LOWER ST. CROIX WATERSHED PARTNERSHIP

Advisory Committee Meeting
Wednesday, Jan. 26, 2-3:30pm

To join the Meeting:
https://us02web.zoom.us/j/81644480415?pwd=TGx6a1ZrN3Z0bGJBM3psRHUxa3dndz09
Meeting ID: 816 4448 0415
Passcode: 732347

AGENDA

1. Welcome and introductions
2. Planning team updates
    - 2022 Timeline for implementation and planning
    - Financial update
    - Request for approval to update the Lower St. Croix interactive web map and migrate the map to a new server (roll call vote)
3. Discussion: 2022 Annual Plan of Work and 2021 Progress Report – Emily Heinz
    - Review/ discuss changes to the 2022 annual plan of work
        - Columns added to identify Fiscal Agent/Responsible Party and Funding Source for each activity
        - Items noted that align with current WBIF grant work plan
        - Partners asked to review and update by Feb. 23
    - Plan for progress reporting
4. Subcommittee Updates
    - A1) Agronomy Outreach – Jay Riggs
        - Jennifer Hahn hired to serve as embedded agronomy outreach specialist in the Lower St. Croix Watershed
    - A2,4,5) Urban and Agricultural Projects – Craig Mell and Mike Isensee
        - Reminder to talk with subcommittees about potential projects for 2022-23
    - A3) Watershed Education – Barbara Heitkamp
    - A6) Wetland Restoration – Becky Wozney
    - A7) Internal Analyses – Susanna Wilson – Witkowski
        - Request for approval: Forest Lake Internal Load Analysis (roll call vote)
    - A8) Targeting and Prioritization Analyses - Mike Isensee
        - Request for approval: Rock Lake (Pine County) Subwatershed Analysis (roll call vote)

PROJECT REQUEST FORM
Lower St. Croix Partnership – Watershed Based Implementation Funding

To: Planning Team (Activity 10), Steering Committee **Date:** January 18, 2022

From: Chisago SWCD, Comfort Lake-Forest Lake WD

Subject: WBIF Project Request: Interactive Web Map Updates, Migration and Hosting

Table of Acronyms

CWMP: Comprehensive Watershed Management Plan	LSC: Lower St. Croix
SWCD: Soil & Water Conservation District	WD: Watershed District
WBIF: Watershed Based Implementation Funding	WMO: Watershed Management Organization

Eligible Project Sponsors

A sponsoring agency is required for each submitted project. The sponsor fills out this request. That agency must be a party to the Joint Powers Agreement for the implementation of the Lower St. Croix Comprehensive Watershed Management Plan. The sponsor, if the project is selected for funding, will enter into a subcontract with the Chisago Soil and Water Conservation District (SWCD) for project funding.

Description of Project (brief paragraph)

Chisago SWCD will be the contract agent on projects that are watershed wide, such as this one. Comfort Lake-Forest Lake Watershed District will provide project support and coordination with Barr.

The purpose of this project has three phases:

1. Add new layers to the Lower St. Croix interactive web map (https://maps.barr.com/LSCWD/1W1P/index.html). The attached GIS Wish List details the proposed new layers. These new layers correspond with some of the priority locations identified in the LSC Implementation Table (CWMP Table 5-1). Adding these layers to the interactive map will help LSC Partners accurately complete annual progress reporting on activities occurring throughout the basin. Cross-referencing these layers with completed activities will help Partners ensure they are reporting activities that actually fall within the indicated priority locations. The proposed new layers do not currently exist and must be created by GIS personnel. Chisago Soil and Water Conservation District will contract with a professional engineering firm to create the GIS layers.
2. Migrate the LSC web map to a new server. The LSC interactive web map resides on server that will be shutting down in the coming months. Barr will migrate the map to its new server and continue hosting in the coming years.
3. Additional web map maintenance. Barr built this task into their proposal in an amount up to $2,000. While LSC Partners should be able to do most of the regular GIS layer updates themselves (once allowed access by Barr), this approval amount could be available to the Partnership if it wants Barr to do any such work that might arise. Note that Barr will not charge for this work except to perform work as requested or to address critical web service needs as they arise.

PROJECT REQUEST FORM
Lower St. Croix Partnership – Watershed Based Implementation Funding

Benefitted Waterbody Information (add rows for additional waterbodies if necessary)

Target waterbody	N/A
Waterbody area (acres)	N/A
Watershed area (acres)	N/A
DNR shoreline classification	N/A
Description of the watershed and near-shore land uses	N/A
Impairment status	N/A
Protection or restoration	N/A

Project Details

Project Name	Interactive Web Map Updates, Migration and Hosting
Project Sponsor	Chisago SWCD (with support by Comfort Lake-Forest Lake WD)
Additional Project Partner(s) (other than sponsor)	N/A
Project Location (lat/long, address, or description)	N/A
DNR Level 8 Subwatershed	N/A
Applicable WBIF Work Plan Activity	Activity 10
Funding Specifically Allocated to this Project in Work Plan (if applicable)	N/A
Estimated Project Timeline	January 26-February 28
Total Project Cost	$5,600
Estimated Lifetime Project Cost (incl. O&M)	N/A
Requested Grant Funding	$5,600 (100%)
Match provided, match source (cannot be state funds)	$0
Target Waterbody (from CWMP Table 5-2, 5-3, 5-4)	N/A
Est. Phosphorus Load Reduction @ Target Waterbody	N/A
Est. TSS Load Reduction @ Target Waterbody	N/A
Calculation Tool Used	N/A
Project Lifespan	N/A
Lifetime Cost-Benefit ($/lb phosphorus removed)	N/A

Pre-Project Identification

Total phosphorus load entering target waterbody	N/A
Total suspended solids load entering target waterbody	N/A
Major sources of nutrient loading	N/A
P reduction required to achieve water quality goal	N/A
Completed projects, load reduction	N/A
Alternative projects, load reduction	N/A

List of Informational Attachments/Templates Included With Form:

1. WBIF Project Request Process Flow Chart
2. CWMP Priority Waterbody Maps
3. CWMP Appendix C – Project Targeting Criteria and Scoring Matrix (for Activities 2, 4, 5, 9)
4. Wetland Restoration Scoring Matrix (for Activity 6)
5. Internal Analysis Request for Funding (for Activity 7; filled out by applicant)
6. Internal Analysis Selection Criteria (for Activity 7; filled out by subcommittee)

7. Targeting Analysis Scoring Matrix (for Activity 8)

Required Attachments for Requesting Partner to Complete (check all that apply):

- ☒ Project Plans/Visual/Map (for all requests) – **GIS Wish List/Project Plan and Barr Proposal**
- ☐ Completed Appendix C Project Scoring Matrix (for Activities 2, 4, 5, 9)
- ☐ Completed Wetland Restoration Scoring Matrix (for Activity 6)
- ☐ Completed Internal Analysis Request for Funding (for Activity 7)
- ☐ Completed Internal Analysis Selection Criteria (for Activity 7)
- ☐ Completed Targeting Analysis Scoring Matrix (for Activity 8)

WBIF Work Plan Activity Color Coding
Implementation - BMPs/Restoration Activities
Implementation - Shared Services
Prioritization & Analysis
Administration

Submit this form and attachments to Angie Hong at (ahong@mnwcd.org) one week prior to the Steering Committee meeting.

PROJECT REQUEST FORM
Lower St. Croix Partnership – Watershed Based Implementation Funding

Steering Committee Roll Call Vote

Steering Committee roll call vote to recommend Chisago SWCD's project for Lower St. Croix Watershed Based Implementation Funding in the amount of $5,600 for Interactive Web Map Updates, Migration, and Hosting.

Organization	Aye	Nay	Absent
Anoka SWCD			
Brown's Creek WD			
Carnelian Marine St Croix WD			
Chisago County			
Chisago Lakes LID			
Chisago SWCD			
Comfort Lake Forest Lake WD			
Isanti County			
Isanti SWCD			
Middle St. Croix WMO			
Pine County			
Pine SWCD			
South Washington WD			
Sunrise River JP WMO			
Valley Branch WD			
Washington CD			
Washington County			
TOTAL (need majority vote to pass)			

GIS Wish List: LSC Priority Locations Map Layers

Cross-referenced from CWMP Table 5-1

House all listed layers in the LSC Interactive Map under a new folder titled "Priority Implementation Locations"

Associated Impl. # (more than one may apply)	**Layer #**	**Layer Name**	**Specs (i.e., it is a priority area if it falls into one of the following categories)**
1	1	Groundwater - Ag	• DWSMA vulnerability is moderate, high, or very high (exclude low and very low); or • Pollution sensitivity to wells is high or very high (exclude moderate and low); or • Pollution sensitivity to near surface materials is karst or high (exclude bedrock at/near surface, low, moderate, very low, water); or • Well testing show ≥ 5 mg/L nitrate (leave this layer off if not possible to create/make public)
12	2	Groundwater Recharge	Groundwater recharge zones ("In critical groundwater recharge areas as identified in existing or future maps or studies")
32	3	Watercraft Decontamination	"Within 15 miles of all public boat launches on zebra mussel infested lakes and rivers"
43	4	Forest Management & Woodland Stewardship	"Areas located along bluffland or adjacent to publicly owned forest land such as state parks and trails"

resourceful. naturally.
engineering and environmental consultants

BARR

Janaury 14, 2022

Emily Heinz
Comfort Lake Forest Lake Watershed District
44 Lake Street South
Suite A
Forest Lake, MN 55025

Re: Agreement for development of GIS layers and continued hosting of Lower St. Croix One Watershed One Plan web map

Dear Ms. Heinz:

Thank you for requesting a quote for our services. We will do our best to justify your expression of confidence in us. Should you accept this proposal, this letter, together with our Standard Terms (attached) sets forth the Agreement between Comfort Lake Forest Lake Watershed District (Client) and Barr Engineering Co. (Barr) for work including the development of priority area GIS layers and hosting and maintenance of the Lower St. Croix One Watershed, One Plan (LSC1W1P) web map.

