Environment and Natural Resources Trust Fund
2020 Request for Proposals (RFP)

Project Title: **ENRTF ID: 118-BH**

Field Testing of a New Phosphorus Removal Technology

Category: H. Proposals seeking $200,000 or less in funding

Sub-Category: B. Water Resources

Total Project Budget: $ 150,000

Proposed Project Time Period for the Funding Requested: June 30, 2023 (3 yrs)

Summary:

The Comfort Lake-Forest Lake Watershed District will pilot new pollutant-removal nanotechnology by installing innovative adsorption pellet containers at multiple sites in order to reduce loading to impaired and/or near-impaired waterbodies.

Name: Mike Kinney

Sponsoring Organization: Comfort Lake-Forest Lake Watershed District

Job Title: District Administrator

Department:

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Forest Lake MN 55025

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Location:

Region: Metro

County Name: Chisago, Washington

City / Township:

Alternate Text for Visual:

Project fact sheet summarizing Clarosorb product and project outcomes

_____ Funding Priorities	_____ Multiple Benefits	_____ Outcomes	_____ Knowledge Base
_____ Extent of Impact	_____ Innovation	_____ Scientific/Tech Basis	_____ Urgency
_____ Capacity Readiness	_____ Leverage	_____ TOTAL	_____%

PROJECT TITLE: Field Testing of a New Phosphorus Removal Technology

I. PROJECT STATEMENT

The Comfort Lake-Forest Lake Watershed District will pilot a new pollutant-removal nanotechnology by installing innovative adsorption pellets in various configurations at multiple sites in order to analyze optimization of this new material so as to reduce loading to impaired and/or near-impaired waterbodies in the most cost-effective manner possible.

Clarosorb is a new proprietary technology that can capture and retain the pollutant of choice. For these trials, the focus will be on dissolved phosphorus (orthophosphate). The new sorbent media; which is available in foam, granule and pellet form; can adsorb over 99% of dissolved phosphorus from water within 1 minute. Furthermore, the amount of phosphorus that can be captured per gram of the material (i.e. the loading capacity) is over 6-10 times higher than other technologies, enabling a small footprint for installation. For example, capturing 40 lbs. of phosphorus requires 55 lbs. of the sorbent material with a footprint less than 0.5 cubic yard. Finally, the bound phosphorus can be efficiently recovered, and the sorbent reused. This is likely to be a game-changer for the field of watershed management moving forward as it may be able to both capture pollutants efficiently and then turn unwanted nutrient pollutants, such as phosphorus and nitrogen, into commodities that can be sold to further reduce the cost of improving water resources.

The main objective of this new technology is to achieve superior removal of dissolved phosphorus with a smaller footprint and lower cost than the currently-used technologies, resulting in improved water quality and less frequent/severe algae blooms. The shared objective of Claros Technologies and the Comfort Lake-Forest Lake Watershed District is to obtain data and demonstrate the effectiveness of the new material in the field. To date, the material has only been tested in the lab. To achieve these objectives, the District proposes to install field-test pilot projects that utilize Claros media at multiple sites in the watershed. Project effectiveness (i.e. actual amount of phosphorus removed) will then be measured. This will result in phosphorus reductions, and subsequently improved water quality, to impaired and/or near-impaired waterbodies such as Forest Lake, Comfort Lake, Bone Lake, Moody Lake, and others. It will mitigate impacts resulting from artificial hydrological modifications in urban and agricultural areas. Moreover, this pilot project will ultimately aim to prove the in-field capacity of this new technology and pave the way for future projects to utilize it, therefore increasing the cost-effectiveness of water quality improvement efforts across the state and beyond.

II. PROJECT ACTIVITIES AND OUTCOMES

Activity 1 Title: Construction and Sorbent Installation

Description: On the ground implementation of sorbent material projects. Multiple sites will be considered for implementation. Prior to the grant period, the District will use its own funds to implement small-scale test sites and identify potential sites to implement larger-scale projects during the grant period. Outcomes of this activity will be evaluated through project effectiveness monitoring, as described in grant Activity 3. This Activity will be carried out by a contractor hired through the appropriate bidding/quotation process, as determined by the final estimated contract price.

