



Environment and Natural Resources Trust Fund

M.L. 2020 Approved Work Plan

General Information

ID Number: 2020-084

Staff Lead: Michael Varien

Date this document submitted to LCCMR: August 27, 2021

Project Title: Wastewater Pond Optimization Implementation

Project Budget: \$700,000

Project Manager Information

Name: Joel Peck

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Project Reporting

Date Work Plan Approved by LCCMR: August 26, 2021

Reporting Schedule: April 1 / October 1 of each year.

Project Completion: June 30, 2023

Final Report Due Date: August 14, 2023

Legal Information

Legal Citation: M.L. 2021, First Special Session, Chp. 6, Art. 5, Sec. 2, Subd. 20a2

Appropriation Language: The appropriation in Laws 2019, First Special Session chapter 4, article 2, section 2, subdivision 8, paragraph (c), Sauk River Dam Removal and Rock Rapids Replacement, in the amount of \$2,768,000, no longer needed for its original purpose is transferred as follows:

(2) \$700,000 is transferred to the commissioner of the Minnesota Pollution Control Agency, in partnership with the Minnesota Rural Water Association and the University of Minnesota's technical assistance program, to implement a

program to optimize existing pond wastewater treatment systems to increase nutrient removal and improve efficiency without requiring costly upgrades;

(d) Transfers and Availability

The transfers under this subdivision are effective June 30, 2021, and the transferred amounts are available until June 30, 2023.

Appropriation End Date: June 30, 2023

Narrative

Project Summary: Implementing the outcomes of our past project to research optimization activities in Minnesota wastewater ponds. This project will employ technical assistance and grant funds to improve nutrient removal and performance.

Describe the opportunity or problem your proposal seeks to address. Include any relevant background information.

There are opportunities for nutrient removal that optimization activities provide for wastewater ponds that reduce the need for costly upgrades. The 2018 ENRTF-Wastewater Treatment Plant and Pond Pilot Program identified many ways to optimize a wastewater pond. If implemented, the 2018 project estimates nitrogen reduction in Minnesota waters at 1,031,800 lbs., and phosphorous reduction at 1,655,679 lbs. The team has published the report, which provides case studies, and step-by-step optimization guidance. But implementing the findings state-wide, and especially in small cities, will be challenging without providing technical assistance and funding. Minnesota Rural Water Association is uniquely positioned to advise operators in identifying what opportunities exist for their facilities with on-site guidance and support. With the additional support of Minnesota Technical Assistance program, quantifying the data and measuring results, we will be able to achieve better nutrient reductions in wastewater ponds through steady-state primary methods, asset management and small-scale capital improvements to improve pond control, and operator knowledge of their own systems.

What is your proposed solution to the problem or opportunity discussed above? i.e. What are you seeking funding to do? You will be asked to expand on this in Activities and Milestones.

The work proposed includes on-site visits from a pond optimization specialist, who will evaluate the physical conditions of the pond, including riprap, control structures and valves that isolate each pond cell, aquatic vegetation present in ponds, color, odor, and other site conditions. Over the past project, we observed many control structures and valves in various states of disrepair, or missing entirely, increasing what is called a "short circuit" condition. This is a condition in which the flow of water moves uncontrolled through the primary cells to the secondary cells without the necessary detention time to achieve adequate treatment. Dye tests are sometimes necessary to verify a short circuited cell. Sometimes, operator understanding of actual pond characteristics may be incorrect. An example is assumed pond depth may be off. Verifying actual conditions may be a simple optimization activity to extend the holding capacity and treatment. Other activities include finding ways to hold back the water as long as possible with a steady-state flow condition, which maximizes the time wastewater has to be treated. There are times when chemical addition is the best solution to reduce nutrients. All these activities are possible depending on the facility's unique needs.

What are the specific project outcomes as they relate to the public purpose of protection, conservation, preservation, and enhancement of the state's natural resources?