The scope of professional consulting services we will provide for your project includes the following tasks:

1. Developing four layers and adding them to the LSC1W1P web map, including the following:
    a. Groundwater priority areas – based on drinking water supply management area vulnerability, pollution sensitivity of wells, and pollution sensitivity of near surface materials
    b. Groundwater recharge areas – note that existing groundwater recharge/discharge areas are delineated only for Washington County; in other portions of the planning area, we will base this layer on a combination of soil hydrologic classification and depth to water table
    c. Watercraft decontamination priority areas – based on areas within 15 miles of public boat launches on zebra mussel-infested waters
    d. Forest management and woodland stewardship priority areas – including parcels within or abutting publicly-owned forest land and bluff areas

    We assume development of the draft GIS layers will be based on reasonable manipulation, calculation, and/or overlay of publicly available (or readily provided) existing datasets. We assume this task will include one virtual meeting to receive feedback on draft layers and minor revisions to address your comments. The new GIS layers will be maintained on our server.
2. Migrating the LSC1W1P web map to an updated server and hosting the web map through December 2023.
3. Up to 16 hours of web map maintenance/updates through December 31, 2023, billed only as requested.

This Agreement will be effective for the duration of the services or until December 31, 2023 whichever comes first unless terminated earlier by either you or us. We will commence work upon receipt of a copy of this letter signed by you. The estimated schedule for the services includes completion of the four new

GIS layers within one month of receiving this signed Agreement, migration of the web map in Spring 2022, and hosting of the web map through at least December 31, 2023.

We will inform you of our progress by email to emily.heinz@clflwd.org following completion of draft new GIS layers. We will schedule a brief virtual meeting to get feedback on the draft GIS layers. Following addition of the new GIS layers, as revised, to the web map, we assume additional GIS needs for the web map will be communicated by you or an authorized representative, as needed.

For the services provided, you will pay us according to the attached Standard Terms. We will bill you approximately monthly. The cost of the services will not exceed $5,600 without prior approval by you. Costs are broken down by task in the following table. Please note that the estimate cost of ongoing web map maintenance following server migration (up to $2,000, see item 3 below) will not be charged except to perform updates authorized or requested by you or to address critical web service needs of the map as they arise.

Task	Estimated Cost	Estimated Completion
1. Develop four GIS layers representing priority areas*, revise per client feedback, and add layers to LSC1W1P web map	$2,400	Within 1 month of signed agreement
2. Migrate LSC1W1P web map to new server and host through December 31, 2023	$1,200	June 1, 2022
3. Perform up to 16 hours of web map updates, as requested, and critical web service maintenance needs through December 31, 2023	$2,000	December 31, 2023
Total	**$5,600**	

* note that our cost estimate assumes new priority layers will be based on spatial analysis of publicly available (or readily provided) datasets that already exist for the LSC1W1P planning area.

We understand you have the authority to direct us and we will direct communications to you at emily.heinz@clflwd.org unless otherwise requested by you. Direction from you should be provided to Greg Williams at gwilliams@barr.com for development of the new GIS layers and to Maureen McFarlane at mmcfarlane@barr.com for future web map update requests.

During the term of this Agreement, Barr agrees to maintain with a company or companies lawfully authorized to do business in the jurisdiction in which the project is located, the type of insurance and policy limits as set forth below (USD):

Workers' Compensation and Employers' Liability

1. Coverage A: Per State Statute
2. Coverage B: $500,000 Each Accident
   $500,000 Disease – Policy Limit
   $500,000 Disease – Each Employee

Commercial General Liability

1. $2,000,000 General Aggregate

2. $2,000,000 Products – Completed Operations Aggregate
3. $1,000,000 Each Occurrence
4. $1,000,000 Personal Injury

Commercial Automobile Liability

1. $1,000,000 Combined Single Limit Bodily Injury and Property Damage

The Commercial Automobile Liability shall provide coverage for the following automobiles:

1. All Owned Automobiles
2. All Non-Owned Automobiles
3. All Hired Automobiles

Umbrella Liability

1. $10,000,000 Each Claim
   $10,000,000 Annual Aggregate
2. The Umbrella Liability provides excess limits for the Commercial General Liability, Employers' Liability, and Commercial Automobile Liability policies.

Professional and Pollution Incident Liability

Professional Liability insurance including Pollution Incident Liability coverage with limits of not less than $5,000,000 Per Claim / $5,000,000 Annual Aggregate.

Certificates of Insurance

Certificates of Insurance will be provided upon request.

Barr and Client waive all rights, including their insurers' subrogation rights, against each other, their subcontractors, agents, and employees, and the other's consultants, separate contractors, and their subcontractors, agents, and employees for losses or damages covered by their respective property or casualty insurance, commercial general liability, or Builder's Risk insurance. This waiver of subrogation is effective notwithstanding any duty of indemnity.

If this Agreement is satisfactory, please sign the enclosed copy of this letter in the space provided and return it to us. This agreement will be open for acceptance until March 1, 2022 unless earlier withdrawn by us (note that delayed acceptance of this agreement will impact the proposed schedule).

Sincerely yours,

BARR ENGINEERING CO.

Karen L. Chandler

Karen Chandler

Its Vice President

Accepted this _____ day of _____, 20____

COMFORT LAKE FOREST LAKE WATERSHED DISTRICT

By _____

Its _____

Attachments
Standard Terms—Professional Services

STANDARD TERMS—PROFESSIONAL SERVICES

Our Agreement with you consists of the accompanying letter or other authorization, Work Orders, and these Standard Terms – Professional Services.

Section 1: Our Responsibilities

1.1 We will provide the professional services ("Services") described in this Agreement. We will use that degree of care and skill ordinarily exercised under similar circumstances by reputable members of our profession practicing in the same locality.

1.2 We will select the means, methods, techniques, sequences, or procedures used in providing our Services. If you direct us to deviate from our selections, you agree to hold us harmless from claims, damages, and expenses arising out of your direction.

1.3 We will acquire all licenses applicable to our Services and we will comply with applicable law.

1.4 Our duties do not include supervising your contractors or commenting on, supervising, or providing the means and methods of their work unless we accept any such duty in writing. We will not be responsible for the failure of your contractors to perform in accordance with their undertakings.

1.5 We will provide a health and safety program for our employees, but we will not be responsible for contractor, job, or site health or safety unless we accept that duty in writing.

1.6 Estimates of our fees or other project costs will be based on information available to us and on our experience and knowledge. Such estimates are an exercise of our professional judgment and are not guaranteed or warranted. Actual costs may vary. You should add a contingency.

1.7 The information you provide to us will be maintained in confidence except as required by law.

Section 2: Your Responsibilities

2.1 You will provide access to property.

2.2 You will provide us with prior reports, specifications, plans, changes in plans, and other information about the project that may affect the delivery of our Services. You will hold us harmless from claims, damages, and related expenses, including reasonable attorneys' fees, involving information not timely called to our attention or not correctly shown on documents you furnish to us.

2.3 You agree to provide us with information on contamination and dangerous and hazardous substances and processes we may encounter in performing the Services and related emergency procedure information.

2.4 You agree to hold us harmless as to claims that we are an owner, operator, generator, transporter, treater, storer, or a disposal facility within the meaning of any law governing the handling, treatment, storage, or disposal of dangerous or hazardous materials.

2.5 Site remediation services may involve risk of contamination of previously uncontaminated air, soil, or water. If you are requesting that we provide services that include this risk, you agree to hold us harmless from such contamination claims, damages, and expenses, including reasonable attorneys' fees, unless and to the extent the loss is caused by our negligence.

2.6 You agree to make disclosures required by law. If we are required by law or legal process to make such disclosures, you agree to hold us harmless and indemnify us from related claims and costs, including reasonable attorneys' fees.

Section 3: Reports and Records

3.1 We will retain analytical data relating to the Services for seven years and financial data for three years.

3.2 Monitoring wells are your property and you are responsible for their permitting, maintenance and abandonment unless we accept that duty in writing. Samples remaining after tests are conducted and field and laboratory equipment that cannot be adequately cleansed of contaminants are your property. They will be discarded or returned to you, at our discretion, unless within 15 days of the report date you give written direction to store or transfer the materials at your expense.

3.3 Our reports, notes, calculations, and other documents, and our computer software, programs, models, and data are instruments of our Services, and they remain our property, subject to a license to you for your use in the related project for the purposes disclosed to us. You may not use or transfer such information and documents to others for a purpose for which they were not prepared without our written approval. You agree to indemnify and hold us harmless from claims, damages, and expenses, including reasonable attorneys' fees, arising out of any unauthorized transfer or use.

3.4 Because electronic documents may be modified intentionally or inadvertently, you agree that we will not be liable for damages resulting from change in an electronic document occurring after we transmit it to you. In case of any difference or ambiguity between an electronic and a paper document, the paper document shall govern. When accepting document transfer in electronic media format, you accept exclusive risk relating to long-term capability, usability, and readability of documents, software application packages, operating systems, and computer hardware.

3.5 If you do not pay for the Services in full as agreed, we may retain reports and work not yet delivered to you and you agree to return to us our reports and other work in your possession or under your control. You agree not to use or rely upon our work for any purpose until it is paid for in full.

Section 4: Compensation

4.1 You will pay for the Services as agreed or according to our then current fee schedules if there is no other written agreement as to price. An estimated cost is not a firm figure unless stated as such and you should allow for a contingency in addition to estimated costs.