ENRTF GRANT BUDGET: $56,000

Outcome	Completion Date
1. Implementation of Claros media at one or more project sites resulting in a measurable reduction in phosphorus, nitrogen, and/or other pollutants	*July 2022*

Activity 2 Title: Development and Engineering of Sorbent Material Project

Description: This activity will include project development, prioritization, feasibility, design, construction contracting assistance, and construction oversight. At the project sites, various design configurations will be

considered specific to each site to minimize clogging while maximizing contact time with the sorbent material. System sizing will be dependent on flows and expected phosphorus loads. Prior to the grant period, the District will use its own funds to perform site identification, feasibility, landowner outreach and landowner agreement execution, so that project implementation during the grant period can begin smoothly. This Activity will be carried out by District staff, District legal counsel (Smith Partners), the District engineer (Emmons and Olivier Resources), and Claros Technologies.

ENRTF GRANT BUDGET: $46,000

In-Kind: $15,000

Outcome	Completion Date
1. Project prioritization list	*December 2020*
2. Project feasibility and design	*December 2021*
3. Construction contract execution	*February 2022*

Activity 3 Title: Monitoring of Sorbent Effectiveness

Description: Project effectiveness monitoring to quantify actual load reductions. Monitoring for results will be performed in two different ways. The first would be to do traditional monitoring at both the inlet and outlet of the treatment system over the course of the season to determine reductions through the system. The second method would be to have Claros Technologies bring the media back to the lab after the season is over and analyze the material to determine the total pounds of phosphorous captured. This Activity will be carried out by Emmons & Olivier Resources and Claros Technologies.

ENRTF GRANT BUDGET: $48,000

Outcome	Completion Date
1. Project effectiveness monitoring report	*July 2022*

III. PROJECT PARTNERS AND COLLABORATORS (TEAM MEMBERS):

- Claros Technologies – proprietor of new sorbent material
- Emmons & Olivier Resources – contracted engineer for the District
- Smith Partners LLP – contracted legal counsel for the District
- Contractor (TBD)

IV. LONG-TERM IMPLEMENTATION AND FUNDING:

Results of this project will be used for future implementation of similar projects at other sites throughout the District and ultimately throughout the region and state. This project aims to test and successfully (i.e. cost-effectively) implement this technology in a field setting. Its success will go toward refining and popularizing this new technology so that it is a reliable and cost-effective solution for watershed management organizations statewide. More specifically, the District plans to continue to implement this technology in similar (i.e. phosphorus-reducing) instances in future years, as well as exploring additional uses such as nitrogen-reducing projects which may also help with managing the invasive species, Eurasian watermilfoil. Additional implementation within the District will be funded by the District's tax levy and/or future grants or local partner contributions.

V. SEE ADDITIONAL PROPOSAL COMPONENTS:

Proposal Budget Spreadsheet – Attached
Visual Component – Attached
Project Manager Qualifications and Organization Description – Attached
Resolution – Attached
Financial Capacity – Most Recent (2017) Approved Audit Attached

Attachment A: Project Budget Spreadsheet
Environment and Natural Resources Trust Fund
M.L. 2020 Budget Spreadsheet
Legal Citation:
Project Manager: Mike Kinney
Project Title: Field Testing of a New Phosphorus Removal Technology
Organization: Comfort Lake-Forest Lake Watershed District
Project Budget: $150,000
Project Length and Completion Date: 3 years; July 2023
Today's Date: April 15, 2019

ENVIRONMENT AND NATURAL RESOURCES TRUST FUND BUDGET	Budget	Amount Spent	Balance
BUDGET ITEM			
Personnel (Wages and Benefits)			
Professional/Technical/Service Contracts			
Emmons & Olivier Resources (Single source contract - Emmons & Olivier Resources is the designated District Engineer by biannual contract with established rate schedule. The Comfort Lake-Forest Lake Board of Managers approves a District Engineer by contract after an RFP process every two years to ensure competitive rates. Emmons & Olivier Resources has extensive knowledge and expertise specific to the Comfort Lake-Forest Lake Watershed District, and is therefore unmatched in its fit for providing engineering support on this project.)	$ 47,000	$ -	$ 47,000
Claros Technologies (Single source contract - Claros Technologies is the proprietor of the sorbent technology, patent pending. No other company has propiety of this new technology, which is the key component of the project. Therefore working with Claros Technologies is crucial to the project.)	$ 45,000	$ -	$ 45,000
Smith Partners LLP (Single source contract - Smith Partners is the designated District Legal Counsel by biannual contract with established rate schedule. The Comfort Lake-Forest Lake Board of Managers approves a District Legal Counsel by contract after an RFP process every two years to ensure competitive rates. Smith Partners has extensive knowledge and expertise specific to the Comfort Lake Watershed District, and is therefore unmatched in its fit for providing legal support on this project.)	$ 2,000		$ 2,000
Construction contractor - TBD (Work will entail fabrication of container, and onsite installation of container and materials. According to the estimated cost, quotes will be obtained through a competitive quotation process. If the estimated cost is revised, the appropriate quotation/bidding process will be used, as defined by statute.)	$ 50,000		$ 50,000
Equipment/Tools/Supplies			
	$ -	$ -	$ -
Capital Expenditures Over $5,000			
Clarosorb sorbent material (Currently estimating that over $5,000 in material alone will be necessary for the project)	$ 6,000		$ 6,000
Fee Title Acquisition			
	$ -	$ -	$ -
Easement Acquisition			
Professional Services for Acquisition			
	$ -	$ -	$ -
Printing			
	$ -	$ -	$ -
Travel expenses in Minnesota			
	$ -	$ -	$ -
Other			
	$ -	$ -	$ -
COLUMN TOTAL	$ 150,000	$ -	$ 150,000

