



MEMORANDUM

Comfort Lake-Forest Lake Watershed District

Date: March 16, 2023
To: CLFLWD Board of Managers
From: Mike Kinney, District Administrator
Subject: Forest Lake Alum Treatment Scope of Work



Forest Lake
Management District

Background/Discussion

The purpose of this agenda item is to consider approving a scope of work from the District Engineer, Emmons & Olivier Resources (EOR), for engineering services associated with the Forest Lake Alum Treatment Project. This project was last discussed at the February 9, 2023 regular board meeting where the Board authorized execution of the associated grant agreement.

The 2023 budget contains \$300,000 under line item 5-228-F (Forest) Internal Load Management for this project. The District has been awarded a FY23 Clean Water Fund grant for this project in the amount of \$533,600 (minimum match: \$133,400). The entirety of the grant is allocated to the alum treatment itself. Match will be composed of staff, legal, engineering, and outreach expenses. Staff have submitted the grant work plan and signed grant agreement to the Board of Water and Soil Resources (BWSR). Once BWSR approves the work plan, it will execute the agreement, and the District can begin incurring grant and match eligible expenditures. EOR will not begin work under the proposed scope until that occurs.

At the February 9th meeting, staff presented an overview of the project outreach plan. Enclosed with this memo is the full outreach plan, as well as a Gantt chart of major project checkpoints.

Recommended Motion

Proposed Motion: Manager _____ moves to authorize the administrator, on advice of counsel, to enter into an agreement with EOR, in accordance with the February 14, 2023, scope of work and in an amount not to exceed \$38,200. Seconded by Manager _____.

Attached: EOR Scope of Work, Project Outreach Plan, Project Gantt Chart

Project Name | Forest Lake Alum Treatment

Date | February 14, 2023

To / Contact info | Board of Managers, CLFLWD

Cc / Contact info | Mike Kinney, CLFLWD

From / Contact info | Cecilio Olivier, PE, EOR
Greg Graske, PE, EOR
Joe Pallardy, EOR
Rosie Russell, EOR

Regarding | Forest Lake Alum Treatment Project Work Plan

Introduction

In 2022, a weight of evidence approach was employed to map alum dosing rates and treatment areas within each basin of Forest Lake. The final alum dose and treatment area was determined based on lake bathymetry, sediment core Releasable Phosphorous (RP) content, biobase bottom hardness measurements, hypolimnion/epilimnion water quality sampling results, and an update to the Forest Lake BATHTUB lake response model. This study concluded that an alum treatment was needed to reduce internal loading in the middle basin. The initial dosing of the middle basin would occur in Summer/Fall of 2023 and the second one in the Summer/Fall 2025.

In 2023, the Comfort Lake Forest Lake Watershed District (CLFLWD) was awarded a Clean Water Fund grant from BWSR to implement the Forest Lake Alum Treatment Project. The proposed alum treatment will reduce internal phosphorus loading by 527 lb/yr and ensure Forest Lake remains below the state standard of 40 µg/L summer average phosphorus concentration. Forest Lake is not listed as impaired for nutrients, but summertime phosphorus readings occasionally exceed state standards, meaning this lake is at great risk of becoming impaired. CLFLWD set its own goal for Forest Lake to achieve and maintain a summertime average phosphorus concentration of 30 µg/L (i.e., even lower than the state standard). Out of the 923-lb/yr external watershed load reduction goal for the lake to achieve this goal, CLFLWD has completed projects achieving 768 lb/yr (83% of external load goal) and has projects in progress to achieve another 128 lb/yr (14% of external load goal). In conducting this alum treatment, the District is predicted to achieve 100% of the internal load reduction goal of 527 lb/yr.

Work Plan

This work plan is broken down into three primary phases.