4.2 You agree to notify us of billing disputes within 15 days and to pay undisputed portions of invoices within 30 days of invoice date. For balances not paid under these terms, you agree to pay interest on unpaid balances beginning 10 days after invoice date at the rate of 1.5% per month, but not to exceed the maximum rate allowed by law.

4.3 If you direct us to invoice another, we will do so, but you agree to be responsible for our compensation unless you provide us with that person's written acceptance of the terms of our Agreement and we agree to extend credit to that person.

4.4 You agree to compensate us in accordance with our fee schedule if we are asked or required to respond to legal process arising out of a proceeding to which we are not a party.

4.5 If we are delayed by factors beyond our control, or if the project conditions or the scope of work change, or if the standards change, we will receive an equitable adjustment of our compensation.

4.6 In consideration of our providing insurance to cover claims made by you, you hereby waive any right of offset as to payment otherwise due us.

Section 5: Disputes, Damage, and Risk Allocation

5.1 Each of us will exercise good faith efforts to resolve disputes without litigation. Such efforts will include a meeting attended by each party's representative empowered to resolve the dispute. Disputes (except collections) will be submitted to mediation as a condition precedent to litigation.

5.2 We will not be liable for special, incidental, consequential, or punitive damages, including but not limited to those arising from delay, loss of use, loss of profits or revenue, loss of financing commitments or fees, or the cost of capital. Each of us waives against the other and its subcontractors, agents, and employees all rights to recover for losses covered by our respective property/casualty or auto insurance policies.

5.3 We will not be liable for damages unless you have notified us of your claim within 30 days of the date of your discovery of it and unless you have given us an opportunity to investigate and to recommend ways of mitigating damages, and unless suit is commenced within two years of the earlier of the date of injury or loss and the date of completion of the Services.

5.4 For you to obtain the benefit of a fee which includes a reasonable allowance for risks, you agree that our aggregate liability will not exceed the fee paid for our services, but not less than $50,000, and you agree to indemnify us from all liability to others in excess of that amount. If you are unwilling to accept this allocation of risk, we will increase our aggregate liability to $100,000 provided that, within 10 days of the date of our Agreement, you provide payment in an amount that will increase our fees by 10%, but not less than $500, to compensate us for the greater risk undertaken. This increased fee is not the purchase of insurance.

5.5 If you fail to pay us within 60 days following invoice date, we may consider the default a total breach of our Agreement and, at our option, we may terminate all of our duties without liability to you or to others.

5.6 If we are involved in legal action to collect our compensation, you agree to pay our collection expenses, including reasonable attorneys' fees.

5.7 The law of the state in which the project site is located will govern all disputes. Each of us waives trial by jury. No employee acting within the scope of employment will have any individual liability for his or her acts or omissions and you agree not to make any claim against individual employees.

Section 6: Miscellaneous Provisions

6.1 We will provide a certificate of insurance to you upon request. Any claim as an Additional Insured will be limited to losses caused by our sole negligence.

6.2 This Agreement is our entire agreement, and it supersedes prior agreements. Only a writing signed by an authorized representative for each of us making specific reference to the provision modified may modify it.

6.3 Neither of us will assign this Agreement without the written approval of the other. No other person has any rights under this Agreement.

6.4 Only a writing may terminate this Agreement. We will receive an equitable adjustment of our compensation as well as our earned fees and expenses if our work is terminated prior to completion.

6.5 We will not discriminate against any employee or applicant for employment because of race, color, creed, ancestry, national origin, sex, religion, age, marital status, affectional preference, disability, status with regard to public assistance, membership or activity in a local human-rights commission, or status as a specially disabled, Vietnam-era, or other eligible veteran. We will take affirmative action to ensure that applicants are considered, and employees are treated during their employment, without regard to those factors. Our actions will include, but are not limited to notifications, hiring, promotion or employment upgrading, demotion, transfer, recruitment or recruitment advertising, layoffs or terminations, rates of pay and other forms of compensation, and selection for training or apprenticeship.

6.6 Neither we nor you, including our officers, employees, and agents, are agents of the other, except as agreed in writing. Except as agreed in writing, nothing in this Agreement creates in either party any right or authority to incur any obligations on behalf of, or to bind in any respect, the other party. Nothing contained herein will prevent either party from procuring or providing the same or similar products or services from or to any third person, provided that there is no breach of any obligations pertaining to confidentiality.

End of Standard Terms

PROJECT REQUEST FORM
Lower St. Croix Partnership – Watershed Based Implementation Funding

To: Activity 7 Subcommittee, Steering Committee **Date:** January 20, 2022

From: Comfort Lake-Forest Lake Watershed District

Subject: WBIF Project Request: Forest Lake Internal Load Analysis

Table of Acronyms

CWMP: Comprehensive Watershed Management Plan	LSC: Lower St. Croix
SWCD: Soil & Water Conservation District	WD: Watershed District
WBIF: Watershed Based Implementation Funding	WMO: Watershed Management Organization

Eligible Project Sponsors

A sponsoring agency is required for each submitted project. The sponsor fills out this request. That agency must be a party to the Joint Powers Agreement for the implementation of the Lower St. Croix Comprehensive Watershed Management Plan. The sponsor, if the project is selected for funding, will enter into a subcontract with the Chisago Soil and Water Conservation District (SWCD) for project funding.

Description of Project (brief paragraph)

Perform an internal load analysis on Forest Lake (82015900).

Benefitted Waterbody Information (add rows for additional waterbodies if necessary)

Target waterbody	Forest Lake
Waterbody area (acres)	2,270.94 acres
Watershed area (acres)	11,666 acres
DNR shoreline classification	General Development
Description of the watershed and near-shore land uses	Classified as General Development lake. Immediate drainage area is largely urban/suburban development. Of the parcels immediately surrounding Forest Lake, 27% have a shoreline/shoreland area with 75% or greater natural coverage. DNR level 8 watershed land use: forest (22%), open water (22%), pasture/grasslands (20%), developed (18%), wetlands (14%), cultivated cropland (4%)
Impairment status	Affected designated use: AQC Pollutant: Mercury in fish tissue (No impairments for eutrophication)
Protection or restoration	Protection

PROJECT REQUEST FORM
Lower St. Croix Partnership – Watershed Based Implementation Funding

Project Details

Project Name	Forest Lake Internal Load Analysis
Project Sponsor	Comfort Lake-Forest Lake WD
Additional Project Partner(s) (other than sponsor)	N/A
Project Location (lat/long, address, or description)	Forest Lake (ID 82015900)
DNR Level 8 Subwatershed	Catchment ID 3705300
Applicable WBIF Work Plan Activity	Activity 7 – Internal Analyses
Funding Specifically Allocated to this Project in Work Plan (if applicable)	N/A
Estimated Project Timeline	Completed by July 30, 2022
Total Project Cost	$36,330
Estimated Lifetime Project Cost (incl. O&M)	N/A
Requested Grant Funding	$16,500
Match provided, match source (cannot be state funds)	$19,830
Target Waterbody (from CWMP Table 5-2, 5-3, 5-4)	Forest Lake (Table 5-4)
Est. Phosphorus Load Reduction @ Target Waterbody	N/A – to be determined by analysis
Est. TSS Load Reduction @ Target Waterbody	N/A
Calculation Tool Used	N/A
Project Lifespan	N/A
Lifetime Cost-Benefit ($/lb phosphorus removed)	N/A – to be determined by analysis

Pre-Project Identification

Total phosphorus load entering target waterbody	2016 external load reduction goal = 923 lb/yr
Total suspended solids load entering target waterbody	
Major sources of nutrient loading	Subwatersheds: Shields Lake, WJD-6, direct drainage area, Hayward Avenue, Castlewood, 3rd Lake Pond. See Forest Lake Diagnostic Study
P reduction required to achieve water quality goal	923 lb/yr
Completed projects, load reduction	768 lb/yr (see attachment for list of projects)
Alternative projects, load reduction	See Forest Lake Diagnostic Study Implementation Plan

List of Informational Attachments/Templates Included With Form:

1. WBIF Project Request Process Flow Chart
2. CWMP Priority Waterbody Maps
3. CWMP Appendix C – Project Targeting Criteria and Scoring Matrix (for Activities 2, 4, 5, 9)
4. Wetland Restoration Scoring Matrix (for Activity 6)
5. Internal Analysis Request for Funding (for Activity 7; filled out by applicant)
6. Internal Analysis Selection Criteria (for Activity 7; filled out by subcommittee)
7. Targeting Analysis Scoring Matrix (for Activity 8)

Required Attachments for Requesting Partner to Complete (check all that apply):

- ☒ Project Plans/Visual/Map (for all requests)
- ☐ Completed Appendix C Project Scoring Matrix (for Activities 2, 4, 5, 9)
- ☐ Completed Wetland Restoration Scoring Matrix (for Activity 6)
- ☒ Completed Internal Analysis Request for Funding (for Activity 7)
- ☒ Completed Internal Analysis Selection Criteria (for Activity 7)

PROJECT REQUEST FORM
Lower St. Croix Partnership – Watershed Based Implementation Funding

☐ Completed Targeting Analysis Scoring Matrix (for Activity 8)

WBIF Work Plan Activity Color Coding
Implementation - BMPs/Restoration Activities
Implementation - Shared Services
Prioritization & Analysis
Administration

Submit this form and attachments to Angie Hong at (ahong@mnwcd.org) one week prior to the Steering Committee meeting.

PROJECT REQUEST FORM
Lower St. Croix Partnership – Watershed Based Implementation Funding

Steering Committee Roll Call Vote

Steering Committee roll call vote to recommend Comfort Lake-Forest Lake Watershed District project for Lower St. Croix Watershed Based Implementation Funding in the amount of $16,500 for the Forest Lake Internal Load Analysis.