Specific outcomes of the project will be increased nutrient removal of wastewater ponds systems in small cities, without costly capital projects. Optimization can take many forms. Sometimes it will be the addition of chemical treatment. Sometimes, it will be a modification of a flow scheme in the pond cells to increase hydraulic retention time. A pond optimization specialist will provide guidance for site specific conditions. A second outcome is increase asset management for small city pond systems. By establishing a grant to correct deficient control structures, we will increase treatment effectiveness. Thirdly, quantify success with reported Daily Monitoring Report data.

Project Location

What is the best scale for describing where your work will take place?

Statewide

What is the best scale to describe the area impacted by your work?

Statewide

When will the work impact occur?

During the Project

Activities and Milestones

Activity 1: Phase 1, Focus on small cities less than 1,000 in population where need is greatest

Activity Budget: \$262,500

Activity Description:

The team will develop a list of small pond facilities where technical assistance and guidance will serve the greatest need. Additional support will be provided by MnTAP where necessary to determine the optimization activity most likely to improve nutrient removal. This will include developing criteria to prioritize grant funds to correct failing infrastructure within the pond system. Promoting the steady-state primary regime to achieve greatest hydraulic retention time (HRT) to maximize the system's design capacity to deliver the longest duration of treatment. It will also include assessment of control structures, beneficial aquatic plant conditions, or other activities. The optimization specialist will complete a standardized pond assessment form to maintain objectivity. As pond discharges are only periodic, MnTAP will evaluate the success of each site by evaluating DMR data to ensure downward trend in nutrients. Bench testing of chemical addition may also be a component of technical assistance. Where appropriate, the use of alum or ferric chloride may prove to be the final option available to achieve permit compliance and the specialist will assist the facility staff in delivering the proper chemical at the proper dose. Continued monitoring will quantify degrees of success. Phase 1 is expected to last nine months.

Activity Milestones:

Description	Completion Date
Enlist smallest cities for participation and schedule site visit with goal 60 to 80 systems	September 30, 2021
Field notes and compliance inspection data will be used to develop grant criteria.	May 31, 2022
Conclude site work on Phase 1	May 31, 2022
Evaluate outcomes of first spring discharge season	June 30, 2022

Activity 2: Phase 2, Include cities with populations of 1,000 to 3,000 where nutrient removal remains elusive

Activity Budget: \$204,167

Activity Description:

The team will advance to site assessments and evaluations of key facilities in larger communities, though still under 5,000 population. Much like the smallest communities, on-site technical assistance and support will be important to municipalities where permit compliance remains elusive. Steady-state flow regime, evaluation of control infrastructure to eliminate short circuiting, operator knowledge, assessment of pond conditions (odor, color, presence or absence of aquatic vegetation) will be among the possible optimization activates. MnTAP technical support will continue and will ensure success is quantified. Where appropriate, bench testing alum and ferric chloride will also remain a component of service delivered. Delivery of grant funds will continue to be prioritized using field notes and MPCA compliance inspection document.

Activity Milestones:

Description	Completion Date
Enlist and schedule municipalities between 1,000 and 3,000 population, goal 50 to 60	July 31, 2022
Expand grant selection criteria to cities with populations between 1,000 and 3,000	September 30, 2022
Conclude site work for Phase 2	December 31, 2022
Evaluate outcomes to ensure downward trends in nutrient removal resulting from optimization activities.	February 28, 2023

Activity 3: Phase 3, Include largest of cities of target population in implementation

Activity Budget: \$233,333

Activity Description:

Speaking broadly, cities of populations between 3,000 and 5,000 are often better equipped to manage and maintain their infrastructure. So, technical assistance may take different approach. Operator education and understanding of optimal conditions within the pond system are only becoming better understood. Technical assistance and guidance will continue to focus on maximizing treatment with various flow regimes - in series or in parallel, or steady-state. But advising on inflow and infiltration, pH of influent, and pretreatment will be components of services delivered. Grant funds by this phase in the project may well be fully expended, as lower populous cities in general, tend to have greater need and fewer resources to pay for them. But, should funds still be available, the team will expand the prioritization method to include this population group. MnTAP will continue to review DMR data and provide technical support.

