

BOARD OF DIRECTORS MEETING AGENDA

7:00 PM February 20, 2019

Vadnais Heights City Hall, Council Chambers; 800 County Road E, East, Vadnais Heights

- I. **Call to Order**, Chair, Dan Jones
- II. **Approval of Agenda**
- III. **Approval of Minutes** from December 12, 2018
- IV. **Visitors and Presentations**
- V. **Business**
 - A. Election of Officers and appointments 🐦
 - B. General Engineering services – consideration 🐦
 - C. Lambert Creek
 - 1. Lambert Lake maintenance & BMP enhancements – Brian / Dawn
 - 2. 319 Grant application – Dawn 🐦
 - D. Annual Report consideration of draft – Nick 🐦
 - E. Birch Lake – 4th & Otter authorization for bidding – Tyler 🐦
 - F. Contract with RCSWCD – vegetation & bathymetry on Birch, Goose, W Vadnais – Dawn/Stephanie 🐦
- VI. **Consent Agenda**
 - A. Designation of Legal publication, legal counsel, and 2019 meeting dates
- VII. **Operations and Administration - Reports**
 - A. TEC Report and Financial – February – Paul Duxbury/Stephanie
 - B. Education events
 - C. Project updates
 - 1. Goose Lake
 - a) Stakeholder meeting, alum application, speed limit /no wake - Dawn /Stephanie
 - b) Oak Knoll pond study & WBF – Stephanie
 - 2. Great River Greening request –Dawn
 - 3. North Oaks stakeholder meeting (March 12, 6:00-7:00 pm) –Dawn / Tyler
 - D. Wetland health assessment – West Vadnais north wetland – Stephanie 🐦
- VIII. **Discussion**
 - A. “Water Matters” workshop / presentations at Board - Nick
- IX. **Administration Communication** – Audit;
- XI. **Adjourn**

Next regular meeting: April 25th

Reminder: LimnoTech DIY automated sampling unit demo on Feb. 25, 11:00 am - 1:00 pm at VLAWMO office



MINUTES OF THE BOARD OF DIRECTORS
 December 12, 2018

Attendance		Present	Absent
Dan Jones, Chair	City of White Bear Lake	X	
Jim Lindner, Vice Chair	City of Gem Lake	X	
Rob Rafferty, Secretary-Treasurer	City of Lino Lakes	X	
Bob Kermes (alternate)	White Bear Township	X	
Marty Long	City of North Oaks	X	
Terry Nyblom	City of Vadnais Heights		X
Stephanie McNamara	Administrator	X	
Brian Corcoran	Water Resources Mgr.	X	
Dawn Tanner	Program Development Coord.	X	
Nick Voss	Education & Outreach Coord.	X	
Tyler Thompson	GIS Watershed Tech.	X	

Others in attendance: Paul Duxbury, VLAWMO TEC representative

I. Call to Order

The meeting was called to order at 7:00 pm by Chair Jones.

II. Approval of Agenda

A motion was made by Lindner and seconded by Long to approve the meeting agenda. Vote: all aye. Motion passed.

III. Approval of Minutes from October 24, 2018

A motion was made by Lindner and seconded by Long to approve the minutes from the October 24, 2018 Board of Directors Meeting. Vote: all aye. Motion passed.

IV. Visitors and Presentations

None present

V. Operations & Administration

A. TEC Report and Financial – December

The December VLAWMO Technical Commission Report to the Board was presented by TEC Commissioner Paul Duxbury and the December financial report was discussed by McNamara.

B. Professional Services Requests for Proposal: legal, auditing

McNamara explained the RFPs for both legal counsel and annual auditing services are ready to be sent out upon direction and approval from the Board. McNamara also explained that in the past VLAWMO has gone longer than 2 years between RFPs for professional services, as do other watersheds, and that going through the time and expenses, for both the Watershed as well as the consultants, may not be an efficient use of public money, and to possibly extend time between RFPs. McNamara suggested the Board discuss this. **McNamara requested Board direction to send out RFPs for both auditing and legal counsel as soon as possible, as well as discuss a second option for direction to proceed into 2019 with our current auditor and legal counsel and postpone RFPs until 2019.**

Discussion: Lindner asked what the repercussions about skipping a year for RFPs. McNamara answered they are light if we don't follow guidelines exactly. Board discussed that they were comfortable letting RFPs lap a year. Long proposed postponing them for 2 years.

A motion was made by Long and seconded by Lindner to approve the waiving the Request for Proposal for both legal counsel and annual auditing services until 2019. Long withdraws motion and no vote is taken. Motion fails.

Jones and Rafferty expressed reservation about 4 total years between RFPs. Rafferty proposed issuing RFPs in 2019. The board agrees that going to 3 years (2019) is appropriate. Lindner is making the friendly amendment to push RFPs to 2019- Long seconds.

A friendly amendment is made by Lindner and seconded by Long to the previous motion to approve the waiving the Request For Proposal for both legal counsel and annual auditing services until 2019. Vote: all aye, Motion passed.

C. Education & Outreach

1. 2018 EOP Summary Chart

Voss presented the 2018 Education & Outreach chart to the Board, along with the 2019 updated Education & Outreach Plan (EOP). Voss discussed the 2018 E&O efforts, as well as 2019 upcoming efforts.

2. Remote Cameras

Tanner presented current efforts and results of placing and using remote cameras (trail cameras) to observe, record and quantify wildlife species within different areas of the watershed, as well as plans and efforts to continue monitoring at locations in the conservation easement of North Oaks.

D. Sustainable Lake Management Plans

1. Three Lakes: Charley-Pleasant-Deep

Tanner gave an updated report on the progress of the Charley and Deep Lake SLMPs. Lake Homeowner Surveys are being analyzed and incorporated into the Plans, as well as suggested BMP locations. Staff plans to have these finished and posted to the website in January. Tanner also reported moving Pleasant Lake up on the SLMP schedule from 2020 to 2019 as to better concentrate efforts on the tri-lake area (Charley-Pleasant-Deep). It was also discussed that as Pleasant already has bathymetry completed, staff will hire and conduct these surveys on 2 other targeted lakes in 2019.

Discussion: Tanner asked for direction from the Board on which lakes to pursue normal surveys on. Jones commented he feels comfortable leaving that decision up to staff. Tanner suggested possibly Birch and West Vadnais Lakes for survey and asked Thompson his thoughts. Thompson conferred Birch and West Vadnais would be good choices for surveys due to the projects and activities going in and on around them.

2. Surveys and Stakeholder meeting

It was reported by Tanner that a stakeholder meeting for the tri-lake area is planned for February 2019 to discuss the SLMPs, promoting water quality and to encourage the possibility of developing a united tri-lake association to consolidate efforts.

E. Lambert Creek (Co. Ditch 14)

1. Lambert Lake maintenance site meeting

Staff met with Curt Peterson from Peterson Excavating and Julia Bohnen from the U of M on November 7th. Peterson is working on a bid for repair and maintenance of the Lambert Lake (LL) weir, and Bohnen identified the plant community in the area. Plans for maintenance will plan to incorporate vegetation and habitat management.

2. Discussion of repair Scoping

Staff presented the current conditions of the LL weir: the steel portion on the structure is holding up well, but the fiberglass portion is leaning and the basin needs to be dredged to restore volume capacity to original design. Also, the outflow of the weir short-circuits the designed wetland sheet flowage by skirting the weir and going directly into Ditch 14. The original design was to allow water to flow out into the wetland to reduce storm discharge bounce, as well as filtering for water quality.

Discussion: Long proposed taking this out with an official RFP for project. McNamara stated it definitely will have to be, but staff was conducting research for idea of possible project scope. Jones asked what the imminent danger of filling up was before proper budgeting. Corcoran answered the liability is low and we have the time now to prepare and decide how exactly to move forward. Long expressed he would like staff to look into Wenck Engineering due to their experience with similar projects.

3. Engineering student

Joe Magner, U of M professor and engineering student supervisor, has been involved with VLAWMO on several projects over the last 20 years. Tanner and Magner are meeting on January 3rd to discuss the possibility of an engineering student to design a stream re-meander and restoration in the Lambert Lake wetland downstream of the LL structure as a possible future project.

Discussion: The Board expressed their excitement for project scoping for possible options in Lambert Lake with U of M students.

F. Goose Lake

1. WBF grant update

Thompson reported that the workplan has been approved, and grant agreement has been signed by both parties and executed by BWSR back in November, allowing for Barr to begin on the first phase of Project. This includes H&H modeling, engineering of possible projects, and a technical memo that is slated to have the first draft to be ready for review in February 2019.

Discussion: Long mentioned concern over the West Goose Lake shore erosion from the Boat Works. McNamara mentioned Boat Works is invited to the stakeholder meeting and we will work with all parties to figure out the best options for the Lakes.

2. Vegetation Management Plan

A stakeholder meeting is planned for January 16th at the Vадnais Heights City Hall from 4:00-5:15 pm that includes representatives from oversight agencies, as well public and private members of the community to discuss and share the upcoming plans and projects for the Goose Lake Subwatershed.

3. Spent lime treatment grant request

Staff reported the Spent Lime Treatment Grant application submitted by Barr Eng. to the U of M was approved. VLAWMO is a partner to this grant and will contribute staff time by way of monitoring and execution assistance. Staff is awaiting further direction from Barr. This grant also involves a “sister” pond in the RWMWD to compare results. McNamara explained that VLAWMO will be contributing staff time and monitoring costs.

4. Alum treatment Grant request

McNamara reported that the Goose Lake Alum Treatment Grant Application was not chosen by BWSR for implementation, but staff will reapply for 2020 funds in 2019.

G. Birch Lake – 4th & Otter

1. Project updates

After a summer and fall of collecting site and survey information, Barr began engineering on the plans for the iron-enhanced sand filter and retrofit site design. The City has agreed to secure the corner parcel VLAWMO was previously pursuing. Draft designs and Engineer's Estimate of Costs are slated to be completed and delivered in January 2019. Staff will disperse these plans to partners for review and comment, and a meeting will also be scheduled to discuss these.

2. MN Conservation Corp grant

The MCC grant application is submitted and award notices will be sent to applicants January 15-30th.

H. Additional Opportunities

1. Partnerships – Service Learning

VLAWMO is now an approved Community Partner for the Center for Community-Engaged Learning at UMN and Tanner & Voss will be presenting to a class on January 24th to offer 2 service-learning positions for possible project and volunteer involvement for students.

2. LimnoTech DIY automated sampling device demo invitation

Tanner will be scheduling a date & time in January with LimnoTech for a training on automated sampler use. Dawn will email interested parties when there is a time set.

VI. Business

A. Certification of 2018 Fund Balance – Res. 10-2018

McNamara ran down the portions of the carryover budget from 2018 into 2019, and highlighted some areas of the attached table that breaks down each individual carry over. **Staff recommends the Board approve Resolution 10-2018 for the certification of the 2018 VLAWMO Fund Balance.** **Discussion:** Long asked McNamara to expand on the points of balancing of program funds.

A motion was made by Lindner and seconded by Long to approve Resolution 10-2018 certifying the program carry over from funds from 2018 into 2019. Vote: all aye. Motion passed.

B. Engineering Support Proposal

McNamara outlined the areas and situations where having an engineer on retainer would benefit the Watershed in the way of efficiency by offering flexibility and capacity with current and upcoming projects. Instead of waiting upon a RFP every time we need engineering assistance valued less than \$10,000, staff could call upon the engineer on retainer to help where needed. **Staff is recommending the Board consider the approval of an RFP process to obtain an on-retainer engineering firm for use on projects valued under \$10,000, will an annual budget of \$30,000 to come from the general fund in 2019, with reassessment for the 2020 budget.**

Discussion: Lindner expressed that he deals with this in his professional life and understands the delays and roadblocks it can cause. Jones stated \$30,000 is a good starting point and is in favor. Long expressed his interest asking for U of M engineering student help with Lambert Lake. McNamara said we will go this route, but we need a professional. Long implored to keep working with the U of M.