Organization	Aye	Nay	Absent
Anoka SWCD			
Brown's Creek WD			
Carnelian Marine St Croix WD			
Chisago County			
Chisago Lakes LID			
Chisago SWCD			
Comfort Lake Forest Lake WD			
Isanti County			
Isanti SWCD			
Middle St. Croix WMO			
Pine County			
Pine SWCD			
South Washington WD			
Sunrise River JP WMO			
Valley Branch WD			
Washington CD			
Washington County			
TOTAL (need majority vote to pass)			

LOWER ST. CROIX WATERSHED PARTNERSHIP

Request for Funding

Activity 7 – Internal Analyses

Activity 7 Description

The 2021 Lower St. Croix 1W1P Watershed Based Implementation Funding grant includes calculating internal loading of phosphorus on two lakes estimated at $25,000 each. Work is anticipated to be completed by a consultant. This request for funding describes how parties can be considered for the funds.

Eligible Project Sponsors

A sponsoring agency is required for each submitted project. The sponsor fills out this request. That agency must be a party to the Joint Powers Agreement for the implementation of the Lower St. Croix Comprehensive Watershed Management Plan. The sponsor, if the project is selected for funding, will enter into a subcontract with the Chisago Soil and Water Conservation District (SWCD) for project funding.

Process for Requesting Funding

1. **Call for projects (due Oct 15)** - The Internal Loading Subcommittee will send an initial request for projects to all qualifying entities. Responses must only include the lake and description of work anticipated. All respondents will receive a complete list of responses and any subcommittee feedback so they can decide if they wish to apply. Deadlines, both for the call for projects and application will be provided.
2. **Application (due Dec 15)** - Fill out the application below and submit to Susanna Wilson Witkowski Susanna.Wilson@chisagocounty.us. The application requires securing a contractor's quote for the work.
3. **Internal Loading Subcommittee review.** The subcommittee will provide a recommendation to the Steering Committee.
4. **Steering Committee review.** The Steering Committee provides a recommendation to the grant fiscal agent, Chisago SWCD.
5. **Sponsors of successful projects will execute a subcontract with Chisago SWCD.** Grant funds expire Dec. 31, 2023.

Required Internal Analyses Elements

The following are required outputs of the internal analyses. The intention is to position projects for state competitive grant implementation funding. These elements are from the 2022 BWSR Clean Water Fund RFP. Please ensure consultant quotes for the work include all these elements.

a. Lake and watershed information (at a minimum, include morphology and depth, summary of water quality information, and assessment of AIS);
b. Description of internal load vs external load nutrient reductions;

c. History of projects completed in the watershed, as well as other in-lake activities if applicable.
d. Cost benefit analysis of options considered;
e. Projected effective life of the proposed activities;
f. Expected water quality outcome;
g. Plan for monitoring surface water quality to assure the project's total phosphorus goal will be achieved during the project's effective life, and
h. For activities related to rough fish (example, carp) the feasibility study must also include:
    a. Methods used to estimate adult and juvenile carp populations;
    b. Description of the known interconnectedness of waterbodies;
    c. Identified nursery areas;
    d. Methods used to track carp movement;
    e. Proposed actions to limit recruitment and movement; and
    f. Proposed actions to reduced adult carp populations.

<u>Eligible Waterbodies</u>

Table 5-4. Regionally Significant Lakes for Internal Loading Analyses

Lake ID	Name	Internal Loading Analysis Needed*	County
2002600	Linwood	A	Anoka
2003400	Martin	A	Anoka
30000900	Typo	A	Anoka, Isanti
13006901	East Rush	A	Chisago
13008301/13008302	Goose (North & South)	A	Chisago
13001400	Linn	A	Chisago
13003300	Little	A	Chisago
13003400	Pioneer	A	Chisago
13004400	School	B	Chisago
13002900	Wallmark	A	Chisago
13006902	West Rush	A	Chisago
58011700	Rock	A	Pine
82007600	Barker	A	Washington
82012000	Benz	A	Washington
82004900	Big Carnelian	B	Washington
82005400	Bone	B	Washington
82011000	Downs	A	Washington
82003400	East Boot	B	Washington
82015900	Forest	B	Washington
82005900	Goose	B	Washington
82002100	Long	A	Washington
82004200	Lynch	A	Washington
82014800	Plaisted	A	Washington
82015100	South School Section	A	Washington
62000100	Silver	A	Washington
82013500	Unnamed (Echo)	A	Washington
82007700	Unnamed (Goggins)	A	Washington

* "A" lakes are a higher priority than "B" lakes

Activity 7 – Internal Phosphorus Analyses Project Funding Application

Project Summary

Sponsoring Entity	Comfort Lake-Forest Lake Watershed District
Project Name	Forest Lake Internal Loading Analysis
Project Location (lake name)	Forest Lake
Lake DNR ID #	82015900
DNR Level 8 Subwatershed	Catchment ID 3705300
Applicable WBIF Work Plan Activity	Activity 7 – Internal Analyses
Estimated Completion Timeline	Completed by July 30, 2022
Total Project Cost	$36,330
Requested Grant Funding	$16,500

Lake Summary

Waterbody area (acres)	2,270.94 acres
Mean and max depths	Mean: 11 ft; Max: 37 ft
Watershed area (acres)	11,666
Recreational uses	Three public boat launches, public beach/docks, fishing, residential
Description of the watershed and near-shore land uses	Classified as General Development lake. Immediate drainage area is largely urban/suburban development. Of the parcels immediately surrounding Forest Lake, 27% have a shoreline/shoreland area with 75% or greater natural coverage. DNR level 8 watershed land use: forest (22%), open water (22%), pasture/grasslands (20%), developed (18%), wetlands (14%), cultivated cropland (4%)
Impairment status and description of degree of impairment:	Affected designated use: AQC Pollutant: Mercury in fish tissue (No impairments for eutrophication)
Describe any previous internal loading projects:	Annual curly-leaf pondweed herbicide treatment Upgrade and operation of carp barrier at channel flowing from Shields Lake to Forest Lake

1. Waterbody to be analyzed is a Priority A or B lake in the LSC CWMP (Table 5-4, see following pages)? ☒ Yes ☐ No

2. Waterbody has had a TMDL, WRAPS, or similar study that identified internal loading as an important pollutant source to be addressed? ☒ Yes ☐ No

3. When would the internal analysis be completed? (grant funds expire 12/31/2023)?
    a. July 30, 2022

4. Describe plans and any financing to implement internal load treatment based on findings from the internal analyses report.
    a. If an alum treatment is warranted, CLFLWD will apply for grant funds (whether through Clean Water Fund Projects & Practices, Watershed Based Implementation Funding if available in future years, or other sources). CLFLWD will provide matching dollars through its ad valorem tax levy.

5. To what extent has watershed external loading of phosphorus been addressed? Measurable outcomes such as pounds of pollutant reduced compared to the needed reductions are appreciated.

    The District has systematically addressed the majority of external phosphorus loading

    a. As of 2021: reduced watershed phosphorus load by 768 lb/yr out of total reduction goal of 923 lb/yr
    b. External load nutrient reductions to date (total annual P reduction = 768 lb/yr):
        i. Shields Lake Stormwater Reuse & Alum Treatment (531 lb/yr)
        ii. Enhanced Street Sweeping Program (143 lb/yr)
        iii. 3rd Lake Pond Wetland Treatment Basin (56 lb/yr)
        iv. Hilo Lane Stormwater Retrofit (12 lb/yr)
        v. Cost-Share Projects (16 lb/yr)
        vi. Permitted Stormwater Best Management Practices (5 lb/yr)
        vii. FL44 2011 Cattle Exclusion & Prescribed Grazing (5 lb/yr)
    c. External load nutrient reductions in-progress (total annual P reduction = 90 lb/yr)
        i. WJD-6 County Road 50 Iron Enhanced Sand Filter (85 lb/yr)
        ii. Castlewood Agricultural Practices (5 lb/yr)
    d. External load nutrient reductions from future projects (total annual P reduction = 65 lb/yr)
        i. WJD-6 Wetland Enhancement (38 lb/yr)
        ii. Direct Drainage Implementation (27 lb/yr)

6. To what extent is addressing internal loading a critical part of successfully meeting the waterbody's water quality goals? Please include information from any TMDL or similar study.
    a. The 2016 Diagnostic Study indicated Forest Lake's west basin is shown to have excess internal load. See table 2-11 from Forest Lake Diagnostic Study. However, more recent monitoring data suggests the Middle Basin may actually be the most in need of internal load management, such as alum treatment. See presentation slides below.

        Forest Lake Diagnostic Study:
        https://www.clflwd.org/documents/ForestLakeUpdatedImplementationPlan_6-30-2018.pdf

        Forest Lake Internal Load Analysis Presentation Slides:
        https://www.clflwd.org/documents/ForestLkInternalAnalysis_20211130.pdf

7. Please attach a consultant's quote for performing the internal loading analysis. (Attached)

technical memo - forest lmd

Project Name |	Forest Lake In-lake Phosphorus Management Options Analysis	**Date** |	11/24/2021
To / Contact info |	CLFLWD Board of Managers		
Cc / Contact info |	Mike Kinney, District Administrator		
From / Contact info |	Cecilio Olivier, PE & Joe Pallardy		
Regarding |	Scope of Work for In-Lake Phosphorus Management Recommendations		

Purpose

The purpose of this memorandum is to present next steps for addressing in-lake phosphorus (P) loading in Forest Lake, beginning with the development of an in-lake feasibility study. The in-lake feasibility study is required to secure BWSR Clean Water Funds for all in-lake management activities. The goal would be to have this study completed in time to submit a Clean Water Fund Application in 2022 for implementation (applications are typically due around August).