1. Alum Dosing / Bidding
2. Water Quality Data Review and Lake Response Model Update
3. Civic Engagement and Messaging

Phase 1: Alum Dosing / Bidding

Paleolimnological sediment core data, previously collected by the St. Croix Watershed Research Station on behalf of CLFLWD, and sediment cores collected by EOR have been analyzed to develop an appropriate dosing plan for the middle basin of Forest Lake. The alum dose will be based on the best available science and methods, a weight of evidence-based approach that combines laboratory analysis of sediment core releasable phosphorus content and phosphorus release rate testing under oxic and anoxic conditions, dissolved oxygen monitoring with water quality sampling of the entire water column, BioBase bottom hardness maps, lessons learned from previous alum treatments, and coordination with industry professionals to include Dr. Bill James of UW-Stout and Dr. John Holz of Solitude Lake Management. In addition, the alum dose will be calculated to account for other compounds that affect the binding efficiency of alum to phosphorus in the sediments (recently published in James and Bischoff, 2015. Relationships

between redox-sensitive phosphorus concentrations in sediment and the aluminum: phosphorus binding ratio. Lake and Reservoir Management 31: 339-346), and in-depth post-treatment sediment core sampling and water quality sampling to evaluate the limnological response to alum treatment.

The alum treatment will be split into two treatments. The alum will likely be applied the second or third week of September during a period in which hypolimnion concentrations are highest and ideally outside of the boating season to limit disturbance of the alum flocculant along the lake's bottom. A strategically timed alum dosing in late September/early October should help to encapsulate this dissolved -P and bind it in the floc that will form along the sediment water interface. However, the exact timing of the treatment will be determined by the contractor's availability.

Plans and specifications will be completed for all components of the alum dosing to be bid, including but not limited to finalizing alum dosing rates, sediment incorporation methods, and obtaining MPCA approval. This task will also include preparing project bidding documents, advertising for bids, answering bidding questions, and providing bid packages for alum application to Forest Lake. Finally, this task will include observation and documentation of the alum application and management of the alum application contract. Frequent site visits will be made by EOR engineer and scientists during application to ensure alum is being incorporated into lake sediments as prescribed. Construction contract management will include the processing of pay requests and project close out documentation. Actual application dose and treatment maps provided by the Contractor will be reviewed by an EOR engineer prior to project close out.

Budget: 48 hours - \$9,600

Timeline: Summer 2023 - Fall 2025

Deliverables: Alum dose specifications, Contractor bidding documents, Attendance at pre-bid meeting, Attendance at bid opening, Bid award recommendation memo to CLFLWD Board of Managers, Site observation and project status reports, Pay requests, Actual alum application dosing map

Phase 2: Water Quality Data Review, Sediment Core Collection, and Lake Response Model Update

Post-treatment monitoring of water and sediment chemistry will be used to update the Forest Lake – lake response model (BATHTUB) from which the trajectory of water quality improvement can be determined as part of the District's adaptive management approach toward making informed decisions regarding adjusting alum application and dosage to meet future water quality goals.

In-lake management activities will begin with a split dose alum application to bind releasable phosphorus (RP) in the portions of the middle basin that are greater than 15 feet deep in 2023. From 2023-2025, the CLFLWD will continue to collect water quality data from each basin of Forest Lake. Water quality samples will be collected from the epilimnion, metalimnion, and hypolimnion. This data should be reviewed to validate the reduction of phosphorus achieved through the alum treatment. The lake response model (BATHTUB) should be recalibrated to match observed conditions to validate the relative contribution of external vs. internal phosphorus sources from which future management decisions can be made.

In May of 2024, EOR will collect five (5) cores from the middle basin. The locations of the sediment cores will be representative of the basin conditions and will be designed to capture the spatial variation in sediment chemistry across the probable deep-water internal loading zones present in the middle basin.

