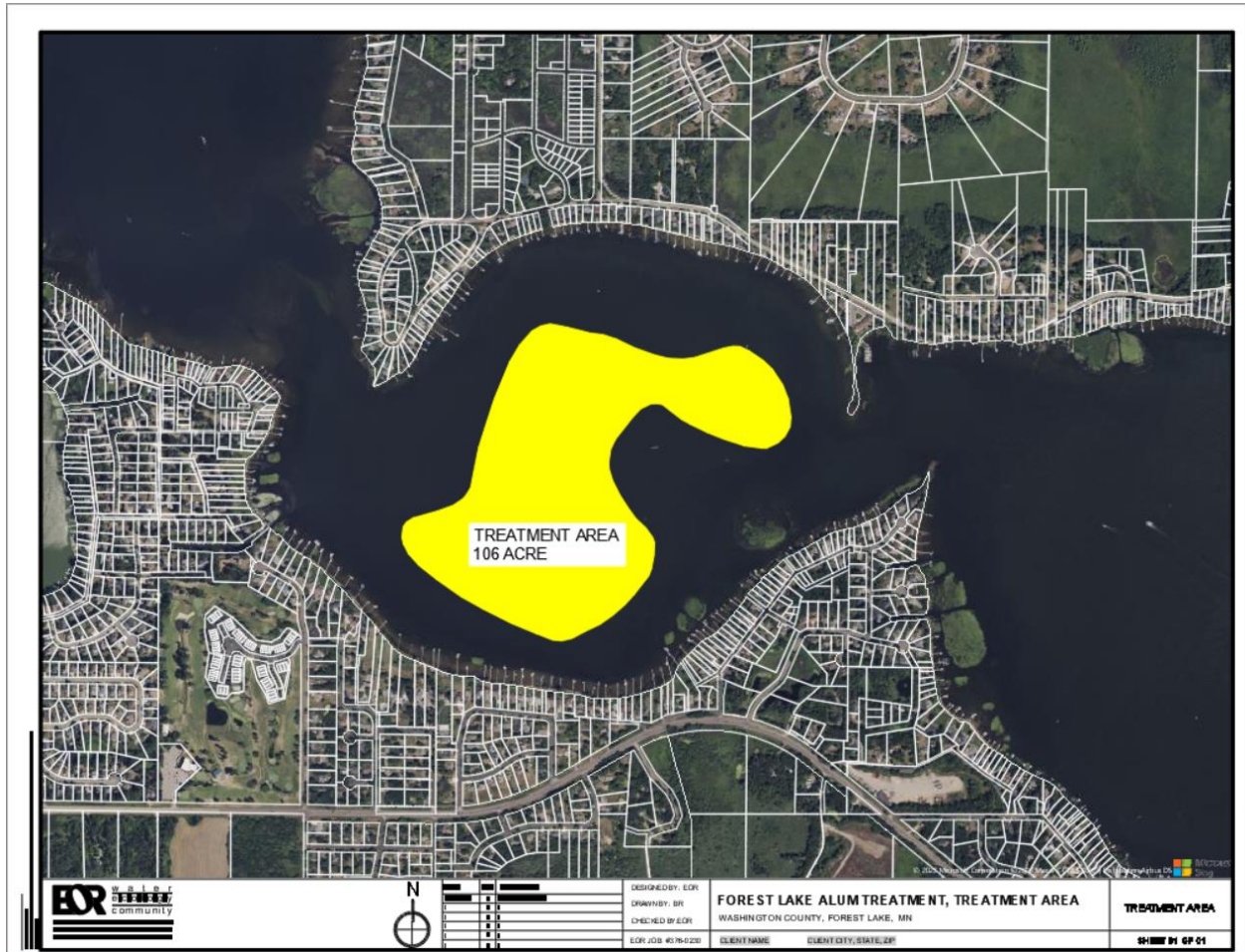


Figure 1. Forest Lake Alum Treatment Area