Background

A 2018 Diagnostic Study and Implementation Plan Update identified that a Total Phosphorus reduction of 923 lbs/year was needed to achieve a long-term, five-year average summer phosphorus concentration at or below 30 ppb as identified in the CLFLWD 2012-2021 Watershed Management Plan. The following key implementation activities were identified as being needed to achieve the phosphorus reduction goals:

Major Completed Activities (District has achieved over 80% of the external load reduction goal for Forest Lake):

- Design and construction of the treatment wetland in the 3rd Lake Pond drainage area
- Design and construction of the Iron-enhanced sand filter in the Heath Avenue drainage area
- Leasing of agricultural land in Castlewood Drainage area and conversion from row crops to perennial vegetation
- Design and construction of the Stormwater Harvest and Irrigation Reuse System in the Shields Lake drainage area and subsequent Shields Lake in-lake alum treatment
- Feasibility and assessment studies in the WJD-6, Hayward Avenue, and Castlewood drainage areas to identify potential projects.
- Completion of the Forest Lake Enhanced Street Sweeping Plan, plus technical and financial support for the City of Forest Lake purchasing of a regenerative air vacuum sweeper and the implementation of an enhanced street sweeping program
- Design and construction of the Shields Lake Fish Barrier and winter aerator to support gamefish populations and subsequently control carp reproductive success.
- Other numerous smaller cost share projects and implementation of District permitting, aquatic invasive species management, and education & outreach programs

Remaining Activities

- WJD-6 Implementation – CR50 Iron Enhanced Sand Filter planned for construction in 2022.
- WJD-6 Western Tributary Wetland Enhancement – Clean Water Fund Application submitted in 2021.
- Additional smaller best management practices (BMPs) around Forest Lake as opportunities arise (e.g., BMPs to be implemented with 2022 Forest Lake Street project on North Shore Circle)
- Potential future alum treatment in one or more of the basins of Forest Lake. Recommendation of which basin(s) would benefit from alum treatment will be determined by the outcome of this study.

2019-2020 Phosphorus Monitoring

Phosphorus load reduction in the Forest Lake watershed has been achieved by implementing the activities identified above. However, results from monitoring data collected in 2019 and 2020 still show elevated phosphorus concentrations, especially in the Middle Basin.

Middle Basin

The Middle Basin of Forest Lake has a maximum depth of 37 feet and a mean depth of 11.1 feet. In 2019, the average phosphorus concentration was 51 µg/L during the growing season (June-September). This is above the State Standard of 40 µg/L. In 2020, the average phosphorus concentration was 42 µg/L during the growing season.

Additionally, summer bottom water (hypolimnion) phosphorus concentrations in the deeper areas of Forest Lake, were consistently high in both 2019 and 2020. A preliminary review of in-lake data collected in 2021 showed a similar pattern with high hypolimnion phosphorus concentrations in August and September prior to an October mixing (turnover) event.

Furthermore, dissolved oxygen (D.O.) and temperature data collected by the St. Croix Watershed Research Station showed that the basin was stratified from June until early September in both 2019 and 2020. Therefore, phosphorus release was possible from early June until early September in both years, with increasingly high phosphorus levels occurring in the hypolimnion by August prior to a fall turnover (mixing event).

Eastern Basin

The Eastern Basin of Forest Lake has a maximum depth of 35 feet and a mean depth of 12.6 feet. Observed growing season phosphorus concentrations were below the 40 µg/L standard in both 2019 and 2020. Fifteen (15) of the 16 hypolimnion samples collected from 2019-2020 were also below 40 µg/L. One sample, collected in August of 2020 had a phosphorus concentration of 50 µg/L. D.O. monitoring conducted in 2019 and 2020 suggested the basin was stratified from mid-June until early September in both years. Therefore, phosphorus release was possible from mid-June through early September. However, bottom phosphorus concentrations remained low.

Western Basin

The Western Basin of Forest Lake has a maximum depth of 22 feet and a mean depth of 9.9 feet. Observed growing season phosphorus concentrations were below the 40 µg/L standard in both 2019 and 2020. Similarly, eighteen (18) of the 19 hypolimnion samples collected from 2019-2020 were below the 40 µg/L standard. D.O. monitoring conducted in the 2019 and 2020 suggested there was no extended period of low oxygen in the bottom waters. The Western Basin is likely intermittently stratified during periods of the year and may be subject to multiple mixing events throughout the growing season.

Next Steps

Given that Forest Lake has the characteristics of both a shallow lake (Western Basin) and a deep lake (Middle/Eastern Basin), a variety of management tools may be needed to control in-lake phosphorus release.

Water quality data collected in 2021, paleo cores collected in 2021, and sediment cores proposed to be collected in 2022 will be analyzed to validate the magnitude and duration of internal loading in each basin. CLFLWD has a staff-led comprehensive annual water monitoring plan which includes surface water quality monitoring to assure the project's total phosphorus goal will be achieved during the project's effective life. More information on the monitoring program available at https://www.clflwd.org/monitoring.php

Following this analysis, a cost-benefit evaluation will be performed to estimate the amount of phosphorus reduction per dollar spent on internal load management practices within each basin.

EOR will generate a matrix that includes a range of potential in-lake treatment options that address internal loading in shallow lakes (Western Basin), deep lakes (Middle/Eastern Basin), and internal loading derived from the littoral zone. In-lake management options will be evaluated and presented to the Board.

Work Tasks & Cost

A combination of in-lake practices may be needed to address the internal loading in the three basins of Forest Lake. This scope of work is for analysis of in-lake data collected to date and analyses of additional sediment cores to be collected in 2022. The most feasible solution, balancing effectiveness with cost will be determined. The outcome of this work will be an in-lake management approach for Forest Lake with a preliminary estimate of probable cost and suggested implementation timeline.

The 2020 Minnesota State and Regional Government Review of Internal Phosphorus Load Control suggests the expected lifespan for alum treatments in stratified lakes is between 4 and 21 years. The in-lake feasibility study will highlight how implementation of best management practices has decreased the external load to the lake and how complimentary in-lake practices designed to reduce the release of phosphorus from the littoral zone can increase the longevity of the alum treatment. Further we will identify a strategy for splitting the total dose evenly into two separate applications to maximize the number of phosphorus binding sites.

Objective 1. Assembling Data and Develop Alum Dosing

Fieldwork that has been completed (or will be completed) will be assembled to determine the current carp population density, aquatic vegetation distribution and composition, and distribution of sediment phosphorus concentrations – all of which impact the feasibility and effectiveness of

in-lake management techniques. Fisheries data will be provided by the DNR. Vegetation distribution, species, and density will be provided by work performed by Blue Water Science and other data sources.

In May of 2022, EOR will collect nine (9) additional sediment cores, including two (2) from the West Basin, two (2) from the Eastern Basin, and 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 each basin of Forest Lake.

All cores will be left undisturbed and delivered to Professor Bill James at the University of Wisconsin-Stout. Bill is a Senior Researcher at the University's Center for Limnological Research and Rehabilitation. Bill is the national leader in laboratory analysis of lake sediment samples and was recently recognized with the Advancements in Lake Management Technologies award at the 2018 North American Lake Management Society (NALMS) Conference in Cincinnati, Ohio. Bill was also part of a team that received national recognition from NALMS for their role in the Bald Eagle Lake alum application. Further, Bill has authored several studies on phosphorus binding dynamics, alum dosing rates, and aluminum to phosphorus binding ratios, many of which are published in peer-reviewed, scientific journals such as the Lake and Reservoir Management Journal.

Each of the nine (9) 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. One core from each of the three lake basins will be used for the phosphorus release rate testing. The sediment phosphorus analysis will be completed by June 2022 and will provide information on the distribution of phosphorus fractionation in the lake sediments. In particular, the Limnological Research Center has unique expertise for determining important mobile phosphorus fractions in aquatic sediments. The lab results will be analyzed to suggest soluble phosphorus release rates, alum dosing levels, alum treatment zones, and associated costs needed to sequester phosphorus in the lakebed sediments.

Objective 2. Develop In-Lake Management Approach

Increases in water clarity following a reduction in internal loading may result in an increase in the abundance and distribution of submergent aquatic plants in Forest Lake. The in-lake management plan will identify complementary aquatic plant management practices that can further reduce internal loading in addition to the internal load reductions achieved via carp management, alum treatment or other in-lake practices.

Historical and current vegetation surveys will be reviewed to determine the feasibility of native vegetation re-establishment and the level of aquatic invasive species management likely needed

with a focus on re-establishing native species, especially *Chara spp.* The *Chara* species, also known as Muskgrass, have the ability to bind and precipitate phosphorus from the water column and can deliver oxygen to the sediment – thereby preventing ironbound sediment phosphorus release.

Recent research conducted on Casey Lake in the Ramsey-Washington Watershed District showed that mechanical harvesting of aquatic plant material can be an economical phosphorus removal tool in shallows lakes. Further, research conducted on Lake Pewaukee (Wisconsin) has found that aquatic plant harvesting by the Lake Pewaukee Sanitary District (LPSD) and the Village of Pewaukee has removed up to 52,348 pounds of total phosphorus from the Lake, an amount equal to between 10 to 34 percent of the nonpoint source phosphorus loading to the Lake during this period.

Previous fish surveys and on-going carp management will also be reviewed, and appropriate management techniques researched and identified. While present in Forest Lake, fisheries surveys completed by the DNR in 2017 and 2019 suggest carp abundance in Forest Lake is low. Research at the University of Minnesota has indicated that carp densities of 100 lb/acre or more can have a significant impact on the native vegetation community, and that a density of 30 lb/acre may be a more appropriate target for lake management (Bajer, Sullivan, & Sorensen, 2009).