All cores will be left undisturbed and delivered to Professor Bill James at the University of Wisconsin-Stout. Each of the five (5) cores will be sectioned into five (5) two-centimeter increments. Each two-centimeter increment will be analyzed for phosphorus fractionation to identify the proportions of releasable-phosphorus present within the upper 10 cm of sediment. Two (2) cores will be used for the phosphorus release rate testing. The sediment phosphorus analysis will be completed by June 2024 and will provide

information on the distribution of phosphorus fractionation in the lake sediments. The lab results will be analyzed, along with the water quality data to help inform the second alum dose which will be completed in 2025. EOR will also continue to communicate with Dr. Bill James to evaluate limnological response to alum treatments being conducted on [East Balsam Lake](#) in western Wisconsin. Lessons learned from this lake (and others) will be compared with data collected at Forest Lake in 2024. EOR will present findings to District staff in November/December 2024 to ensure the 2025 treatment will achieve the desired outcomes.

Budget: 50 hours - \$10,000, Lab analysis – \$6,400

Timeline: Summer 2023 - Fall 2025

Deliverables: In-lake sediment core analysis, Updated Lake response model,

Phase 3: Civic Engagement and Messaging

Forest Lake is an important amenity to residents and tourists within the District. Therefore, this alum treatment is excellent opportunity for the District to build relationships with the public through proactive engagement and awareness. For this phase, District staff will communicate outreach needs to EOR. As directed by the District, EOR will work collaboratively with up to two organizations that support diverse communities within the District to provide assistance in creating educational content and graphics that can be maintained on the District's website and handed out during the alum treatment. These educational materials will also be translated in to up to two additional languages, based on input from the local organizations. This content will provide background context as to why the alum treatment is being conducted, information on blue/green algae, the role of alum in minimizing harmful algal blooms, and the impact of the alum treatment on the health and safety of fishing, swimming, and other water-based activities. The presentation of this content will be informed by discussions with the local organizations and will complement the education and outreach work being conducted by District staff.

Budget: 66 hours - \$11,800, Translation (INGCO International) - \$400

Timeline: Summer 2023 - Fall 2025

Deliverables: Graphics and educational information in formats at the request of the District that can be printed and incorporated into online engagement platforms, translated in up to two languages. EOR understands that CLFLWD will be leading Civic Engagement efforts.

Summary & Recommendation

The total estimated engineering cost for Forest Lake Alum Treatment Project Work Plan is \$38,200. It is recommended that the complete work plan be approved after the Board orders the project.



CLFLWD
WATERSHED DISTRICT



FOREST LAKE ALUM TREATMENT

Education & Outreach Plan



DOCUMENT DATE

03/01/2023

DRAFT - DRAFT - DRAFT



TABLE OF CONTENTS

PURPOSE



The purpose of this document is to provide a detailed description of the timeline, efforts, and materials that will be utilized by the Comfort Lake–Forest Lake Watershed District (CLFLWD) to educate and engage District stakeholders in the upcoming alum treatment on Forest Lake. The District reserves the right to utilize adaptive management to make changes to this plan on an as-needed basis.

SECTION

01 Materials

Topics	04
Print Materials	04
Digital Materials	04

SECTION

02 Events

District Hosted Events/Meetings	06
Partner Hosted Events/Meetings	06

SECTION

03 Timeline

Gantt Chart	07-08
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SECTION

04 Resources

Project Staff	09
Material References	10

SECTION 01

MATERIALS



The District will develop, adapt, and distribute a wide variety of educational and informational materials regarding the Forest Lake Alum Treatment. These materials will come in a variety of formats for both print and digital use.

Education and outreach materials for this project will cover a variety of topics related to the Forest Lake Alum Treatment. The main objective for these materials is to communicate the **purpose** and expected **outcomes** of the alum treatment.

Materials may be added or removed at the discretion of District Staff.

Photo: Image of alum application barge on Moody Lake

TOPICS

Frequently Asked Questions

- » What is an alum treatment?
- » What is the purpose of an alum treatment?
- » When will the application take place?
- » Where will the application take place?
- » Why is the project split over two years?
- » Why is the application only occurring on 2nd lake?
- » What will the application look like?
- » Is it safe for people, pets, and wildlife?
- » Can people recreate during the application? (swim, boat, fish, etc.)