Activity Milestones:

Description	Completion Date
Enlist and schedule municipalities of 3,000 to 5,000 population, goal 55 to 60	February 28, 2023
Expand grant selection criteria to cities between 3,000 to 5,000 in population	June 30, 2023
Conclude site work for Phase 3	June 30, 2023
Evaluate outcomes to ensure downward trends in nutrient removal resulting from optimization activities.	June 30, 2023

Project Partners and Collaborators

Name	Organization	Role	Receiving Funds
Frank Stuemke	Minnesota Rural Water Association	Technical assistance and field work necessary to implement the 2021 Optimization Guide for Wastewater Operators	Yes
Jon Vanyo	Minnesota Technical Assistance Program (MnTAP)	MnTAP will provide data analysis and technical review for the project. MnTAP will also serve as an advisor for applications for optimization activities where the best activities are unclear. MnTAP will also hire and train student workers, and provide oversight and guidance to them.	Yes

Dissemination

Describe your plans for dissemination, presentation, documentation, or sharing of data, results, samples, physical collections, and other products and how they will follow ENRTF Acknowledgement Requirements and Guidelines.

Additional case studies will be drafted and added to the Wastewater Treatment Plant and Pond Optimization Pilot Project web site, hosted by MnTAP. The following ENRTF acknowledgement: "Funding for this project was provided by the Minnesota Environment and Natural Resources Trust Fund as recommended by the Legislative-Citizen Commission on Minnesota Resources (LCCMR)," or the official logo of ENRTF will be made. The logo and acknowledgement will be included in all presentations, publications, and printed materials.

Long-Term Implementation and Funding

Describe how the results will be implemented and how any ongoing effort will be funded. If not already addressed as part of the project, how will findings, results, and products developed be implemented after project completion? If additional work is needed, how will this be funded?

Through this appropriation, MPCA will engage Minnesota Rural Water Association to implement recommended wastewater optimization techniques that ensure improved nutrient removal in wastewater stabilization ponds. Activities may include guiding operators through "steady-state primary" flow, identifying short-circuit conditions, or repairing control structures that improve hydraulic retention time. These are among the activities that have proven to improve nutrient removal in previous pilot test scenarios. Quality control will be provided by MnTAP's evaluation of Daily Monitoring Report (DMR) data. A portion of the appropriation will be set aside as a grant fund to provide small-dollar capital projects for on-site control structure repair.

Budget Summary

Category / Name	Subcategory or Type	Description	Purpose	Gen. Ineligible	% Benefits	# FTE	Classified Staff?	\$ Amount
Personnel								
							Sub Total	-
Contracts and Services								
Minnesota Technical Assistance Program	Professional or Technical Service Contract	MnTAP will provide a student and a supervising advisor to monitor the success of pond optimization activities, through analysis of DMR data, and literature view. Activities may also include GIS and shapefile development.				3		\$110,000
Minnesota Rural Water Association	Sub award	Minnesota Rural Water will provide on-site technical assistance through the services or a pond optimization specialist. The specialist will document conditions, and scope of infrastructure needs, recommend the best approach to improve nutrient removal, and instruct operators on best practices for wastewater pond operations.				2		\$306,000
Minnesota Technical Assistance Program	Sub award	Minnesota Technical Assistance Program, with consultation from Minnesota Rural Water Association and Minnesota Pollution Control Agency, will administer a grant to fund the replacement of control structure assets within municipal wastewater pond systems. The maximum award amount will be \$25,000, and will cover non-construction costs, like gates and valves.		X		0		\$200,000
							Sub Total	\$616,000
Equipment, Tools, and Supplies								
	Tools and Supplies	One televising kit. Additional Confined space safety equipment.	The purpose of this line item is for safety of personnel on site.					\$20,000
							Sub Total	\$20,000
Capital Expenditures								