All data collected to date suggests carp are not a major contributor to the internal nutrient load. EOR will review results from all fishery surveys and will work with the DNR and CLFLWD staff to determine if a fisheries survey is needed to better quantify the carp population. There are many different methods that can be use to refine carp population estimates, including a catch per unit effort method (CPUE) or a mark-recapture method from which we can compare to the 30 lb/acre threshold for carp populations.

Given the current population of carp in Forest Lake is believed to be below the 30 kg/ha threshold identified by Bajer, Sullivan, & Sorensen, 2009, EOR would likely recommend monitoring and tracking carp locations and populations by using a variety of tools, including radio-tags, PIT tags, fin-clipping, and electrofishing. This information would then be used in conjunction with CLFLWD staff knowledge regarding known spawning ground to identify migration routes for potential barrier sites, to locate aggregation areas of carp for removals, and to estimate carp population & biomass removal amounts. If the carp population exceeds 30 kg/ha, EOR will work with CLFLWD staff to identify appropriate physical (seines, baited box nets) and biological (stocking of predatory fish) removal techniques. An adaptive management approach will be developed that engages the public and informs them on ways they can assist.

Following this data analysis, EOR will recommend an integrated in-lake management approach and timeline, including a preliminary cost estimate for budgeting and planning purposes. In addition, the results from this study and the in-lake management recommendations will be presented to the Board for their input and consideration for future budgeting. As these

management activities are undertaken iteratively, an adaptive management approach may allow the County to forego some proposed activities/costs.

Dr. Jim Almendinger, PhD, a senior scientist with more than 20 years of experience in hydrological research, will serve in an advisory role, verifying quality assurance and control on all aspects of the project.

Project Budget

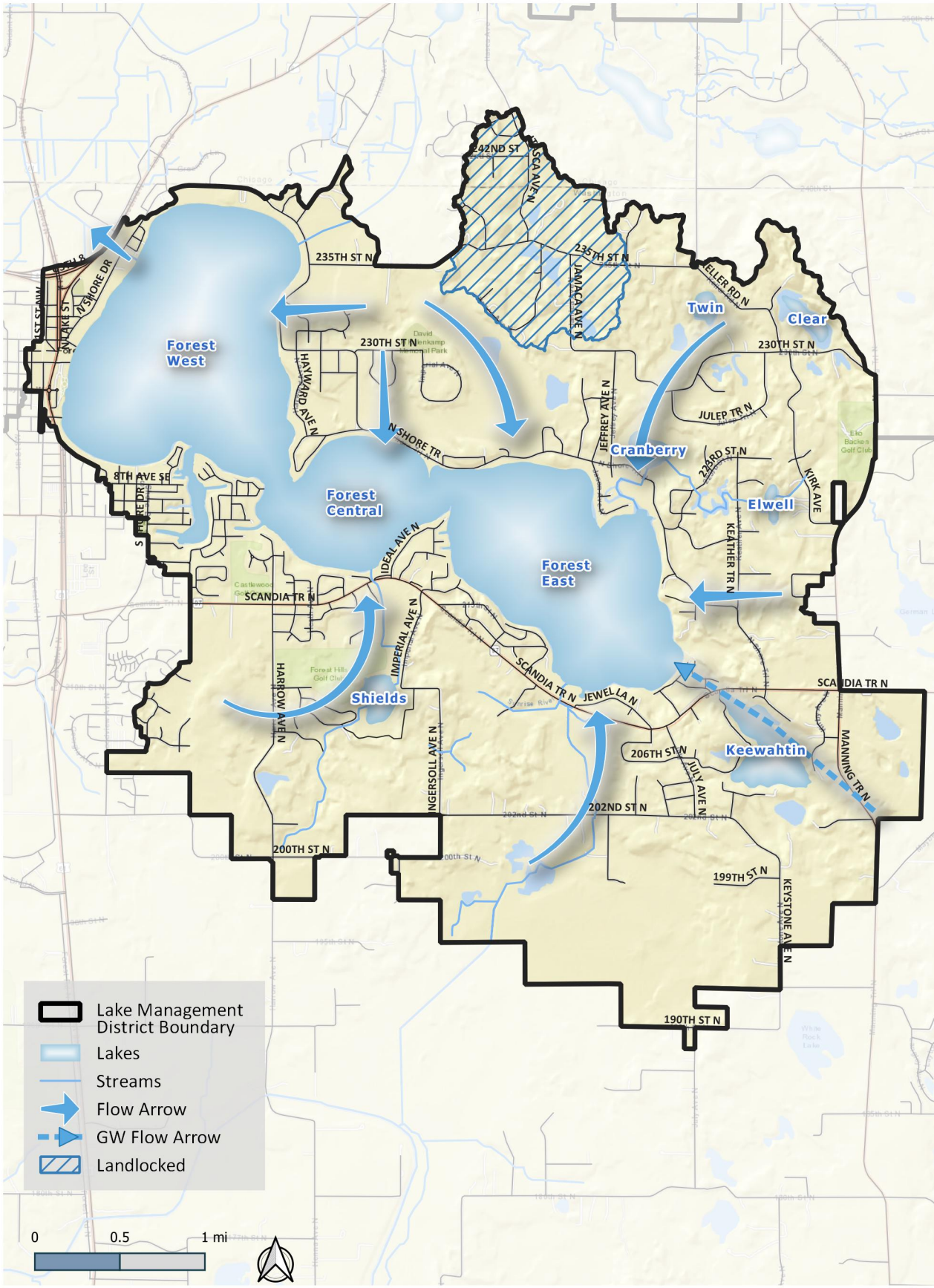
Table 1. Project Budget

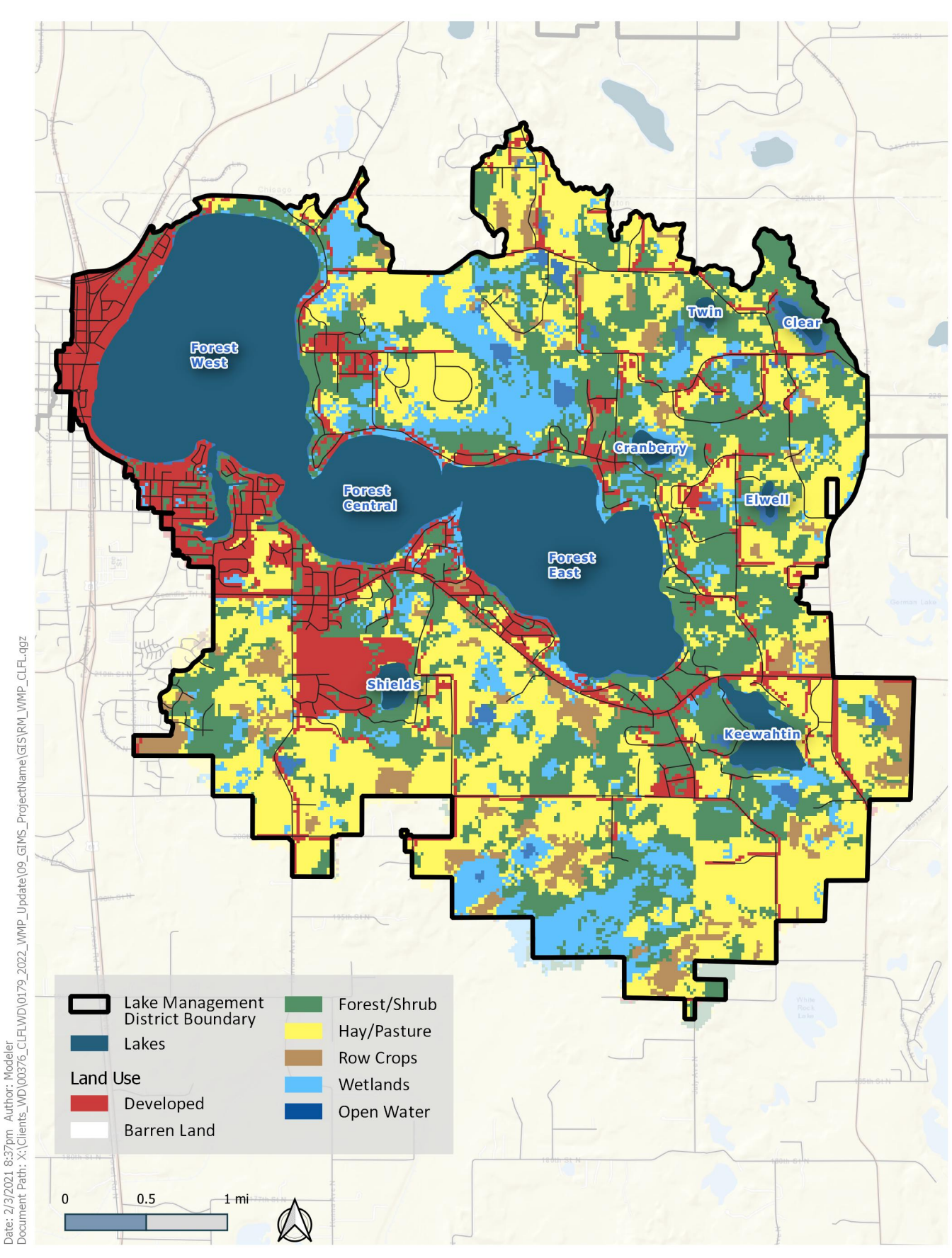
	Labor	Expenses	Total
Objective 1. Assembling Data and Develop Alum Dosing*	$10,110	$14,030	$24,140
Objective 2. Develop In-Lake Management Approach	$12,140	$50	$12,190
Project Total	**$22,250**	**$14,080**	**$36,330**

* Includes costs associated with U.W. Stout laboratory analysis of nine (9) sediment cores.