Managing Expectations

- » What does a healthy lake look like?
- » What other lakes have had alum treatments? (Moody, Shields, Bald Eagle)
- » What will Forest Lake look like after the treatment? (Immediate outcomes vs. long-term outcomes)
- » How will the plant community be effected?
- » How long will the results last?

PRINT MATERIALS

Articles/Press Releases

- » East Metro Water Blog
- » Forest Lake Times
- » The Lowdown
- » The Peach
- » City Utility Mailer
- » FLLA Member E-mails

Informational Materials

- » Newsletter
- » Postcards
- » Door hangers
- » Tri-fold brochures
- » Reference sheet for partners/agencies
- » Watercraft Inspector handouts

Signage

- » Standing display for events/tables
- » Barge signage
- » Brochure holder at public access
- » In-progress signage

DIGITAL MATERIALS

Social Media

- » Facebook
Informational Posts & Updates
- » NextDoor
Informational Posts & Updates
- » YouTube
Video mini-series addressing FAQ and expectations

Website

- » News section blog posts
- » Detailed Project Webpage with photo gallery and FAQ section
- » Home page pop-up alert
- » Project events & meetings included on calendar

SECTION 02

EVENTS

The District will host several educational and informational meetings and events prior to the Forest Lake Alum Treatment Project. In addition to these hosted events, the District will also attend several partner and community events to promote awareness of the project and answer questions.

Outreach events for the Forest Lake Alum Treatment Project will occur throughout the summer of 2023. The purpose of these events is to promote awareness of the project, address community concerns, and manage project outcome expectations.

Outreach events are divided into two categories: Partner Meetings and Public Events.

Events may be added or removed at the discretion of District Staff.



Photo: Alum applicator answers questions regarding the Moody Lake alum treatment and give visual tour of the application barge.

PARTNER MEETINGS

Partner communications will begin in late March with initial meetings between key stakeholders including, but not limited to, the Forest Lake Lake Association Board, the City of Forest Lake Staff, the Minnesota DNR, and the Forest Lake Times. While many of these organizations have already been informed of the intent to conduct the alum treatment, the purpose of the initial key partner meetings is to provide District partners with key project facts and to solicit feedback on outreach plan (this document) and the project timeline.

PUBLIC EVENTS

Public communications will begin in mid-May with the annual meeting of the Forest Lake Lake Association serving as the initial kick-off point. This delay between the initial partner meetings and start of public communications will allow time for the District to process and act-on the feedback received from partners and to finalize the development of the materials discussed in Section 01.

Public events are divided into two categories: District Hosted Events and Partner/Community Events.

District Hosted Events

- » [Project Ordering \(May\)](#)
Weekday, Evening @ Board Meeting
- » [In-Person Information Sessions \(June\)](#)
Weekday, Evening @ Hardwood Creek
Weekend, Morning @ Hardwood Creek
- » [Virtual Public Information Session \(June\)](#)
Weekday, Evening @ Zoom, Recorded
- » [Project Open House \(August\)](#)
Weekday, 8am-8pm @ CLFLWD Office
- » [Application Kick-Off \(TBD\)](#)
Weekday, morning @ Public Access