A motion was made by Long and seconded by Lindner to approve the submittal of a Request For Proposal for engineering services that would service individual projects valued under \$10,000 and with a total budget of \$30,000 that would come from VLAWMO's general fund in 2019, and reassessment for the 2020 budget. Vote: all aye. Motion passed.

C. Equipment Proposal

Thompson presented the possibility of purchasing simple but super-accurate GNSS survey equipment that can easily be operated and maintained by technical staff. Throughout the year, staff encounters many situations where this equipment would be a great benefit in the way of productivity and staff efficiency and professional costs. **Staff is recommending the Board consider approving the use of carry over funds from the 2018 monitoring & equipment budget up to \$9,200 for purchase of a GNSS receiver kit.** **Discussion:** Jones asked about service life. Long asked about the 2nd step down model as an option. Thompson answered that the most expensive model will have the longest service life, due to its ability to connect to upcoming satellite systems, making the extra \$1,000 worth it in the long run. Rafferty commended staff for proposing purchase of equipment that will provide a great benefit and effectiveness.

A motion was made by Rafferty and seconded by Jones to approve funds up to \$9,200 of carry over funds from the 2018 Monitoring & Equipment budget to purchase a GNSS survey receiver. Vote: all aye. Motion passed.

D. MAWD Membership Proposal

McNamara presented that in years past WMOs have not been allowed to be voting members, but at this past 2018 MAWD meeting, it was voted on and passed to allow for WMOs to be paying members with voting privileges. The introductory rate is \$500 for the first year.

Staff is recommending the Board approve VLAWMO to join MAWD for the \$500 introductory rate in 2019, and assessment of benefits and costs after that time for 2020.

Discussion: Rafferty asked what next year's dues would be and says he is cautious on this due to the lack of benefits we would get from that. Jones said he is also unsure of 2020 dues. McNamara explained this is an entrance rate and that will be determined next year. Lindner stated that \$500 is not a high price to pay to try something. The Board was in consensus to try the membership for 2019 and reassess for 2020 based on benefits and membership cost.

A motion was made by Lindner and seconded by Long for approval of VLAWMO to join MAWD as a voting member for 2019 for the introductory cost of \$500, and assessment of benefits and costs before membership renewal for 2020. Vote: all aye. Motion passed.

VII. Discussion

VIII. Administration Communication

McNamara updated that VLAWMO and RWMWD will continue to work together on Grass Lake. Jones announced he will be stepping down as Board Chair. There was discussion on moving nominations to the April meeting.

XI. Adjourn

A motion was made by Lindner and seconded by Long to adjourn at 8:43 pm. Vote: all aye. Motion passed.

Minutes compiled and submitted by Tyler Thompson.



800 County Road E E, Vadnais Heights, MN 55127
www.vlawmo.org; Office@vlawmo.org

To: Board of Directors

From: Stephanie McNamara, Administrator

Date: February 2019

Re: V.A. Elections and Appointments

1. Election of officers. 2018 Slate: Chair: Dan Jones; Vice Chair: Jim Lindner; Secretary Treasurer: Rob Rafferty. Please consider how you might best serve. Officers preside over the meeting (Chair, Vice Chair, Sec-Tres.) and become check signers through US Bank. Other duties: the Chair may speak for VLAWMO in public situations, and the Sec- Treasurer is a member of the Finance committee.
2. Committee Assignments. Finance, Policy & Personnel may meet 1-3 times per year. They make recommendations for Board action as far as new policies or policy updates. They also assist with human resources questions and direction as needed. Two Board members have served on the committee.
3. Technical Commission (TEC) Chair. VLAWMO process requires appointment of the TEC Chair by the Board. The TEC has recommended Jim Grisim, commissioner from White Bear Lake as its Chair.

To: Board of Directors
From: Stephanie McNamara, Administrator
Date: February 15, 2019
Re: General Engineering Services Proposals and Recommendation

At the December meeting the Board directed a Request for Proposal for General Engineering Services. Up to \$30,000 would be shifted from general fund for smaller cost engineering needs. Larger projects, over \$10,000 would be bid as part of the project. The RFP would be for a 2-year agreement but funding levels for 2020 would be determined by the Board based on the first year of use. The staff requests the \$10,000 cap be removed as it is arbitrary and contrary to the intent of the general services proposal which seeks efficient project development.

The RFP identified work that might include civil or water resource engineering, modeling, analysis, surveying or water resource science. Categories scored: main contact, cost, approach, exp. With stormwater BMPs, feasibility studies, project design, grant knowledge and assistance, stormwater standards knowledge, other. They might attend meetings on an as-needed basis. Eight proposals were received.

Barr	Bolton & Menk
Burns & McDonnell	LimnoTech
Houston Eng.	RESPEC
S.E.H.	Reliant Resilience & Wenck

All of these firms have a good reputation and could do a good job for VLAWMO. VLAWMO has had some contact with all of the firms. Of the eight, Bolton and Menk offered the best price but did not make the staff's top three candidates because experience had more to do with ditch law (103e) work. They cited only one grant funded project where they helped secure funding. They did not seem to have as much relevant experience for the needs anticipated. The staff was asked to review all the proposals, score and comment as needed, and bring in their top 3. Barr Engineering, Houston Engineering, and Short Elliot Hendrickson (S.E.H.) were those firms identified as having solid capacity with a proven track record. All of them work in the area and with our neighboring watersheds and our municipalities. The prices vary by job classification. VLAWMO is working with or has worked with Barr and Houston Engineering in the last year. The prices from Barr appear slightly better however our experience with timeliness/responsiveness and a potential conflict of interest on West Vadnais have shifted them to second place. Staff recommends continuing to work with Barr on Goose Lake. HEI prices seemed the highest although their service was excellent on Lambert Creek. S.E.H. is recommended as a new engineer who has the benefit of familiarity with VLAWMO through our municipalities. We would be happy with any.

RECOMMENDATION: VLAWMO should enter into a 2-year agreement with S.E.H. Engineering. The consultant would provide service on an as-needed basis. The Board would authorize the Chair to sign the agreement when it is available. Costs for 2019 would not exceed \$30,000 unless approved by the Board. Larger project engineering would still be bid out per VLAWMO bidding policy. No arbitrary cap on per projects engineering costs.



proposal to provide

professional engineering services

prepared for

the Vadnais Lake Area Water Management Organization

submitted by Barr Engineering Co.
February 6, 2019



contents

letter of interest 1

company overview.....3

related work, projects, and clients4

VLAWMO project team leaders6

other services and specialties.....14

Barr’s 2019 fee schedule21

references.....23

stormwater management and policy24

feasibility studies29

design assistance40

grant application assistance46

meeting attendance and presentations48

stormwater development plan review58

letter of interest

February 6, 2018

Stephanie McNamara, Administrator
Vadnais Lake Area Water Management Organization
800 East County Road E
Vadnais Heights, Minnesota 55127

re: request for proposal to provide professional engineering services

Dear Ms. McNamara:

We are pleased to submit our qualifications to provide the Vadnais Lake Area Water Management Organization (VLAWMO) with engineering services in 2019 and 2020. We truly enjoy the relationship we've fostered with you and your staff. By choosing Barr, you'll get:

Unmatched Minnesota watershed management expertise and sound solutions that fit your needs, values, and goals. Some of Barr's very first clients were watershed organizations—Ramsey-Washington Metro Watershed District, Valley Branch Watershed District, Nine Mile Creek Watershed District, Riley-Purgatory-Bluff Creek Watershed District, Bassett Creek Watershed Management Commission, and Lower Rum River Watershed Management Organization. We have worked side by side with them to pioneer watershed management and move it forward and are proud that these same districts are still clients 30 to 50 years later. Our long-term clients appreciate the individual ownership, low turnover, institutional knowledge and recall, innovative solutions, and personal touches our staff members provide—benefits we hope to continue providing to you. We are committed to solving your problems as if they are our own.

Easy access to multidisciplinary staff and comprehensive water resources management services. You'll work with a select team led by key Barr contacts under just one roof and a short distance away. Our team is skilled in making documents and presentations easily understood by both the general public and technical stakeholders. As the need arises, they can draw on a bench of more than 100 water resources experts—engineers, limnologists, biologists, ecologists, fisheries professionals, geographic information (GIS) specialists, and landscape architects. They are further backed by 700 other experts across all areas of engineering and environmental science. Our core team will work to implement your priorities and communication preferences and strive to respond to requests within one business hour.

Flexible, client-focused service that yields the results and deliverables you need, when you need them. Because these are your water resources and watershed, we will listen carefully to you and provide regular updates. At no cost, Barr will create a client service plan to document your expectations, goals, and preferences (e.g., communications, billing, updates, report styles, etc.). Our clients have found that projects are smoother and more successful when client service plans are established up front and followed throughout the project life cycle. Mindful of constraints on watershed district budgets, we commit to maintaining our billing rates for the two-year contract period, as noted in our fee schedule on page 21.

Greater efficiency, more consistency, and long-term success. Composed of seasoned and upcoming professionals with an average tenure of 25-plus years, our project team will work to serve you for the long haul. To achieve your goals and objectives, we'll partner with you to develop projects using methods supported by decades of applied experience. We're also passionate about innovative, science-backed solutions to emerging issues such as improving surface and lake water quality through lake diagnostic

studies, nutrient treatment, aquatic invasive species management, and low-impact stormwater management and treatment. To achieve the greatest benefits per dollar, we'll help you prioritize projects in a documented, flexible, paired-criteria approach. We've also helped our clients leverage project funds by securing more than \$20 million in grants.

We look forward to continuing and expanding our relationship with VLAWMO. If you have any questions or require additional information, please contact either of us at 952-832-2600.

Sincerely,



Greg Wilson, PE
Project Manager



Hal Runke, PhD
Vice President, Principal in Charge

company overview

Barr Engineering Co. provides engineering and environmental consulting services to clients across the Midwest, throughout the Americas, and around the world. Founded as an employee-owned firm in 1966, Barr was built upon the hydrology practice of Adolph Meyer, one of the first hydrologists in the United States in the early 1900s. With more than 800 engineers, scientists, and technical specialists, we help clients develop, manage, and restore natural resources.