Project Timeline

This study and all necessary supporting information will be completed by July 30, 2022, such that EOR is positioned to help the CLFLWD apply for a Clean Water Fund grant application in August of 2022. If successful, grant would be awarded in spring of 2023, which would allow for a fall 2023 treatment. The expected water quality outcome, following implementation of prescribed best management practices, is for Forest Lake to achieve a 5-year average summer phosphorus concentration at or below 30 micrograms per liter.




Forest West
Forest Central
Forest East
Twin
Clear
Cranberry
Elwell
Shields
Keewahtin
Lake Management District Boundary
Lakes
Land Use
Developed
Barren Land
Forest/Shrub
Hay/Pasture
Row Crops
Wetlands
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PROJECT REQUEST FORM
Lower St. Croix Partnership – Watershed Based Implementation Funding

To: A8 Subcommittee, Steering Committee **Date:** 1/11/22

From: Pine County

Subject: WBIF Project Request: Rock Lake SWA

Table of Acronyms

CWMP: Comprehensive Watershed Management Plan	LSC: Lower St. Croix
SWCD: Soil & Water Conservation District	WD: Watershed District
WBIF: Watershed Based Implementation Funding	WMO: Watershed Management Organization

Eligible Project Sponsors

A sponsoring agency is required for each submitted project. The sponsor fills out this request. That agency must be a party to the Joint Powers Agreement for the implementation of the Lower St. Croix Comprehensive Watershed Management Plan. The sponsor, if the project is selected for funding, will enter into a subcontract with the Chisago Soil and Water Conservation District (SWCD) for project funding.

Description of Project (brief paragraph)

Benefitted Waterbody Information (add rows for additional waterbodies if necessary)

Target waterbody	Rock Lake
Waterbody area (acres)	88
Watershed area (acres)	6,264
DNR shoreline classification	
Description of the watershed and near-shore land uses	Watershed is described as 8% developed, 30% cropland, 6% woodland, 39% grassland/pasture, and 16% aquatic/wetland
Impairment status	Impaired (TP)
Protection or restoration	Restoration

Project Details

Project Name	Rock Lake SWA
Project Sponsor	Pine County Planning and Zoning Department
Additional Project Partner(s) (other than sponsor)	Pine SWCD
Project Location (lat/long, address, or description)	45.793458, -92.981007
DNR Level 8 Subwatershed	Lower St. Croix
Applicable WBIF Work Plan Activity	Activity 8
Funding Specifically Allocated to this Project in Work Plan (if applicable)	Goal 54 LK 1A, 1B, and 4A (see table 5-3 and Figure 5-3 of Lower St. Croix 1W1P)
Estimated Construction Timeline	12/15/21-5/15/21
Total Project Cost	$8,826.30

PROJECT REQUEST FORM
Lower St. Croix Partnership – Watershed Based Implementation Funding

Estimated Lifetime Project Cost (incl. O&M)	NA
Requested Grant Funding	$12,541.40
Match provided, match source (cannot be state funds)	$579.90
Target Waterbody (from CWMP Table 5-2, 5-3, 5-4)	Rock Lake
Est. Phosphorus Load Reduction @ Target Waterbody	TBD
Est. TSS Load Reduction @ Target Waterbody	TBD
Calculation Tool Used	STEPL, WiLMS, BATHTUB & FLUX if data becomes available
Project Lifespan	NA
Lifetime Cost-Benefit ($/lb phosphorus removed)	TBD

Pre-Project Identification

Total phosphorus load entering target waterbody	15,237 lb/ac/yryr
Total suspended solids load entering target waterbody	271 lb/ac/yr
Major sources of nutrient loading	Cropland, ditches?
P reduction required to achieve water quality goal	1,763 (4,877 in-lake)
Completed projects, load reduction	274
Alternative projects, load reduction	

List of Informational Attachments/Templates Included With Form:

1. WBIF Project Request Process Flow Chart
2. CWMP Priority Waterbody Maps
3. CWMP Appendix C – Project Targeting Criteria and Scoring Matrix (for Activities 2, 4, 5, 9)
4. Wetland Restoration Scoring Matrix (for Activity 6)
5. Internal Analysis Request for Funding (for Activity 7; filled out by applicant)
6. Internal Analysis Selection Criteria (for Activity 7; filled out by subcommittee)
7. Targeting Analysis Scoring Matrix (for Activity 8)

Required Attachments for Requesting Partner to Complete (check all that apply):

- ☐ Project Plans/Visual/Map (for all requests)
- ☐ Completed Appendix C Project Scoring Matrix (for Activities 2, 4, 5, 9)
- ☐ Completed Wetland Restoration Scoring Matrix (for Activity 6)
- ☐ Completed Internal Analysis Request for Funding (for Activity 7)
- ☐ Completed Internal Analysis Selection Criteria (for Activity 7)
- ☐ Completed Targeting Analysis Scoring Matrix (for Activity 8)

WBIF Work Plan Activity Color Coding
Implementation - BMPs/Restoration Activities
Implementation - Shared Services
Prioritization & Analysis
Administration

Submit this form and attachments to Angie Hong at (ahong@mnwcd.org) one week prior to the Steering Committee meeting.

PROJECT REQUEST FORM
Lower St. Croix Partnership – Watershed Based Implementation Funding

Steering Committee Roll Call Vote

Steering Committee roll call vote to recommend [Project Sponsor] project for Lower St. Croix Watershed Based Implementation Funding in the amount of $_____ for the [Project Name].

Organization	Aye	Nay	Absent
Anoka SWCD			
Brown's Creek WD			
Carnelian Marine St Croix WD			
Chisago County			
Chisago Lakes LID			
Chisago SWCD			
Comfort Lake Forest Lake WD			
Isanti County			
Isanti SWCD			
Middle St. Croix WMO			
Pine County			
Pine SWCD			
South Washington WD			
Sunrise River JP WMO			
Valley Branch WD			
Washington CD			
Washington County			
TOTAL (need majority vote to pass)			

Lower St Croix Partnership Prioritization and Targeting Analysis Eligibility

Submit completed form to A8 Subcommittee as an attachment to PROJECT REQUEST FORM

A. Requesting Partner and Contact			
Partner Name	Project Contact	Contact Phone	Contact Email
Pine County	Jeremy A. Williamson	(320) 591-1649	Jeremy.Williamson@co.pine.mn.us

B. Project Information

Project Name

Rock Lake SWA

C. Protocol or Technique

☒ SWA ☐ Feasibility Study ☐ Other*

Assessment Type: ☐ Urban ☒ Rural/Agricultural ☐ *Combined* Urban/Rural

*Approaches not identified in "LSCP Prioritization and Targeting Protocols" must be approved by A8 Subcommittee

D. Gatekeeper Criteria – Please Review, Internalize, and Check

☒ **Priority Location:** The proposed activity is located in a priority location listed in the Implementation (See Table 5.1).

☒ **Priority Activity:** The activity is listed as a high or medium priority for Watershed Based Implementation (See Section VI.E).

☒ **Protocol:** The activity will follow meet the requirements established by the LSC Prioritization and Targeting.

☒ **Agreement***:* Partner will enter into agreement with Chisago SWCD to provide services/product and meet deadlines in the agreement**.**

Program Tracking

A8 Approved	Steering Committee	Chisago SWCD
☐ Date:	☐ Date:	☐ Date:

Lower St Croix Partnership Prioritization and Targeting Analysis Eligibility

Submit completed form to A8 Subcommittee as an attachment to PROJECT REQUEST FORM

Gatekeeper Criteria (from CWMP Section VII.B. on page 95):
3. An analysis is complete and/or data are gathered to target and prioritize specific projects where they will have most benefit using the analyses components below*; or the project is outside an area with a completed prioritization but has a similar cost benefit as a previously analyzed project and benefits the same water resource as the completed analysis. **

*Minimum components of targeting and prioritizing analyses (e.g., SWA (see sidebar on CWMP page 95), diagnostic study, feasibility study):

- ✓ Spatial analysis that includes pollutant delivery evaluation to the targeted waterbody
- ✓ Desktop analysis that includes historical aerial photo review
- ✓ Water quality modeling or monitoring for load reduction analysis
- ✓ Field evaluation for BMP feasibility and potential
- ✓ Cost benefit analysis completed in two ways. First, based on amount of WBIFs/pound total phosphorus removed, and second based on the total project cost/pound total phosphorus removed, both annualized for the anticipated life of the project based on accepted standards (The first calculation would be important if a project includes significant funding partners. For instance, in the case of some very large projects, such as urban retrofits, a private entity or local government may contribute significant funds. In those cases, the cost benefit to state taxpayers contributing to WBIFs would be much lower than the cost benefit of the total project.)

Rock Lake Surface Water Assessment

Description of project area

Rock Lake (58011700) is in southern Pine County near Pine City and is on the EPA 303d impaired waters list due to elevated nutrients. The Lake is in the Rock Creek HUC 12 Watershed, which is in the HUC 8 Lower St. Croix Watershed. The Lower St. Croix Watershed (07030005) is one of four major watersheds on the Minnesota side of the St. Croix River Basin. The rock Lake watershed is 6,182 acres in size and the primary land use in the catchment is agriculture.

There are three inflows to Rock Lake. Rock Creek enters Rock Lake from the northeast and two inlets enters from the southwest.

Rock Lake has a surface area of 87.64 acres, a shore length of 2.77 miles and a maximum depth of 32 feet.