							Sub Total	-
Acquisitions and Stewardship								
							Sub Total	-
Travel In Minnesota								
	Miles/ Meals/ Lodging	Performing the necessary field work for the Wastewater Treatment Plant and Pond Optimization amounted to 47,000 miles in one year for the MRWA Pond Optimization Specialist in 2020. This category should cover mileage at a rate of \$.56, meals, and lodging for this position.	To perform the field work necessary to implement optimization activities, the Pond Optimization Specialist must travel, and travel state-wide. Meals are taken on the road, and over-night lodging is frequent.					\$64,000
							Sub Total	\$64,000
Travel Outside Minnesota								
							Sub Total	-
Printing and Publication								
							Sub Total	-
Other Expenses								
							Sub Total	-
							Grand Total	\$700,000

Classified Staff or Generally Ineligible Expenses

Category/Name	Subcategory or Type	Description	Justification Ineligible Expense or Classified Staff Request
Contracts and Services - Minnesota Technical Assistance Program	Sub award	Minnesota Technical Assistance Program, with consultation from Minnesota Rural Water Association and Minnesota Pollution Control Agency, will administer a grant to fund the replacement of control structure assets within municipal wastewater pond systems. The maximum award amount will be \$25,000, and will cover non-construction costs, like gates and valves.	This generally ineligible cost is justified as isolation of pond cells is critical to the success of wastewater treatment, and especially so with the steady-state primary flow regime. Missing and damaged infrastructure continues to be a symptom of the age and condition of many systems throughout the state. If this small grant program can demonstrate success, it could be the first step in a broader effort to address such conditions. See attachment for proposed program description.

Non ENRTF Funds

Category	Specific Source	Use	Status	Amount
State				
			State Sub Total	-
Non-State				
			Non State Sub Total	-
			Funds Total	-

Attachments

Required Attachments

Visual Component

File: [6b2dbdab-d30.docx](#)

Alternate Text for Visual Component

The map attached detail pond site visits and assessments for 2018 Wastewater Treatment Plant and Pond Optimization Pilot Project. Further, it details where future work will be beneficial....

Optional Attachments

Support Letter or Other

Title	File
Grant Request for Proposals, grant scope and scale	3fa198f6-fb8.docx
Background Check	4490655b-aa2.pdf
System Assessments	5afbe9da-7e7.pdf

Media Links

Title	Link
Work Product from 2018 Wastewater Treatment Plant and Pond Optimization Pilot Project	http://www.mntap.umn.edu/industries/facility/potw/wastewater/wastewater-nutrient-optimization/

Difference between Proposal and Work Plan

Describe changes from Proposal to Work Plan Stage

This project did not have a proposal, but is the result of legislative action.

Additional Acknowledgements and Conditions:

The following are acknowledgements and conditions beyond those already included in the above workplan:

Do you understand and acknowledge the ENRTF repayment requirements if the use of capital equipment changes?

N/A

Do you agree travel expenses must follow the "Commissioner's Plan" promulgated by the Commissioner of Management of Budget or, for University of Minnesota projects, the University of Minnesota plan?

Yes, I agree to the Commissioner's Plan.

Does your project have potential for royalties, copyrights, patents, or sale of products and assets?

No

Do you understand and acknowledge IP and revenue-return and sharing requirements in 116P.10?

N/A

Do you wish to request reinvestment of any revenues into your project instead of returning revenue to the ENRTF?

N/A

Does your project include original, hypothesis-driven research?

No

Does the organization have a fiscal agent for this project?

No

Control Structure Asset Replacement Grant

The Wastewater Treatment Pond Optimization Implementation Project, funded through the Environment and Natural Resources Trust Fund, is making available \$200,000 to assist communities replace missing and damaged water control structures and infrastructure in wastewater treatment ponds. Priority will be given to facilities that must meet a phosphorous limit, or have a compliance schedule to meet a new phosphorous limit.

Who is eligible?

- Minnesota Municipalities under 5,000 in population
- Permitted pond facilities
- Facilities that must meet a phosphorous limit, or have a schedule of compliance to meet a limit within five years.

Maximum award:

\$25,000

Eligible projects:

- Slide gates
- Valves
- Grated Covers
- Hardware

Ineligible project costs

- Construction costs
- Engineering costs
- Construction materials