We are based in the Twin Cities, but also have offices in Duluth and Hibbing, Minnesota, as well as in Jefferson City, Missouri; Ann Arbor and Grand Rapids, Michigan; Bismarck, North Dakota; Salt Lake City, Utah; and Calgary, Alberta. More than 400 staff members work in our Minneapolis office, with more than 100 participating regularly in the areas of water resources study and design.

proposed service areas

For VLAWMO, we propose to provide the following services as described in detail beginning on page 24:

- stormwater management and policy
- feasibility studies
- design assistance
- grant application assistance
- meeting attendance and presentations
- stormwater development plan review

other services and specialties

In addition to the services above, we can offer VLAWMO assistance in the following areas, as described in further detail starting on page 14:

- monitoring
- pond maintenance and sediment management
- sustainability alternatives assessment (life-cycle analysis and Envision™ rating system)
- aquatic invasive species
- landscape architecture
- land surveying
- geographic information systems

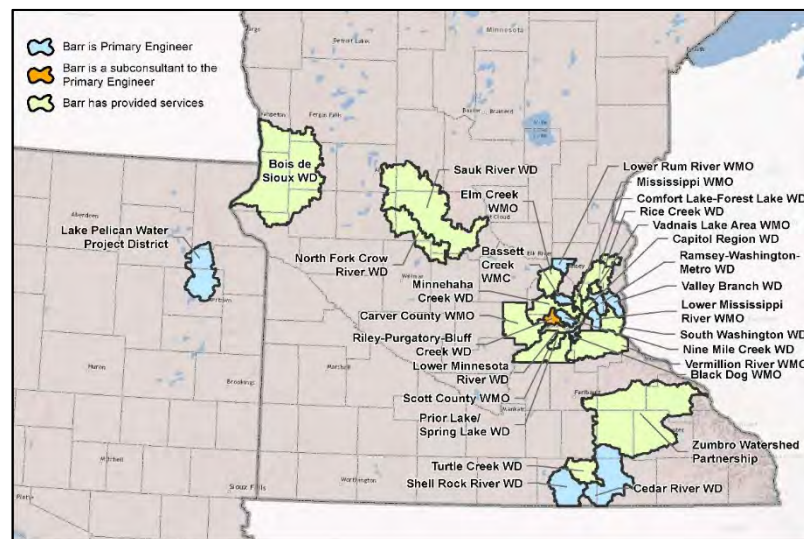
related work, projects, and clients

Barr has been assisting watershed districts and water management organizations since the early 1960s. During this time, we have worked for dozens of watershed districts and watershed management organizations and have honed our expertise in the areas of stream restoration, corridor studies, total maximum daily loads (TMDLs), stormwater management, best management practices (BMPs), watershed planning, and low-impact development.

Barr currently serves as a primary consultant (*) or as part of a select consultant pool to the following watershed districts and water management organizations. The dates in parentheses indicate when we began working with these clients:

- Nine Mile Creek Watershed District (1960)*
- Valley Branch Watershed District (1969)*
- Bassett Creek Watershed Management Organization (1969)*
- Riley-Purgatory-Bluff Creek Watershed District (1969-2007, 2013)*
- Ramsey-Washington Metro Watershed District (1975)*
- Lower Mississippi River Water Management Organization (1986)*
- Lower Rum River Water Management Organization (1987)*
- Sauk River Watershed District (1990)
- Black Dog Watershed Management Organization (1996)*
- Lake Pelican Watershed Project District (1998)*
- South Washington Watershed District (2001)
- Capitol Region Watershed District (2003)
- Cedar River Watershed District (2007)*
- Shell Rock River Watershed District (2008)*
- Carver County Watershed Management Organization (2013)
- Bois De Sioux Watershed District (2014, as sub-consultant)*
- Rice Creek Watershed District (2014)

We also provide services to many other water management organizations, as shown in the following map.



The table below shows the services provided to each of the watershed organizations for which Barr serves as the primary consultant, as well as a sampling of others with which we have long-term working relationships.

watershed organization	watershed management and planning	stormwater management	review of development plans	stream & ravine stabilization and protection	stream & lake monitoring	water quality studies & implementation	aquatic plant management	capital improvement program assistance	innovative stormwater management	urban planning	wetland services
Bassett Creek WMC	•	•	•	•	•	•	•	•	•		•
Black Dog WMO	•	•			•	•	•	•	•		•
Capitol Region WD	•	•	•	•	•	•		•	•	•	•
Carver County WMO	•	•				•			•		•
Cedar River WD	•	•	•		•	•	•	•	•	•	•
Elm Creek WMC	•	•	•			•		•			•
Lake Pelican WPD	•	•				•		•	•		
Lower Mississippi River WMO	•	•		•	•	•	•				•
Lower Rum River WMO	•	•		•		•		•			•
Mississippi WMO	•	•		•		•		•	•	•	•
Nine Mile Creek WD	•	•	•	•	•	•	•	•	•	•	•
North Fork Crow River WD	•	•		•	•						•
Ramsey-Washington WD	•	•	•	•	•	•	•	•	•		•
Prior Lake-Spring Lake WD	•	•			•	•				•	•
Riley-Purgatory-Bluff Creek WD	•	•	•	•	•	•		•	•		•
Sauk River WD	•	•		•	•	•	•	•			•
Scott WMO	•	•		•	•	•		•	•	•	•
Shell Rock River WD	•	•	•	•	•	•	•	•	•	•	•
Turtle Creek WD	•	•			•	•				•	
Valley Branch WD	•	•	•	•	•	•	•	•	•		•
Zumbro WP				•	•	•		•			

VLAWMO project team leaders

Barr uses a project team approach to match our expertise with the unique requirements of each project and client. The following pages include brief biographies of Barr leaders who we believe can best guide Barr staff to serve the needs of VLAMO in 2019 and beyond.

In addition to the key staff listed here, you can expect Barr to utilize the more than 100 scientists and engineers on staff on our water resources team to provide you with comprehensive services. When a project needs extra, specialized skills, Barr can draw on the expertise of our more than 800 scientists, engineers, and technical specialists. Our project team will be tailored to specific project needs and budgetary constraints.

Greg Wilson, who has served as Barr's primary client-contact for all project work done for VLAWMO, will retain that position and responsibility for the next two years. Greg will be responsible for directing the day-to-day project activities of all technical and professional staff, and will serve as the primary contact person for WMO Managers and Administrative staff. He will report to Hal Runke, Barr's Principal-in-Charge of all work done under contract with VLAWMO.



project manager

service areas:

stormwater management and policy, feasibility studies, design assistance, grant application assistance, meeting attendance and presentations, stormwater development plan review

Greg Wilson, PE

Senior Water Resources Engineer

MS, Civil Engineering

Greg has more than 29 years of experience in hydrology, hydraulics, and water-quality enhancement engineering; wetland restoration; municipal separate storm-sewer system (MS4) permitting; water-reuse and BMP design; TMDL and WRAPS studies; limnology; and biological-stressor identification. His work includes water-quality and water-quantity monitoring and modeling for diagnostic-feasibility and/or TMDL and WRAPS studies for 90 lakes. He is widely recognized throughout Minnesota as a technical expert in advanced water-quality monitoring and modeling for lake and stream management planning and treatment design, including several in-lake and pond alum-treatment projects.

relevant experience:

- Project manager and primary technical resource for multiple projects with the Vadnais Lake Area Water Management Organization, including the spent lime research study, the Goose and Wilkinson Lakes feasibility study, the 4th & Otter wetland iron-enhanced sand filter and the Goose Lake subwatershed feasibility and implementation projects.
- Assisting the Comfort Lake-Forest Lake Watershed District with the Lofton Pond and Moody Lake wetland rehabilitation studies.
- Completing a feasibility study and iron-enhanced sand filter design and construction for the Lake Susan Park Pond watershed treatment and stormwater reuse project in the Riley-Purgatory-Bluff Creek Watershed District.
- Authored MPCA's *Detailed Assessment of Phosphorus Sources to Minnesota Watersheds* and developing updates to the infiltration section of the *Minnesota Stormwater Manual*.
- Consulting to assess excess nutrients, TSS, bedded sediment, nitrate, dissolved oxygen, chloride, bacteria, and fish/macro-invertebrate bioassessment impairments in several watersheds for multiple clients. Assisted in the delisting of Wirth and Bryant Lakes from the MPCA's impaired waters list.
- Managed preparation and updating of a watershed-wide water-quality model (P8) and advising the Bassett Creek Watershed Management Commission and municipal separate storm-sewer system (MS4) stakeholders on coordinated efforts to meet TMDL implementation reporting requirements.
- Reviewing water quality modeling for proposed developments on behalf of multiple clients.

As principal in charge, Hal Runke will continue to oversee Barr's team of technical professionals, and to ensure that necessary staff resources are directed to VLAWMO work. He will also be available to Greg Wilson and the Barr project team for expert technical assistance, and to attend VLAWMO board meetings, as might be necessary. He will also serve as the primary Barr corporate officer for all WMO-related contractual matters. Hal has more than four decades of experience as a project manager and technical expert in the fields of limnology, stormwater management and environmental engineering.



principal in charge

service areas:
feasibility studies, grant application assistance, meeting attendance and presentations

Hal Runke, PhD
*Vice President, Senior Limnologist
PhD, Environmental Engineering*

Hal has devoted 41 years to the study and resolution of lake and stream water quality impairments. He has written the water-quality and wetlands-management sections of surface-water management plans for seven watershed management organizations and six Minnesota municipalities, and directs Barr's impaired waters (TMDL) work.

relevant experience:

- Serving as principal in charge of more than 30 TMDLs and other water quality projects in Minnesota, including documenting impairments and watershed issues, assessing existing water-quality and flow data, conducting watershed inventories and assessments, and creating monitoring plans, and developing pollutant loadings and source allocations.
- Serving as principal in charge for lake and watershed use-attainability analyses for the Nine Mile Creek Watershed District and Riley-Purgatory-Bluff Creek Watershed District.
- Conducting diagnostic studies of lake water quality problems and their potential solutions for numerous Minnesota and Wisconsin lakes.



service areas:
stormwater management and policy, feasibility studies, design assistance, meeting attendance and presentations, stormwater development plan review

Matt Kumka, PLA
*Senior Landscape Architect
Master of Landscape Architecture*

Matt has 11 years of experience in landscape design, installation, and construction observation as well as native plant community restoration and stormwater infrastructure BMPs. At Barr, he has developed living streets initiatives, created sustainable landscape master plans, and planned invasive species control. He has also managed and led design on numerous landscape projects related to stormwater-quality improvement and ecologically appropriate placemaking.

relevant experience:

- Coordinating a multi-year BMP project for the City of Eagan, including a rain garden installation program in conjunction with street revitalizations.
- Serving as lead landscape designer and ecological restoration planner for Discovery Point, the headquarters and educational center for the Nine Mile Creek Watershed District.
- Developing planting and restoration plans for the Edina stream restoration project.
- Serving as lead landscape architect on the Nine Mile Creek Watershed District's ongoing non-profit site BMP retrofit program, which includes a grant from the Clean Water Fund.



service areas:
stormwater management and policy, feasibility studies, meeting attendance and presentations, stormwater development plan review

Jay Hawley

Water Resources Engineer
MS, Civil and Environmental Engineering

Jay has six years of design experience in water resources, from open-channel hydraulics and groundwater flow to water and wastewater treatment plants. He is proficient in a variety of modeling programs including PCSWMM, XP-SWMM, HEC-RAS, DYRESM-CAEDYM, P8, GoldSim, Delft3D, and HydroCAD. Jay works on projects involving H&H modeling to assess critical post-storm water levels, water-quality modeling and assessment, water balance modeling, and flow-rate calculations for natural and manmade water bodies and conduits (ranging in size from entire watersheds and large lakes to individual retention ponds and storm-sewer pipes). He has worked on projects for Minnesota regulatory agencies and more than a dozen Twin Cities municipalities.

relevant experience:

- Currently working on the water quantity and quality modeling for the Goose Lake subwatershed feasibility and implementation study on behalf of VLAWMO.
- Completing H&H modeling updates for Purgatory Creek, Riley Creek, and Bluff Creek XP-SWMM models for the Riley-Purgatory-Bluff Creek Watershed Districts, including review of watershed divides, storm sewer review, model calibration, and assessment of the impacts of Atlas 14 precipitation and potential climate change on associated flood elevations.
- Conducting water quality modeling to identify sources of nutrient loading to water bodies and assessing the potential of proposed watershed modifications for the Riley Creek chain of lakes as well as Lotus, Red Rock, and Hyland lakes in the Purgatory Creek watershed.
- Writing reports summarizing the water resources work Barr has completed for cities, watershed districts, and larger industrial clients, including modeling efforts, field monitoring, and proposed design work.



service areas:
feasibility studies, design assistance, stormwater development plan review