Partner/Community Events

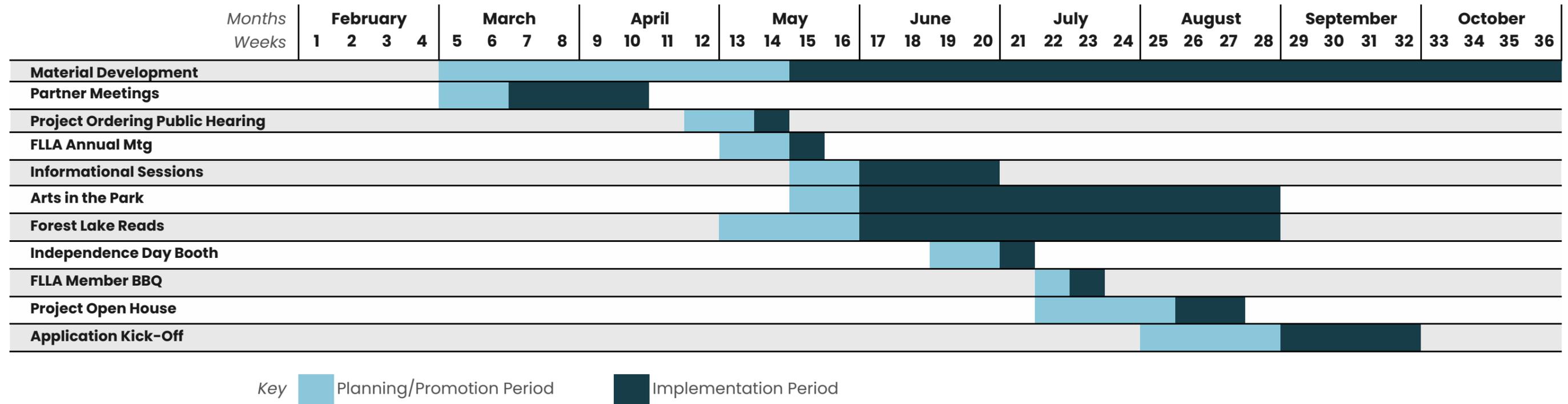
- » [Forest Lake Lake Association](#)
Annual Meeting (May 17)
Member Barbecue (July)
- » [City of Forest Lake](#)
Arts in the Park (June, July, August)
- » [Hardwood Creek Library](#)
Forest Lake Reads (Summer, TBD)
- » [American Legion](#)
Independence Day Festivities (July 4)

Additional public events will be scheduled for 2024 prior to the second alum application.

SECTION 03

TIMELINE

The gantt chart included below provides a visual representation of the various timelines related to the planning, promotion, and implementation of the outreach materials and events outlined in this plan. These timelines are tentative and may be adjusted at the discretion of District Staff. This chart does not include material or event timelines for the second application in 2024. Details for those items will be solidified in spring of 2024.



SECTION 04

RESOURCES

The CLFLWD recognizes that the Forest Lake Alum Treatment Project is a large project not only in terms of scale, but also in terms of public visibility. The District has assigned a team of qualified professional staff to implement the project and engage the community. As with all of the District’s projects, the CLFLWD will also be utilizing the scientific expertise of several consulting firms.

PROJECT STAFF

PROJECT LEAD



Mike Kinney
Administrator

Mike will be the overall lead for the Forest Lake Alum Treatment Project. He has been with the District since 2014 and has successfully lead the District through two prior alum treatments on Shields and Moody Lake.

IMPLEMENTATION



Blayne Eineichner
Project Coordinator

Blayne will be leading implementation efforts for the Forest Lake Alum Treatment Project. He has been with the District since 2019 and has a background in biology, applied ecology, and project management.

OUTREACH



Jessica Lindemyer
Operations & Outreach

Jessica will be leading all outreach efforts related to the Forest Lake Alum Treatment Project. She has been with the District since 2016 and has a background in visual arts, biology, and environmental education.

Photo (right): Forest Lake’s middle basin as seen from the Willow Point public access

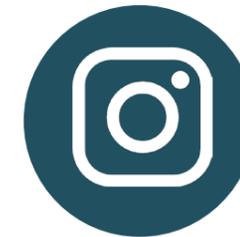


The latest information on the Forest Lake Alum Treatment, and all of the District’s other capital improvement projects can be found at the resources below.



WEBSITE

The CLFLWD website will be the main hub of information related to the Forest Lake Alum Treatment Project.
www.clflwd.org



SOCIAL MEDIA

Regular updates will be posted to the District’s social media channels including Facebook and Instagram
[@clflwd](https://www.instagram.com/clflwd)



BOARD MEETINGS

Updates will be given at the District’s monthly board meetings as part of the project update agenda item.
www.clflwd.org