SOURCE AND USE OF OTHER FUNDS CONTRIBUTED TO THE PROJECT	Status (secured or pending)	Budget	Spent	Balance
Non-State:				
State:				
In kind: District tax levy, staff wages and fringe	Secured	$ 15,000	$ -	$ 15,000

Other ENRTF APPROPRIATIONS AWARDED IN THE LAST SIX YEARS	Amount legally obligated but not yet spent	Budget	Spent	Balance
		$ -	$ -	$ -

Clarosorb™ P: Dissolved Phosphorus Sorbent

With its proprietary nanocoating technology, Claros Tech. is able to grow nanoparticles directly on support materials enabling the next generation of water and air sorbents with unprecedented properties and performance.

The Clarosorb™ P sorbent removes over **99%** of dissolved phosphorus within **1 min**, has a **loading capacity of 300-700 mg P per gram sorbent**, and a wide operational **pH range from 3 to 11**.

Other Performance Benefits:

- **Antimicrobial** activity and prevents biofouling
- Highly **selective** to phosphorus and does not capture other elements
- Available in **foam**, **granule**, and **pellet** forms
- Phosphorus can be **recovered** and the sorbent **reused**
- Additional forms available for other nutrients such as **nitrogen**

Project Outcomes

Water Quality

- **Reduce** frequency and severity of **algae blooms**
- Increase **water clarity**
- Capture and **remove** target pollutant (e.g. phosphorus)

Innovation

- **First field test** of this new technology as a tool in watershed management
- Demonstrate **low cost-high return** of new material with a small footprint
- Test in-lake and stream configurations

Project Manager Qualifications and Organization Description

The Comfort Lake-Forest Lake Watershed District is a local government organization that covers 49 square miles in northern Washington and southern Chisago counties. The District includes portions of the City of Wyoming, Chisago City, Chisago Lake Township, Franconia Township, the City of Forest Lake, and the City of Scandia. Like other watershed districts, our geographic boundaries are not determined by municipal boundaries, but instead by hydrologic boundaries. Our mission is protect and improve water resources through adaptive management approaches and education of local stakeholders.

The CLFLWD is governed by an appointed, five-member Board of Managers. Managers are appointed by the counties within which the Watershed District is located. Because the Comfort Lake-Forest Lake Watershed District is located within Chisago and Washington counties, the make-up of the Board of Managers reflects the percent of the watershed within each County. Roughly 60 percent of CLFLWD is within Washington County and 40 percent is within Chisago County. Therefore, in CLFLWD, two managers are appointed by Chisago County and three managers are appointed by Washington County. The Board of Managers meets monthly at Forest Lake City Hall and encourages members of the public to attend.

The District has an Administrator (Mike Kinney), three additional full-time staff members, and two part-time/seasonal staff members. The District also contracts work with an engineering firm, legal firm, and accounting firm in addition to contracting work with the two County Soil and Water Conservation Districts.

More information about the history and approach of the District can be found in the 2012 Watershed Management Plan, which is available on the District website at www.clflwd.org.

Mike Kinney has been the District Administrator for the Comfort Lake–Forest Lake Watershed District since 2014. He has a master's degree in Water Resources Management from the University of Wisconsin, Madison, is a certified crop adviser, and has over 20 years of experience in resource planning and management. In addition, Mike was a commissioned officer in the Navy, did research for NASA while working for the U.S. Bureau of Mines, and spent a year teaching at the University in Prague, Czech Republic followed by a summer research project on Lake Baikal in Siberia. Mike grew up on a dairy farm near Lake Superior where his father taught him the importance of having a business mindset and using cost-benefit analysis. Today, he lives on a farm of his own near Hudson, Wisconsin and utilizes the cost-benefit analysis approach to manage water resources in the CLFLWD.