Greg Nelson

Senior Project Designer
AS, Civil Technology and Land Surveying

Greg has more than 22 years of experience providing assistance on water resources projects, including surveying, engineering design, and construction. He provides initial project coordination with other staff members to obtain topographic site surveys and public and private land ownership relations. Working directly with the project engineer, he develops preliminary and/or final design drawings and specifications for all types of watershed and stream restoration projects. Greg provides services to develop plans, specifications, cost estimates, bidding and contract administration, construction oversight, and project management.

relevant experience:

- Currently working on the project design and implementation of the 4th & Otter wetland iron-enhanced sand filter on behalf of VLAWMO.
- Managing the maintenance and repair of annual capital improvement projects for the Ramsey-Washington Metro Watershed District.
- Developing design plans and specifications for watershed districts, including the Ramsey-Washington Metro Watershed District, Riley-Purgatory-Bluff Creek Watershed District, Nine Mile Creek Watershed District, Valley Creek Watershed District, and Scott Watershed Management Organization.
- Serving as lead designer for streambank stabilization and restoration projects.
- Serving as lead designer for stormwater quality improvement systems for water resources clients, including spent-lime and iron-enhanced sand systems used to pretreat surface water runoff to remove phosphorus.



service areas:
stormwater
management and
policy, feasibility
studies, design
assistance

Brandon Barnes, PE
Water Resources Engineer
BS, Civil Engineering

Brandon has 12 years of experience water resources and civil engineering. His work includes developing detailed H&H models, conducting interior drainage analyses, integrating GIS with floodplain studies, observing construction of water resources improvements, and addressing public concerns. Brandon has created XP-SWMM models for floodplain and watershed projects, prepared letters of map revision (LOMRs), and completed coincidental frequency analyses.

relevant experience:

- Updating the Ramsey-Washington Metro Watershed District's H&H models to incorporate Atlas 14 rainfall depths and leading discussions with the district's member cities to communicate the impacts that the revised depths had on the 100-year inundations areas within each city.
- Developing a detailed XP-SWMM model for the Vermillion River Watershed Joint Powers Organization to establish flow standards at municipal boundaries.
- Developing XP-SWMM models for the Airport South Drainage District in Bloomington, the Central City stormwater tunnel drainage area in Minneapolis, and the Shell Rock River watershed in southern Minnesota.



service areas:
feasibility studies,
grant application
assistance

Erin Anderson Wenz, PE, ENV SP
Vice President, Senior Water Resources Engineer
MS, Environmental Engineering and Science

Erin has 21 years of experience working on projects involving hydraulics and hydrology, including both stormwater and lake-water quality modeling for watershed districts and municipalities. Her project work includes writing stormwater management plans and designing and constructing low-impact development features such as rain gardens, porous pavement, and tree trenches for both large and small retrofit sites. Erin is also trained in applying the Envision™ Sustainable Infrastructure Rating System to projects.

relevant experience:

- Managing a stormwater feasibility study for the Lafayette Park Campus in St. Paul for the Capitol Region Watershed District and MPCA, including designing green infrastructure features that can be retrofit into a corporate site that is a former rail yard and warehouse district.
- Managing development of a stormwater management plan for Miller Hill Mall in Duluth, for the South St. Louis Soil and Water Conservation District, including green infrastructure features across a 50-acre parking lot that can lower the temperature of stormwater runoff to Miller Creek, which is currently impaired for brook trout habitat.
- Managing a retrofit project at Maplewood Mall that involved design and construction of low-impact development features including rain gardens, porous pavement, and 200 trees planted in tree trenches (STTeMS) as well as public education features across a 35-acre parking lot for the Ramsey-Washington Metro Watershed District.
- Managing two projects aimed at developing partnerships between the Ramsey-Washington Metro Watershed District and commercial and school properties within the district, with the goal of finding 10 commercial and school sites willing to partner with the district in retrofitting rain gardens on their sites.



service areas:
feasibility studies

Kevin Menken
Senior Environmental Engineer
MS, Civil Engineering

Kevin has 15 years of experience in water resources engineering and environmental investigation, remediation, and restoration. He conducts lake-water-quality studies, including collection of lake bathymetry data and sonar data for mapping of submerged aquatic vegetation biovolume. He also manages, coordinates, and conducts sediment-sampling in lakes, rivers, and streams. In addition, Kevin manages Barr's aquatic invasive species prevention program, conducts sediment phosphorus and wild rice and vegetation studies, models pollutant runoff from watersheds, and assists with TMDL development.

relevant experience:

- Managing, coordinating, and conducting sediment sampling and survey field investigations of numerous lakes, rivers, and stormwater ponds throughout Minnesota as part of larger stream restoration/stabilization and dam removal/modification projects.
- Managing and conducting long-term water-quality monitoring studies and aquatic biota surveys for numerous Minnesota lakes and streams.
- Conducting water-quality modeling of lakes and reservoirs, including modeling nutrient, phytoplankton, and zooplankton dynamics.



service areas:
feasibility studies

Keith Pilgrim, PhD
Senior Water Resources Scientist
PhD, Water Resources Science

Keith's 23 years of experience have involved water quality modeling, BMPs, development and implementation of water monitoring work plans, nutrient management, stormwater treatment and hydrology, NPDES permitting, aquatic chemistry, and toxicology. He also designs and implements surface-water-quality monitoring programs for urban environments.

relevant experience:

- Developing one-dimensional lake models for more than a dozen lakes to determine the source and sinks on nutrients in water bodies and the effect of nutrients on algal blooms.
- Serving as technical lead for the Schaper Pond monitoring project and Sweeney Lake aeration study project.
- Preparing the Schaper Pond feasibility study, which included monitoring pond inflows and outflows, modeling particle-size distribution, and modeling potential effectiveness of an in-pond diversion to improve water quality treatment.
- Managing preparation of the Twin Lake water-quality improvement options study and developing dosages for alum treatment.
- Creating an innovative stormwater treatment system using spent lime to reduce dissolved phosphorus.
- Developing a three-dimensional water-quality model (Delf3D) to predict the effect of dredging Fountain Lake in Albert Lea on lake-water and sediment quality.



service areas:
*feasibility studies,
meeting
attendance and
presentations*

Maureen McFarlane
GIS Applications Specialist
Master of Geographic Information Science

Maureen has three years of experience in web mapping, data modeling, relational databases, three-dimensional and spatial analysis, and application development. At Barr, she develops and manages online mapping applications and works with project teams to design and program geoprocessing tools and other web-based GIS tools. She helps develop and enhance field data collection tools, create maps using ArcMap, and document user procedures for field and online applications.

relevant experience:

- Working with the Mississippi Watershed Management Organization to create a customized ESRI Story Map web application for educational outreach.
- Maintaining web-map updates for the Valley Branch Watershed District and City of Edina.
- Developing alternative web-mapping templates for the diverse needs of clients.
- Creating a procedure for software widget development in order to house customized geoprocessing tools within web-mapping applications.



service areas:
*stormwater
management and
policy, feasibility
studies, design
assistance*

Tyler Olsen
Water Resources Engineer
MS, Civil Engineering

Tyler works on projects involving H&H modeling, stormwater management and planning, flood risk assessment, surface-water-quality analysis, and GIS. He creates hydraulic (HEC-RAS, XP-SWMM) and water-quality (P8, MIDS) models for watersheds and other industry clients to facilitate planning and project design. Tyler also assists with green infrastructure planning and design for watershed clients.

relevant experience:

- Conducting feasibility-level analysis and planning for the Ramsey-Washington Metro Watershed District to identify potential BMP implementation locations and prioritize the district's planning efforts.
- Assisting with climate change resiliency analysis for the Nine Mile Creek Watershed District by identifying high-flood-risk areas with hydraulic modeling and geospatial analysis.
- Producing Shell Rock River Watershed District annual water-quality reports.
- Updating HEC-RAS models for the Antelope Creek and Wild Rice River basins for district-wide planning and flood management.



service areas:
stormwater management and policy, feasibility studies, design assistance, stormwater development plan review

Heather Hlavaty
Water Resources Engineer
MS, Civil Engineering

Heather has four years of experience in H&H modeling, floodplain modeling and permitting, and water quality management. She has developed and updated several XP-SWMM and HEC-RAS models, which have been used to determine flooding impacts, establish storm-sewer network deficiencies, redesign culvert crossings, and evaluate lake-level flood elevations. Heather has also worked on projects addressing stormwater treatment and reuse. Employing the Minnesota MIDS, she has designed and sized BMPs such as bioretention basins (rain gardens) and underground storage and reuse structures using AutoCAD Civil 3D.

relevant experience:

- Updating the Capitol Region Watershed District's Trout Brook storm-sewer XP-SWMM model to incorporate Atlas 14 and update infrastructure modifications.
- Performing modeling for a feasibility study to make water-quality and flood-mitigation improvements in the Willow Reserve subwatershed, part of the Capitol Region Watershed District's Trout Brook storm-sewer watershed.
- Updating an existing detailed PC-SWMM model for the Riley-Purgatory-Bluff Creek Watershed District in largely urbanized areas.
- Developing an XP-SWMM model near Downs Lake for the Valley Branch Watershed District. The model was used to summarize and evaluate existing lake-level flood elevations.



service areas:
stormwater management and policy, stormwater development plan review

Josh Phillips
Water Resources Engineer
BS, Civil Engineering

Josh has more than three years of experience in water resources engineering. His work involves development reviews, inspection and maintenance for stormwater infrastructure, feasibility studies, H&H modeling, and stormwater management design.

relevant experience:

- Reviewing development proposals for conformance with water quality standards (MIDs), floodplain mitigation criteria, erosion control, and other watershed policies.
- Assisting with the Westwood Lake water-quality improvement project and Bryn Mawr Meadows Park water-quality improvement project feasibility studies for the Bassett Creek Watershed Management Commission.
- Working on subwatershed feasibility studies for potential BMP retrofit systems.



service areas:
*feasibility studies,
design assistance,
stormwater
development plan
review*

Karen Wold
Senior Environmental Scientist
BA, Environmental Studies

Karen has two decades of experience in wetland delineations, monitoring, and functional assessments. She has conducted wetland investigations and evaluations for many Minnesota watershed management organizations as well as municipal, county, industry, and commercial clients. Her work also involves preparing Section 404 permit applications and Wetland Conservation Act wetland replacement plans.

relevant experience:

- Conducting and reviewing wetland delineations, Minnesota Routine Assessment Method (MnRAM) assessments, and permit applications for watershed and other local government unit clients.
 - Serving as part of the technical evaluation panel for watershed management organizations for administration of the Wetland Conservation Act.
 - Delineating wetlands as part of creek stabilization and restoration projects for the Bassett Creek Watershed Management Organization and Nine Mile Creek Watershed District.
-

other services and specialties

monitoring

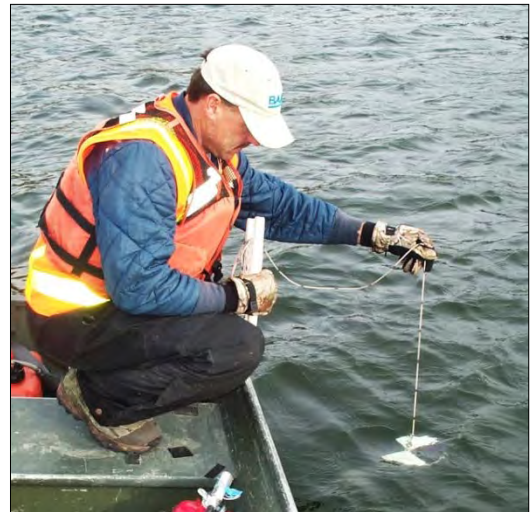
Good water quality is defined by more than a few measurements, especially when considered as part of a healthy environment where water quality supports a rich and varied community of organisms and protects public health. We believe that continued implementation of a monitoring program that determines improving or degrading trends is critical to protecting your water resources and measuring the success of projects and programs. Monitoring is the first step toward achieving sustainable uses appropriate for each water body in VLAWMO. By capturing and evaluating current data, adaptive management is feasible. Barr will use monitoring results and historic data to advise managers on future monitoring and other water quality management actions.