The soils of the watershed are not known at this time as the NRCS has not finished the Pine County soil survey.

Problem to be addressed by project

The purpose of this assessment is to form the basis for a future water quality plan to work in concert with the Goose Creek TMDL and the Lower St. Croix One Watershed One Plan (1W1P) to understand the hydrology and improve the quality of Rock Lake, its tributaries and downstream waters through the implementation of BMPs. Currently Rock Lake is considered an impaired water body by the Minnesota pollution Control agency.

The most recent water quality assessment of Rock lake was done in 2012 and focused solely on Phosphorus and Chlorophyll *a.* All other water quality work in the Rock Creek Watershed has taken place outside of Pine County and a significant distance from the direct outlet of the lake. There has however been citizen monitoring of Secchi depth from 2014-2019.

The EPA Spreadsheet Tool for Estimating Pollutant Load (STEPL) was used to estimate the watershed runoff volumes and phosphorus loads from the direct drainage of Rock Lake for the Goose Creek TMDL. The STEPL model estimates the annual average overland runoff flow and phosphorus load based on land cover, runoff curve numbers, annual rainfall, and event mean concentration. However, the STEPL model has a coarse resolution and is only intended as a planning tool. The model will be reevaluated using identified BMPs within the watershed to estimate reductions

Because of the lack of monitoring and soils data Rock Lake/Rock Creek was considered a priority watershed for the implementation of the Lower St. Croix 1W1P (Table 5-1 Part D). Much of this work is considered a local priority or is not eligible for Watershed Based Implementation Funds. Collaboration with other entities and use of additional funding sources will be needed to accomplish these actions. The highest priority activity in the “Prioritization and Analysis” program area is to conduct analyses to identify and prioritize water quality improvement projects within a priority subwatershed. The methods and types of analyses may vary depending on the available data, the ability to collect additional data, modeling capabilities, staff capacity, etc. Types of analyses can include site or field scale subwatershed

analyses, spatial analysis and mapping, modeling, cost benefit analyses of BMPs, or other data-driven targeting activities.

A 2004 Report on the Recommended Water Quality Goals of the St. Croix Basin Water Resources Planning Team recommends a 20% reduction in total phosphorus loading withing the St. Croix Basin. Modeling of inlets, tributaries, ditches and culverts will help determine the areas of highest loading to the lake so the SWCD/County can adequately install lake protection programs and practices through comprehensive lake management. Best Management practices which will yield the best results will be detailed in a plan that may be used as an addendum to the Lower St. Croix 1W1P

Project goals and objectives

The primary goal of this project is to identify BMPs critical to improve or maintain water quality in Rock Lake and by extension, Rock Creek. The Pine County Planning and Zoning Department will Partner with the Pine County SWCD to identify priority BMPS in the watershed and prioritize installation based on subwatershed nutrient allocation.

Another goal of this project is to enhance knowledge and understanding of the Rock Lake watershed conditions that are currently affecting, or have the potential to affect, the lake's ecosystem. To meet this goal the lakes watershed will be delineated, existing land uses, and acreages will be estimated and QSWAT, HSPF, or another appropriate model will be used to estimate annual pollutant loading. Additionally, boundaries of individual reaches and catchments will be delineated using the most recent LiDAR data and GIS tools. Loads will be partitioned for each catchment/reach through modeling, and eventually diagnostic monitoring through outside funds. Data will be used to identify surface runoff patterns and delineate environmentally sensitive areas in the Rock Lake watershed. The most effective identified best management practices will be suggested for funding and implementation.

Given the uncertainty of the level of impairment in Rock Lake and the historic lack of understanding about hydrologic pathway and process in the lake this proposal seeks to build a water and nutrient budget as another goal. Tributary and ditch subwatershed modeling will be used to develop a nutrient budget for the lake and used to calibrate other watershed loading scenarios to generate an appropriate lake condition response model (Canfield-Bachmann, Rechow, Vollenweider, etc.). Hypolimnetic samples are not available so a mass balance equation will be used to create a nutrient budget and internal load scenario (Nurnberg) and used in the lake condition response to identified watershed nutrient reductions.

To construct a water budget, we will use precipitation data to model what falls upon the lakes and the amount that falls in the surrounding watershed. In a wooded watershed 95% of the precipitation that makes to the ground surface, enters the ground and contributes to interflow and groundwater recharge. In rare instances, snow can melt and runoff over frozen ground and/or storm events can be very intense and of a magnitude and duration to cause overland runoff in some portions of a watershed. We will attempt to model surface inflow and outflow and seepage inflow and outflow if data becomes availible (MOD-FLOW).

Methods and activities

Mapping and watershed delineation from the Lower St. Croix 1W1P will be ground truthed and used as a basis for modeling, BMP prioritization, as well as delineation, for the Rock Lake watershed and sub-catchments. The Metro Conservation Districts SWA protocols will be utilized for targeting and

prioritizing areas for catchment and reach assessment withing the Rock Lake (https://23eb5e34-24a9-4c0a-ae19-16b53e245249.filesusr.com/ugd/0b511c_ac0f9eddb594432ca2e9035e372846b5.pdf, https://23eb5e34-24a9-4c0a-ae19-16b53e245249.filesusr.com/ugd/0b511c_1e77f8daf2cd4a198149c45c3013da36.pdf) , An appropriate model such as STEPL, WiLMS, or BATHTUB will be updated to determine the phosphorus loading from land and upstream tributaries and how and the effects on Rock Lake. Scenarios of land use change and BMP installation will be used to show estimated improvements water quality.

Tributaries/ditches and other areas perceived to be of interest for water quality improvement will be identified and prioritized in field surveys. Potential high sources of phosphorus will be investigated for the most appropriate BMPs and/or wetland restoration.

Data will be organized into a data base and analyzed using appropriate statistical software and GIS. Select tests will be run and the data will be interpreted, and a final report will be produced which will include predicted water quality improvements based on BMP implementation.

Project products or deliverables

A final report, executive summary, and work plan for distribution to the public, cooperating agencies, and elected officials will be prepared which includes:

- Identification of BMP location and prioritization
- Evaluation of watershed conditions and land use including annual pollutant loading determined through modeling and actual load partitioning
- Delineation of environmentally sensitive areas in the Rock Lake Watershed and potential wetland restoration sites
- Delineation of critical sites and shoreline restoration strategies

	Budget Category	Activity	Time (hr.)	Grant Cost	Responsible Party	Description
	Wages & Emp. Benefits	Slope and erosion potentail analysis	48	1649.28	Zoning staff	ArcGIS or QGIS tools will be used with LiDAR spatial analysis tools will be used to detrimine slopes and highly erodible areas within the watershed to aid in BMP identification.
	Wages & Emp. Benefits	Sub-watershed Delineation	65	2233.4	Zoning staff	Mapping and watershed delineation from the Lower St. Croix 1W1P will be ground truthed and used as a basis for modeling as well as delineation for the Rock Lake watershed and BMP prioritization. The Metro Conservation Districts SWA protocols will be used for targeting and prioritizing areas for catchment and reach assessment within the Rock Lake watershed. ArcGIS or QGIS tools will be used with LiDAR spatial analysis tools
	Wages & Emp. Benefits	Watershed Modeling + potentail reductions with identified BMP installation Storm event modeling/climate change scenarios	110	927.72	Zoning staff	The EPS STEPL model will be used to determine the initial phosphorus loading from land and upstream tributaries and how and the effects on Rock Lake. If diagnostic data becomes availible FLUX will be used to determine tributaty nutrient and water loading and BATHTUB will be used to model the lakes trophic response. Scenarios of land use change and BMP installation can be show how to improve water quality.
	Wages & Emp. Benefits	Initial Lake Response Modeling using existing data	45	1546.2	Zoning staff	Using appropriate well established in-lake resposne model (i. e. Canfield-Bachmann) a lake response will be generated for current conditions and potentail BMP reductions of the nutrient budget. Additionally, responses of chlorophyll *a* and pelagic gross primary production will be modeled.
	Wages & Emp. Benefits	Sub-watershed ranking	20	687.2	Zoning staff	Model Interpretation
	Wages & Emp. Benefits	Potential future sampling location identification, culvert inventory, potential wetland restorations	65	2233.4	Zoning staff	Ground truthing of hydrology and erosion features and concerns, sampling locatioins for future reference and to evaluate the effectivness of watershed management activities
	Wages & Emp. Benefits	BMP location identification, landowner contatact, cost analysis	95	3264.2	SWCD staff	SWCD to review subcatchments and sites of high resource concern and prescribe BMPs, approximate size, and cost estimate. County to assist as needed.
	TOTALS			**12541.4**		

		Cost/Sample	# of Samples	Cost	
Water Chemisty/Geochemistry					
	stable isotopes - H and O	$15	24	$360	
	total phophorus	$16	50	$800	
	soluble reactive phosphorus	$14	50	$700	
	nitrate/nitrite	$15	50	$750	
	ammonium	$17	50	$850	
	total Kjeldahl nitrogen	$16	50	$800	
	total suspended solids	$15	30	$450	
	chloride	$15	30	$450	
	chlorophyll *a*	$21	50	$1,050	
	Subtotal		**384**	**$6,210**	
	Iron	$22	5	$110	*
	Sulfate	$17	5	$85	**
	RMB Courier	$15	10	$150	
	Total			**$6,555**	

		Number needed	Cost	
Equip/Consumables				***
	PVC	20 linear feet	$79.80	
	t posts	4	$19.96	
	zip ties 14 inch	4 packages	$13.12	
	Water sampler	1	$595.00	
	Total		**$707.88**	

*This would only be done in the hypolimnetic sampling to try and assess internal loading

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***Possible costs, donated services