Barr is well-positioned to support VLAWMO's monitoring efforts. We are able to supply continuous-flow monitoring of streams, lake-level monitoring, and groundwater-level monitoring, as well as lake and stream water-quality monitoring. Barr has the equipment necessary to conduct environmental sampling for water quality, soil, and sediment. We also have sophisticated instrumentation and in-house maintenance and repair to enable proper and accurate functioning of equipment.

Barr looks at more than water levels and water chemistry. We conduct habitat monitoring, assess wetlands, survey aquatic plants, and monitor fish. Based on monitoring results and evaluation, we recommend additional monitoring and/or management measures, as warranted, and help clients understand the pros and cons of various options.

Barr has an in-house limnology laboratory that we use to analyze lake and stream samples for low concentrations of phosphorus and nitrogen. We provide this service to our clients because commercial laboratories generally do not provide the accuracy and precision required for low concentration assays of lake and stream samples. In addition to analyses of phosphorus and nitrogen compounds in lake and stream water samples, we use our laboratory for biological-specimen analyses and perform specialty experiments in support of lake and stream diagnostic-feasibility studies.

While Barr routinely conducts lake aquatic macrophyte surveys, we have also trained and worked with citizens to complete water-quality and aquatic-plant-management projects for decades. Citizens have played a primary role in the collection of data for more than two dozen lake management projects. Barr staff have trained citizens to collect lake water quality samples, measure lake levels, collect lake inflow samples, measure stream discharge, operate automated flow and water sampling equipment, collect herbicide residue samples, and complete aquatic plant surveys.



Barr technician Dave Melmer measures Secchi depth at an area lake.



Barr has installed several creek monitoring stations, including this station on Purgatory Creek.

pond maintenance and sediment management

All of the projects VLAWMO builds or manages require periodic and timely maintenance. Flood detention basins, water-quality treatment ponds, and other water-quality treatment BMPs are no exception. Infrastructure monitoring and maintenance and sediment accumulation monitoring and management are aspects of projects that have been and will continue to be important as VLAWMO and its partners work to protect and improve the quality of downstream water bodies. If desired, Barr can perform select portions or all aspects of preparing and implementing a project monitoring and maintenance program including:

- bathymetric analyses and surveys to determine sediment accumulation and current basin or BMP treatment efficiency
- coring and sediment sampling for sediment characterization and reuse evaluation, including analysis of polycyclic aromatic hydrocarbon (PAH) concentrations and sediment phosphorus release
- sediment handling and disposal
- BMP inventories and/or maintenance programs
- operations and maintenance plans and manuals
- infrastructure inspection for damage or deterioration
- feasibility and options analyses and studies
- plans, specifications, and contract documents
- environmental assessment and permitting
- construction management
- reporting

Barr regularly performs or has performed these services for watershed districts, water management organizations, and municipalities, including:

- Riley-Purgatory-Bluff Creek Watershed District
- Nine Mile Creek Watershed District
- Bassett Creek Water Management District
- Ramsey-Washington Metro Watershed District
- Valley Branch Watershed District
- City of Brooklyn Park
- City of Eagan
- City of Hastings
- City of Mounds View
- City of St. Louis Park

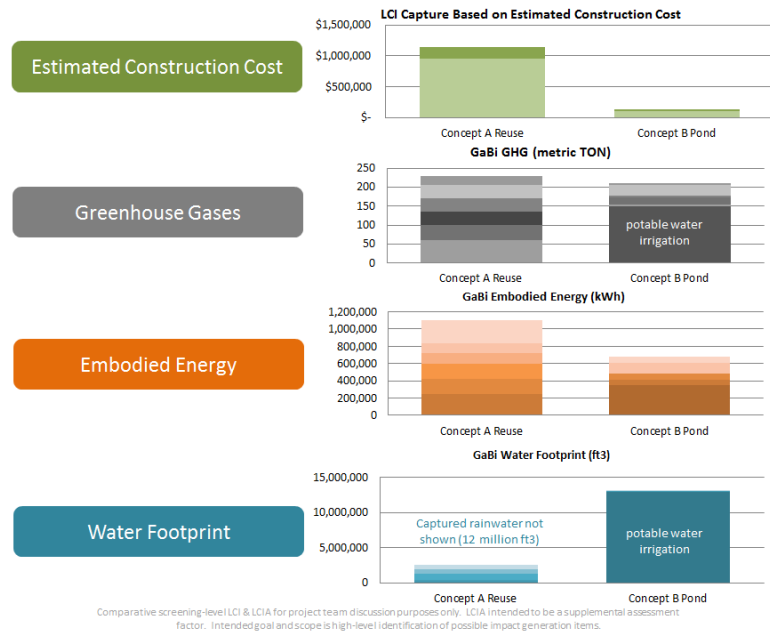
sustainability alternatives assessment

Strategies to manage big-picture impacts and related risk begin with understanding sources of impacts. In today's global supply chains, the relationships between supply and consumption are complex. Barr uses two emerging approaches—Envision™ and life-cycle assessment—to assess and quantify costs and environmental benefits and impacts associated with sustainable infrastructure design and products, processes, and services.

The Envision™ rating system is a project assessment and guidance tool for sustainable infrastructure design developed by the Harvard Graduate School of Design, American Society of Civil Engineers, American Public Works Association, and American Council of Engineering Companies. It is an objective framework of criteria and performance achievements that help users identify ways that sustainable approaches can be used to plan, design, construct, and operate infrastructure projects. Envision™ provides an opportunity for infrastructure owners and designers to be recognized for using a life-cycle approach, working with communities, and using a restorative approach to infrastructure projects. Envision™ is also a useful tool in comparing project options that have different intangible benefits that can be hard to quantify through traditional means.

Recently, Barr used Envision™ to evaluate the differences between two Northwood Lake stormwater improvement project options for the Bassett Creek Watershed Management Commission. While both options (option A: stormwater reuse irrigation system, and option B: traditional stormwater pond) would benefit Northwood Lake’s water quality, the commission recognized that there were other, less tangible pros and cons to each option that it wanted to consider in their decision. To systematically evaluate a wider range of potential project benefits, both options were scored using the Envision™ rating system. In addition, a screening-level life-cycle analysis of each option was performed using GaBi™ software. A life-cycle analysis is the systematic approach of looking at a product's complete life cycle, from raw materials to final disposal of the product. It offers a “cradle to grave” look at a product or process, considering environmental aspects and potential impacts such as greenhouse gas emissions and energy and water consumption, often expressed as “footprints.” Life-cycle analyses are one important consideration in the Envision™ rating system, offering decision makers another way to consider a wider range of differences between project options.

Both project options were “scored” using a comprehensive Envision™ guidance manual that includes the assignment of possible credits. Out of 60 credits, the two project options scored the same points in 48 credit areas. The two project options scored differently across 12 specific credits, resulting in a higher overall score for the water reuse option over the pond option. This information was used in helping guide the managers’ decision as to whether to help fund the water reuse project option, which was more expensive, but was ultimately the chosen option.



Barr developed this LCA dashboard to be used by the client as a decision support tool for comparing alternatives.

Barr can customize each Envision™ and life-cycle assessment to fit your specific needs on a project for well-informed decision-making and design. A right-sized effort can deliver actionable information. Each assessment uses focused goal-setting, gathers necessary inventory data and translates it into understandable impacts. In this way, tradeoffs can be evaluated and opportunities for improving performance can be identified.

aquatic invasive species

Aquatic invasive species are a serious threat to lakes, rivers, wetlands, recreation, property values, and tourism in Minnesota. Barr works with watershed districts and water management organizations and advisory groups to manage invasive species and prevent the spread of these species, where possible.

When a lake has too many or too few plants or is unbalanced by invasive species, Barr can help. We know different lakes call for different approaches to aquatic plant management. And as such, we develop lake-specific vegetation management plans, whether it's a multi-year plan or a one-time treatment. We create specialized invasive species management programs to reduce Eurasian watermilfoil, curly-leaf pondweed, and other invasive plant species. We then track their success by evaluating the reduction in invasive species and re-emergence of native plants.

Invasive aquatic plants can not only hamper recreational opportunities, but can also be detrimental to lake water quality. Barr works with watershed districts and management organizations as well as advisory groups to monitor the distribution of invasive aquatic plants, prevent further spread, and manage problems caused by these plants. Working in close collaboration with the Nine Mile Creek Watershed District, City of Eden Prairie, Three Rivers Park District, and riparian property owners, Barr implemented a curly-leaf pondweed management program for Northwest, Southwest, and Southeast Anderson lakes.

Zebra mussels are an invasive species that has spread into regional lakes, causing problems for lake recreationists and lakeshore owners. To prevent spread of the invasive mussels from lake to lake, Barr utilizes a hot-water boat decontamination process and recently purchased special equipment to achieve heat temperatures of 140 degrees or greater to enable elimination of the mussels between lakes. We are a Minnesota Department of Natural Resources (DNR)-permitted lake service provider, which requires compliance with boat and equipment decontamination and training for employees on preventing the spread of aquatic invasive species.



Water quality in Northwest Anderson Lake improved after lake-wide management of curly-leaf pondweed.



Barr determined that adding new gates along the dam crest and submerged slide gates through each dam bay at the Rum River Dam in Anoka would be the most practical method to prevent the migration of Asian carp.

We have completed evaluations, studies, and design for a variety of fish barrier systems—including electric, mechanical, sound, light, and hydraulic barrier designs—for the Minnesota DNR (Lock & Dam #1), City of Anoka (Rum River Dam), Ramsey-Washington Metro Watershed District (Kohlman Creek), Shell Rock River Watershed District (Shell Rock River), U.S. Fish and Wildlife (USFWS), private power utilities, and municipal and regional governments. We have worked with proprietary vendors, research scientists, USFWS staff, and our own in-house fisheries biologists to evaluate and design other systems.

In Ramsey County's Kohlman Lake, for example, Barr worked with a technical advisory committee to complete an aquatic plant management plan. The technical advisory committee consisted of representatives from the Kohlman Lake Association, Ramsey County, Ramsey-Washington Metro Watershed District, Minnesota Pollution Control Agency (MPCA), and Minnesota DNR. The committee used a consensus approach to select a management approach to control Eurasian watermilfoil and curly-leaf pondweed in Kohlman Lake while protecting native species.

Barr often teams with experts at the University of Minnesota and other private consultants on aquatic plant management.

landscape architecture

Barr's urban planning, design, and landscape architecture practice is grounded in urban ecology—a natural model for sustainable design. We have a long history of providing watersheds, municipalities, and private-sector clients with innovative planning and design services that balance economic and social needs with the capacity of the environment. Our services include:

community planning

- land-use and water-management planning
- ordinance development
- public process design and facilitation
- community education

landscape ecology and architecture

- ecologically sensitive landscape design
- park design and interpretive signage
- trail design and interpretive signage
- hard structure design (streetscapes, sidewalks, and roadways)
- grading and drainage plans
- planting design
- alternative stormwater management design
- infiltration systems design
- stormwater wetland design
- impervious surface reduction
- native plant community protection, restoration, and mitigation
- prairie, savanna, and forest restoration design
- wetland restoration and mitigation
- wetland protection and management plans
- lakeshore stabilization and restoration
- interpretation and education
- demonstration landscape creation

- workshops and lectures on sustainable landscape and alternative stormwater management
- brochures, flyers, and other written materials

native plant community restoration

From stream corridor restoration to urban forestry plans, Barr provides thoughtful, cost-effective strategies for restoring native plant communities to the most ecologically diverse condition possible. The City of Minneapolis used our plan to stabilize a 2-mile stretch of Minnehaha Creek, which was eroding from high volumes of neighborhood runoff while parks in Burnsville—invaded by buckthorn and garlic mustard—have benefitted from the invasive species control strategies developed as part of our natural resources master plan for the city.

sustainable landscape

We understand that when a project looks good and functions in sync with nature—providing wildlife habitat and an ecologically stable landscape—citizens and public officials are satisfied. We've successfully completed sustainable landscape design projects for a variety of clients ranging from watershed districts and municipalities to mining companies. Our goal for these projects is to improve environmental quality while creating great outdoor places for people to experience.

land surveying

Virtually every analysis, feasibility study, project design, or construction project we undertake involves our surveyors to some degree—each of whom has 15 to 35 years of surveying experience. Additionally, most of our civil, structural, and geotechnical engineers and engineering technicians have significant surveying experience. Barr's surveying services include:

- topography and bathymetry surveying
- detailed inventorying of infrastructure (utilities, buildings, basins, lakes, wetlands, ditches, outlets)
- surveying within piping systems (such as the Trout Brook storm sewer)
- construction staking
- property corner locations
- sediment accumulation surveys
- global positioning system (GPS)/dated photography
- development of survey databases for our client's specific needs
- easement and property descriptions

Additionally, the use of three-dimensional laser scanning in engineering applications is growing. For capturing and documenting anything from pipe inverts and manhole covers to the beams of a bridge needing to be widened, Barr uses these scanners to provide extremely accurate measurements in complex environments.

Barr's Leica ScanStation C10 three-dimensional laser scanner offers increased accuracy with great speed and range, enabling our technicians to scan sites in just a few hours without directly accessing hazardous areas. While it does not replace traditional surveying methods, this technology increases safety and helps cut costs by reducing the amount of time spent on-site.

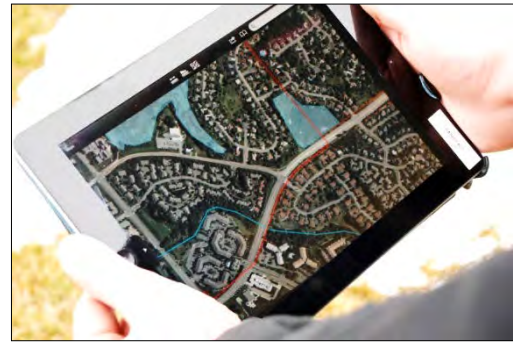
The point cloud images captured with the Leica ScanStation C10 can determine the distance between two points down to one one-hundredth of a foot in both indoor and outdoor settings, and in various climates and weather conditions.

The machine also has the ability to take photos, which can be added to the point cloud images to improve visual accuracy when site information is being processed. Data from the ScanStation C10 can then be exported to Civil 3D, Revit, CADWorx, and other software for further processing and interpretation, allowing our engineers a solid understanding of site features and the ability to create effective, custom solutions. In the rare instance that VLAWMO may need to actually set legal property lines, Barr would team with a survey firm, such as Sunde Land Surveying, that is specially licensed to set such corners.

geographic information systems

GIS is an integral part of Barr's surface-water modeling and management efforts. GIS plays a key role in the collection, management, analysis, and presentation of data.

For modeling, Esri ArcGIS software is used to develop input data into many models, including HEC-RAS, HEC-HMS, P8, and XP-SWMM. Preprocessing includes watershed delineation, land-use/land-cover analysis, stormwater-facility and flow network mapping (of ditches, streams, and storm sewers) and automated volume calculations of ponds. Barr also utilizes the National Oceanic and Atmospheric Administration's (NOAA) NEXRAD radar data within ArcGIS to estimate rainfall distributions temporally and spatially across watersheds. Barr has developed several GIS tools that automate many of these processes.



When it is necessary to review or collect data in the field, Barr uses a GIS-linked system which uses iPads and GPS technology. This system enables data entry in the field, on-the-spot map updates and live viewing of GIS data stored at Barr's office. This allows for convenient and up-to-date access for all project staff and others to up-to-date project information. ArcGIS Server is used to develop these field applications and also for web-based mapping.

Using GIS on the web allows viewing of our clients' project-related data via a web browser and/or apps on mobile devices. Depending on the need, these maps can be developed for viewing by Barr project staff members, VLAMO, and/or the public. Using web-based mapping provides easy/anytime access to data, keeping all interested parties informed on VLAWMO projects and issues.

Barr's 2019 fee schedule

Barr's 2019 fee schedule, presented below, summarizes the range of billing rates for each of our staffing categories that are likely to work on projects for the WMO. In many cases, the billing rates listed represent a wide range, based on varying levels of experience and expertise of staff within these categories. When building a team for VLAWMO projects, we will select appropriate staff in consideration not only for the right experience, but also staff billing rates, to confirm that VLAWMO receives high-value services for a reasonable cost.

Barr will not include in its invoices to the WMO, any subconsultant markups or administrative fees for direct or subcontracted costs. Additionally, we will not charge VLAWMO for accounting services or invoice preparation. In the event that the WMO also wishes to establish an incidental work authorization arrangement with Barr for the completion of minor work tasks that are time-sensitive and too small to warrant issuance of a Work Order, we are happy to work against a modest retainer (e.g., \$5,000, or other amount) established at the start of the new contract period.

Finally, Barr staff will attend monthly VLAWMO Board of Managers or TEC meetings as requested, and will not charge the WMO for travel time or mileage.

description	rate* (U.S. dollars)
engineer/scientist/specialist I.....	\$65-90
engineer/scientist/specialist II.....	\$95-120
engineer/scientist/specialist III.....	\$125-150
consultant/advisor.....	\$155-175
principal.....	\$145-175
technician I.....	\$50-90
technician II.....	\$95-120
technician III.....	\$125-150
support personnel I.....	\$50-90
support personnel II.....	\$95-150

Rates for litigation support services will include a 30-percent surcharge.

A 10-percent markup will be added to subcontracts for professional support and construction services to cover overhead and insurance surcharge expenses.

Invoices are payable within 30 days of the date of the invoice. Any amount not paid within 30 days shall bear interest from the date 10 days after the date of the invoice at a rate equal to the lesser of 18 percent per annum or the highest rate allowed by applicable law.

Reimbursable expenses including, but not limited to, the actual and reasonable costs of transportation, meals, lodging, parking costs, postage, and shipping charges will be billed at actual cost. Materials and supplies charges, printing charges, and equipment rental charges will be billed in accordance with Barr's standard rate schedules. Mileage will be billed at the IRS-allowable rate.

*Rates do not include sales tax on services that may be required in some jurisdictions.

principal category: includes consultants, advisors, engineers, scientists, and specialists who are officers of the company.
consultant/advisor category: includes experienced personnel in a variety of fields. These professionals typically have advanced background in their areas of practice and include engineers, engineering specialists, scientists, related technical professionals, and professionals in complementary service areas such as communications and public affairs.

engineer/scientist/specialist categories: include registered professionals and professionals in training (e.g., engineers, geologists, and landscape architects), and graduates of engineering and science degree programs.

technician categories: include CADD operators, construction observers, cost estimators, data management technicians, designers, drafters, interns, safety technicians, and surveyors, as well as water, air, and waste samplers.

support personnel categories: include information management, project accounting, report production, word processing, and other project support personnel.

references

Black Dog Watershed Management Organization

Daryl Jacobson, Administrator
952-895-4574

Riley-Purgatory-Bluff Creek Watershed District

Terry Jefferey, Project and Permit Manager
952-807-6885

Ramsey-Washington Metro Watershed District

Tina Carstens, Administrator
651-792-7960

City of Bloomington

Scott Anderson, Senior Water Resources Civil Engineer
952-563-4867

Minnesota Pollution Control Agency

Mike Trojan, Stormwater Master Contract Manager
651-757-2790

Nine Mile Creek Watershed District

Randy Anhorn, District Administrator
952-835-2078

Minnesota Board of Water and Soil Resources

Kevin Bigalke, Central Region Manager
651-297-2906

Scott Watershed Management Organization

Paul Nelson, Environmental Services Program
Manager
952-496-8054

stormwater management and policy

key team members



For 50 years, Barr has provided engineering expertise to watershed management organizations as well as federal, state, and municipal clients. Our staff has grown to include more than 100 water resources engineers, and scientists. Whether a client has a single concern or needs help with multiple complex watershed issues, we can provide workable, affordable, and environmentally friendly solutions.

We've written dozens of watershed management plans and updates including first-, second-, and third-generation plans for:

- Riley-Purgatory-Bluff Creek Watershed District
- Bassett Creek Watershed Management Commission
- Black Dog Watershed Management Organization
- Cedar River Watershed District
- Lake Pelican Water Project District
- Lower Rum River Watershed Management Organization
- Nine Mile Creek Watershed District
- Ramsey-Washington Metro Watershed District
- Six Cities Water Management Organization
- Thirty Lakes Watershed District
- Valley Branch Watershed District
- Bois de Sioux Watershed District (watershed plan)
- Cedar River, One Watershed, One Plan Partnership (includes multiple soil and water conservation districts (SWCDs), counties, and cities)



Barr leading discussions at a stakeholder meeting for the Valley Branch Watershed District

We have also helped more than 50 cities develop comprehensive plans. Some of these clients include:

- City of Apple Valley (surface-water management plan update)
- City of Bloomington (local surface-water management plan update)
- City of Eden Prairie (stormwater and natural resource plans)
- City of Edina (sanitary-sewer and stormwater management plans)

- City of Golden Valley (surface-water management plan update)
- City of Hastings (third-generation stormwater plan)
- City of Inver Grove Heights (second-generation water-resources management plan)
- City of Lakeville (stormwater plan)
- City of Minnetonka (stormwater and natural resources plan)
- City of New Brighton (water supply system plan)
- City of Northfield (surface-water plan)
- City of Richfield (surface-water management plan update)
- City of Willmar (second-generation stormwater plan)

As the engineer for numerous Minnesota watershed districts, cities, and counties, Barr has been instrumental in developing construction-site and watershed management standards and requirements that have been adopted by cities, counties, watershed districts, and agencies throughout the state. We recently assisted the Riley-Purgatory-Bluff Creek Watershed District in a major revision of its rules and reinstatement of its regulatory program. In addition, Barr worked with the MPCA and a large group of stakeholders in developing a statewide stormwater volume performance goal through the minimal impact design standards (MIDS) project. With a growing staff of 800 engineers, scientists, and technical experts, we have the resources to assist clients with the projects identified in these management plans.

"The Barr Engineering MIDS team has performed flawlessly with superb technical analyses, communication to the diverse work group while maintaining close communications with MPCA project staff. They have provided top-quality products on time and within budget, and earned the respect and praise from the diverse MIDS work group. I give them my highest ratings that go beyond excellence because of dedication, anticipating problems/issues, and crafting excellent scientific foundations for a very difficult and challenging project."

relevant project examples

Goose Lake subwatershed feasibility and implementation study

Vadnais Lake Area Water Management Organization • Vadnais Heights, Minnesota

Barr is currently completing a project on behalf of VLAWMO to study the feasibility of various stormwater treatment options for achieving significant nutrient reductions in the Goose Lake subwatershed.

Water-quality and water-quantity monitoring and modeling data is being used to develop phosphorus loading estimates. Applying the results, we are analyzing feasible BMP opportunities throughout the Goose Lake subwatershed and assisting with design and implementation of feasible treatment options to improve the stormwater quality entering Goose Lake. Barr is also helping engage the public, regulatory agencies, and VLAWMO staff to understand the management options for the watershed.

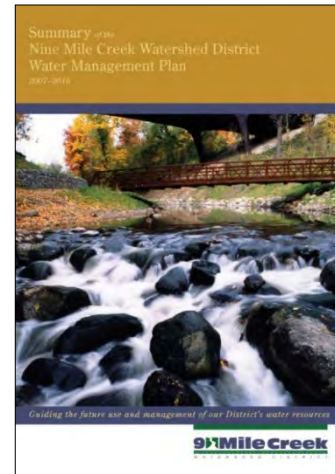
development of water management plan and guidance document

Nine Mile Creek Watershed District • Edina, Minnesota

Barr has served the Nine Mile Creek Watershed District since its inception in 1959, providing planning, engineering, and natural resources services. In the mid-1990s, we prepared a second-generation water management plan for the district that addressed flood control, improvement in the water quality of streams and lakes, groundwater protection, preservation of wetlands and open spaces, wildlife- and fish-habitat restoration, and streambed erosion control. The plan also included a detailed capital improvement program to guide the district's actions for the next 10 years.

In 2005 and 2006, Barr worked closely with the district to develop the third-generation plan, which focused on involving the public, municipalities, and local and state agencies in the planning process. We compiled the results of a district-commissioned survey of residents in a summary report, and the district prepared its revised plan in light of those results.

Barr participated in public meetings held in each of the cities in the Nine Mile Creek watershed and facilitated meetings with a technical advisory committee composed of municipal-engineering and public-works staff members, as well as representatives from local and state agencies. Along with district managers, the stakeholders provided feedback on the draft plan in every phase of development. The intensive process fostered a third-generation plan designed to allow the district to achieve its goals while also providing flexibility for local governments and promoting partnerships among stakeholders. The Minnesota Board of Water and Soil Resources (BWSR) approved the plan in January 2007, and the district adopted it in two months later.



After completing the plan, Barr worked closely with district staff to develop a 28-page communication booklet that provides a concise synopsis of the plan. The visually appealing document supplies background information on the district and its resources; it also summarizes the district's 10-year goals and implementation programs, including education and outreach.

Lake Susan subwatershed study identifies innovative solution

Riley-Purgatory-Bluff Creek Watershed District • Minnesota

Barr completed a feasibility study to identify a stormwater treatment BMP that would efficiently remove phosphorus from Lake Susan while minimizing site impacts and changes to water surface elevations upstream of the BMP, and did not modify the high-traffic walking path adjacent to the site. The study included an evaluation of several innovative treatment system designs, including a woodchip bioreactor, spent-lime reactor, and iron-enhanced sand filter.

Barr evaluated each design based on:

- potential to remove phosphorus from stormwater
- construction impacts on adjacent uplands and wetlands
- impacts on wetland water elevations
- construction and maintenance costs



Barr prepared conceptual renderings of what the site could look like during and after construction from the adjacent walking path (left). Construction of the spent-lime system was completed in 2016 (right).

Barr recommended the spent-lime reactor as the system that would provide the highest phosphorus removal efficiency while also having the smallest construction footprint. We developed renderings to show how the proposed system could look as viewed from the walking path during construction and following site restoration. Barr worked closely with the Riley-Purgatory-Bluff Creek Watershed District and City of Chanhassen during construction to minimize the impacts to city trails and residents. During construction, Barr observed and documented construction progress, provided updates to city and district

Cedar River one watershed one plan The 1W1P Partnership • Austin, Minnesota

Barr is assisting with the development of a 10-year comprehensive watershed management plan for the 462,295-acre Cedar River watershed, which includes the Cedar River, Turtle Creek, Little Cedar, Otter Creek, Deer Creek, and Wapsinicon watersheds. The planning process is supported by funding from BWSR and must meet Minnesota statute and BWSR requirements. The plan will address surface water and groundwater, fish and wildlife habitat, water recreation, wetlands, flood damage reduction, and shoreland and riparian zones.



The Cedar River

Several local and regional agencies formed a partnership to facilitate plan development, including cities, counties, SWCDs, and watershed districts. The partnership includes the counties and SWCDs of Dodge, Steele, Freeborn and Mower, along with the Turtle Creek and Cedar River watershed districts and City of Austin. To facilitate and coordinate development of this complex plan across multiple jurisdictions, several committees were created:

policy committee—This 11-member committee is the decision-making authority during the planning process. It is composed of one county commissioner and one SWCD supervisor appointed from each watershed county, one manager each from the Cedar River Watershed District and the Turtle Creek Watershed District, and an Austin city council member.

advisory committee—This committee makes recommendations regarding plan content. Members are appointed by the policy committee and include local, state, and federal agency staff; representatives from agricultural and conservation groups; municipalities; and other stakeholders.

planning work group—This group will guide the logistics of the planning process and includes local governmental staff from the counties, SWCDs, watershed districts, and City of Austin.

The Barr team is responsible for 1) compiling available information and data/information generated by the partnership's planning work group and in the advisory committee and policy committee meetings; 2) preparing the draft comprehensive watershed management plan based on information generated at the committee meetings; and 3) editing the plan based on input from the advisory and policy committees, with the final product submitted to BWSR for approval. Our team will also assist the planning work group with guiding the plan through public and agency review.

feasibility studies

key team members



VLAWMO has an abundant diversity of water bodies, with lakes, streams, and wetlands of varying size, type, and characteristics. Barr takes a holistic approach to resource management to account for the interconnectivity and interdependency of the various water resources in each jurisdiction. Our approach to water management is key to understanding the systems and the true impacts (both advantages and disadvantages) of potential water-quality improvement projects.

lake management

Barr has been managing water resources using a holistic watershed approach for more than 50 years and has staff in-house to address all aspects of project planning, design, permitting, and implementation. We are at the forefront of implementing stormwater BMPs and in-lake management techniques because of our ability to blend traditional engineering practices with ecologically sensitive approaches that are aesthetically pleasing to the general public. We have worked with our clients and the communities they represent to implement innovative water-management techniques in a variety of settings, including city-wide BMP implementation, wetland restorations, streambank stabilizations, invasive species management, stormwater-conveyance retrofit projects, residential rain garden programs, and regional water-quality improvement facilities. Barr has worked on half of the Metro-area lakes that have been delisted through 2018 and have engineered 60 percent of the alum treatments in Minnesota.

Barr's holistic approach to achieving water quality improvements was used in the recent development of use-attainability analysis (UAA) updates for the Riley-Purgatory-Bluff Creek Watershed District. The one-waters management approach was also applied in the Purgatory Creek watershed assessment and the Rice Marsh Lake/Lake Riley UAA updates. Barr used a watershed-wide approach to resource management in the design and implementation of the district's Lake Riley water-quality improvement project.

Barr is currently working on several other exciting lake management projects highlighted in our project examples later in this section, including a successful alum treatment on Spring Lake for Prior Lake-Spring Lake Watershed District. We're studying carp and their role in re-suspending phosphorus from lake sediments and potential impacts to alum treatments in the Phalen Chain of Lakes for the Ramsey-

Washington Metro Watershed District. We're continuing to explore the use of innovative filtration media to remove dissolved phosphorus from stormwater, such as spent lime, woodchip bioreactors, and sand filtration enhanced with iron filings.

wetland services

Our team includes five Minnesota-certified wetland delineators with a combined total of more than 45 years of experience in the following areas:

- wetland identification, delineation, characterization, and mapping
- functions and values assessments of wetlands
- identification and interpretation of local, state, and federal wetland regulations
- wetland hydrology studies and evaluation of hydrologic impacts
- evaluation and recommendations for modifying development proposals regarding wetland impacts
- design of programs to avoid, minimize, and mitigate wetland impacts
- preparation of municipal wetland management ordinances
- wetland mitigation design, construction administration, maintenance, monitoring
- regulatory negotiations
- historical wetland surveys

Barr has been involved in administration of the Wetland Conservation Act since the law's inception in 1991. We have developed an in-depth knowledge of the law and its administration, as we have provided wetland services since development of the law and through the four major amendments adopted since the permanent rules went into effect in 1993.

Watershed districts and watershed management organizations for whom Barr has provided Wetland Conservation Act administration and technical assistance are listed below. We have also provided similar services to numerous municipalities and counties.

- Riley-Purgatory-Bluff Creek Watershed District
- Bassett Creek Watershed Management Commission
- Lower Rum River Watershed Management Organization
- Nine Mile Creek Watershed District
- Valley Branch Watershed District

stream restoration

Barr has been a leader in implementing ecological methods for stream and river restoration, habitat preservation, and erosion control. Our restoration efforts are informed by the hydrology, geomorphology, biology, water quality, and connectivity of each stream—enabling our engineering solutions to align with the function and character of the stream corridor. We gather data from a variety of sources and then analyze the information to identify problem sources and cost effective alternatives so that decision makers can make informed, justifiable choices with a full understanding of the expected outcomes. Examples of our restoration projects include work on portions of the following streams:

- Battle Creek
- Farney Creek
- Fish Creek
- Minnehaha Creek
- Nine Mile Creek
- Purgatory Creek
- Raleigh Creek
- Valley Creek

Barr has also worked on ravine stabilization and restoration projects throughout the state, including:

- Battle Creek Regional Park (Woodbury, Maplewood, and St. Paul)
- Carver ravine (Woodbury)
- DeMontreville ravine (Lake Elmo)
- Fish Creek ravine (Maplewood and St. Paul)
- Hastings Industrial Park ravine (Hastings)
- Mississippi River bluff (Minneapolis)
- Riley Creek lower valley (Eden Prairie)
- West 110th Street eroding ravine (Bloomington)

hydraulic and hydrologic modeling and analysis

Barr was founded on the strength of our hydrologic and hydraulic capabilities, and we have performed hydrologic and hydraulic analyses and developed stormwater management plans for watershed districts, water management organizations, municipalities, and state and federal agencies. We provide solutions that are not only technically sound, but sensitive to important factors such as water quality, wetland management, biological integrity, habitat enhancement, and overall aesthetics.

We are experienced with a variety of hydrologic and hydraulic computer models and enjoy the challenge of selecting and using the models to best meet the specific needs of a project. Our breadth of experience encompasses simple hydrologic models such as HydroCAD, TR20 and TR55 to more complex models such as HEC-HMS and PCSWMM and water-quality/hydrologic models such as SWAT and HSPF.

Our experience with hydraulic models includes one-dimensional HEC-RAS (both steady and unsteady models), RMA2 (a two-dimensional river hydraulic model), AdH (a two-dimensional hydraulic model), and Delft 3D (a three-dimensional hydrodynamic model).

Our hydraulic analysis and design projects have included stormwater drainage and flood control systems, dam and hydropower facilities, spillway design, structural flood proofing, erosion control measures, and water-supply and water-treatment systems. We've designed and constructed large- and small-scale stormwater management systems for municipalities, watershed organizations, and other local, state, and federal entities.

TMDL studies

Barr's water quality team has completed or is working on more than 30 TMDL and impaired waters studies for state agencies, watershed districts, and local governments. Our experience includes:

- pollutant-source and land-use inventories/assessments
- stressor Identification
- pollutant loadings and source allocations
- load-reduction scenario development and evaluation
- TMDL implementation plans
- selection and location of BMPs

We've managed large-scale and/or multiple impairments and stressors, including:

- turbidity
- excess nutrients
- chloride
- bedded sediment
- metals
- fecal coliform

- dissolved oxygen
- temperature
- nitrate

water-quality modeling and analysis

With increased regulation of stormwater and TMDLs to address impaired water bodies, many watershed districts, water resource management organizations, and municipalities are working to implement BMPs and need to know whether their efforts are having the desired results. Barr has modeled the effectiveness of BMPs for more than 20 years, including developing MIDS and a stormwater BMP performance evaluation tool for the MPCA. We also developed a proprietary software program, SHSAM, to predict the pollutant removal from underground stormwater treatment structures and sump manholes. The following is a list of the computer simulation models that Barr has used for TMDL projects:

BATHTUB—Lakes Jane, Minnewawa and DeMontreville and Silver, Echo, Mud, Long, and Olson lakes; Medicine Lake, Wirth Lake; Big Sandy and Horseshoe lakes; Spring and Upper Prior lakes; Heron Lake

P8—East and West Goose Lake, Lakes Jane and DeMontreville and Silver, Echo, Mud, Long, and Olson lakes; Medicine Lake, Wirth Lake; Cedar and McMahan lakes; Kohlman, Keller, and Beaver lakes; Crystal, Keller, Lee, and Early lakes

FLUX—Medicine Lake watershed, Big Sandy Lakes watershed, Spring and Upper Prior Lakes watershed, Heron Lake watershed

ArcSWAT—Logan Creek watershed

BASINS/HSPF—Seven Mile Creek watershed

AQUATOX—Bryant Lake, Riley Lake

QUAL2E/QUAL2K/Streeter-Phelps modeling—Blue Earth River, Grindstone Creek (Missouri)

DYRESM-ELCOM-CAEDYM—Ford Lake (Ypsilanti, Michigan); Lake DeMontreville and Long Lake; Pearl Lake; Sunfish Lake

XP-SWMM—Nine Mile Creek watershed, Vermillion River watershed, cities of Bloomington and Edina

PEST—Vermillion River watershed

MODFLOW/PEST/MIKE SHE/SWB—Washington County groundwater modeling, Seminary fen, Savage fen

RUSLE2—West Fork Des Moines River Watershed

WATBUD/Meyer models—Lake Jane and Silver, Penn, Olson-DeMontreville, Long, Bush, Bryant, and Bone lakes; Downs, McDonald, Sunnybrook, Cloverdale, and Horseshoe lakes, Goetschel, Capaul's, and Fahlstrom ponds

MINUHET—Vermillion River watershed

CORMIX—Black Dog coal facility/Minnesota River

HEC-RAS/HEC-GeoRAS/HEC-HMS—Rabbit River and Oconto River; Detroit and St. Clair rivers; Fargo-Moorhead metro flood-risk management project feasibility study; Upper Cedar River watershed

MINLEAP—Fairmont Chain of Lakes; Lake Minnewawa, Big Sandy and Horseshoe lakes

empirical mass-balance modeling spreadsheet—Cedar and McMahon lakes; Parkers and Turtle lakes (Plymouth); Wirth Lake (Golden Valley); Crane Lake (Minnetonka); Grimes, North Rice, and South Rice ponds (Crystal and Robbinsdale); Lake McCarrons; Bryant Lake; Kohlman, Keller, and Beaver lakes; Crystal, Keller, Lee, and Early lakes

real results

Our experts help clients solve a variety of water quality problems. Some outcomes from this work include:

- permit-specific phosphorus trading program for the Southern Minnesota Beet Sugar Cooperative
- proposed application of site-specific standards for eutrophication in lakes near ecoregion boundaries
- linking NEXRAD precipitation data, geomorphology, and groundwater/optimization models to watershed modeling
- distinguishing natural and man-made effects on low dissolved oxygen in Nine Mile Creek
- MIDS for mimicking natural hydrology following land disturbance
- manuals and protocols for BMP design, implementation, and maintenance
- paired watershed study to monitor cost effectiveness of rain gardens for retrofit and newly urbanizing developments
- delisting of Nine Mile Creek for turbidity and Tanners Lake for excess nutrients

relevant project examples

East Goose, West Goose, and Wilkinson lakes feasibility study

Vadnais Lake Area Water Management Organization • Vadnais Heights, Minnesota

Barr, in partnership with Young Environmental Consulting Group, recently completed a project on behalf of VLAWMO to revisit whether current lake-water-quality standards for East Goose, West Goose, and Wilkson lakes are realistic or attainable, and to determine the best options for achieving significant nutrient reductions in all three lake basins—with a priority to work toward delisting the impaired waters within the next five years.

Barr compiled water-quality and water-quantity monitoring data and phosphorus loading estimates from recent studies and a continuous watershed modeling simulation to determine annual and seasonal water-quality changes for each lake basin. The results were used to estimate the assimilation capacity of each lake under varying climatic conditions and determine the phosphorus-load reduction goals necessary to meet state water-quality standards. We also conducted and compared MNLEAP modeling to current water quality to evaluate whether the water quality standards were attainable for each lake. A stakeholder engagement process was incorporated to help the public, regulatory agencies, and VLAWMO staff members understand user perceptions and to identify and vet management solutions for each lake.

Barr developed in-lake phosphorus mass-balance modeling to evaluate lake-water-quality improvement options. The results, along with costs for each option, were summarized, including consideration of whether watershed BMPs or in-lake improvement options can feasibly attain load reduction goals that will enable compliance with the lake water quality standards.

Rice Marsh Lake and Lake Riley UAA update Riley-Purgatory-Bluff Creek Watershed District • Minnesota

In 2016, Barr completed the Rice Marsh Lake and Lake Riley UAA update, originally conducted in 1999, to assess the lakes' water quality based on more recent physical, chemical, and biological data, and to identify and evaluate watershed and in-lake BMPs to improve and protect the water quality of these lakes.

The study found that water quality in both lakes does not achieve current state or district water-quality standards. Soluble, or dissolved, phosphorus is especially prevalent in the watershed runoff reaching the lake since much of the particulate phosphorus appears to settle out in the existing stormwater ponds. Lake Riley is also heavily influenced by inflows from upstream Rice Marsh Lake. Strong thermal stratification in Lake Riley limits the amount of phosphorus transferred from the lake's deep water to its surface waters.

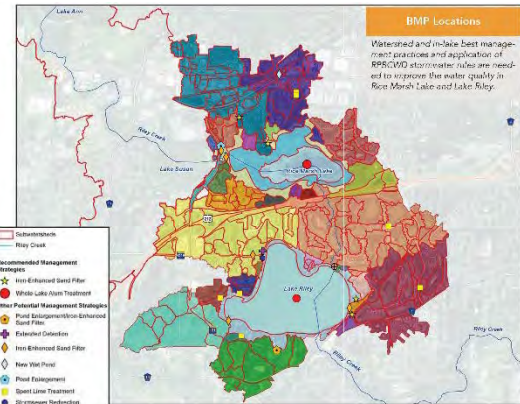
Based on modeling results, Barr developed customized management strategies for Rice Marsh Lake and Lake Riley, including practices to target removal of dissolved phosphorus from watershed runoff and in-lake management to address internal phosphorus loading. Barr developed concept-level designs for iron-enhanced sand filtration, a spent-lime treatment system, and alum treatments and prepared planning-level construction costs for each management practice. The watershed and in-lake models were used to quantify pollutant removal effectiveness and predict the resulting improvements in water quality in Rice Marsh Lake and Lake Riley. We also computed project costs per pound of phosphorus removal to help the district evaluate and prioritize projects.

streambank restoration projects

Riley-Purgatory-Bluff Creek Watershed District • Minnesota

Serving as district engineer for more than four decades, Barr has assisted the Riley-Purgatory-Bluff Creek Watershed District in implementing numerous ecological methods for stream, wetland, and lake restoration; habitat preservation; and floodplain management. Several of the more recent stream restorations efforts are summarized below.

Purgatory Creek restoration in Minnetonka: In 2013, Barr assessed approximately 2,200 feet of Purgatory Creek in Minnetonka for stream stability. Concept designs were developed for 25 erosion areas. After additional cost-benefit analysis, final designs were completed to stabilize 12 sites along 1,100 feet of stream. Our restoration efforts included surveying, wetland delineation, hydrology, hydraulics, geotechnical assessment, cultural resources review, stakeholder coordination, design, construction quality assurance review, and contract administration. Stabilization work was substantially completed in 2016, and final plantings were completed in spring 2017. Because most of the site is in a city park, more natural stabilization methods—such as root wads, vegetated reinforced soil slope, and boulder grade controls—were used. Areas with exotic vegetation were replanted with native vegetation



Watershed and in-lake BMPs and stormwater volume abstraction rules are needed to improve the water quality in Rice Marsh Lake and Lake Riley.



Lower Riley Creek restoration: In 2016, Barr assessed approximately 1 mile of Riley Creek in Eden Prairie where deep channel incision had resulted in significant bank erosion, which contributed to destabilization of tall, steep slopes and disconnection of the creek from the floodplain. Barr completed concept designs involving natural stabilization methods—such as root wads, vegetated reinforced soil slope, and boulder grade controls—and cost estimates in 2016, with final design completed in 2017.

Bluff Creek restoration: In early 2017, Barr assessed two reaches totaling approximately 3,200 feet on Bluff Creek in Chanhassen to assess the feasibility of stabilization and habitat enhancement. We developed concept designs for each reach and provided a recommendation for proceeding with one reach into final design. Final design began in February 2017.

creek restoration action strategy: In 2015, Barr worked with the district to complete a simplified method to efficiently assess and prioritize potential stream projects across the 50-square-mile watershed district with three unique creeks. The project split three creeks and tributaries creeks into approximately 90 reaches and sub-reaches, and scores for items such as water quality, habitat quality, stream stability, and threat to infrastructure were assigned to each reach to assist in developing a restoration priority list.

suburban stream stabilized and connected to new channel

Nine Mile Creek Watershed District • Hopkins, Minnesota

Barr evaluated and designed stream stabilization measures for the north fork of Nine Mile Creek. The first phase of the project involved stabilizing a 3,800-foot reach that flows through a deep, confined ditch bounded primarily by commercial and high-density residential housing. We armored the lower banks with native fieldstone and removed invasive vegetation and undesirable trees on the upper stream banks. Contaminated soils that were discovered were also removed and disposed of offsite.



For the second phase, we constructed 3,100 feet of new, meandering channel to restore reaches that had previously been straightened. Because most of the site is in a city park, more natural stabilization methods—such as root wads, vegetated reinforced soil slope, and boulder grade controls—were used. Areas with exotic vegetation were replanted with native vegetation, and almost a mile of walking and biking trail was constructed to follow the new stream alignment.



Spring Lake alum treatment achieves state water-quality criteria

Prior Lake-Spring Lake Watershed District • Minnesota

Spring Lake is a 642-acre lake that has been placed on the impaired waters list for excess phosphorus. According to the approved TMDL report for Spring Lake, the 10-year mean summer total phosphorus concentration was approximately three times higher than the water quality criteria for deep lakes in the North Central Hardwood Forest ecoregion, and internal loading contributes approximately half of the phosphorus load to the Lake.

Barr prepared a report for the Prior Lake-Spring Lake Watershed District that prescribed an in-lake alum dose, a recommended approach for alum applications, and estimated cost to control internal loading of phosphorus in Spring Lake. To address questions and concerns, a comparative analysis on alum treatment effectiveness explained why other whole-lake alum treatments have succeeded or failed and how this information can be used to inform the projected lifespan and success of the treatment proposed for Spring Lake. The district subsequently approved and provided funding for the first phase of alum treatment. Barr developed contract documents and provided bid administration, treatment oversight, and verification monitoring for the alum treatment.



To date, this is the largest in-lake alum treatment project in Minnesota, and the resulting water quality has met the state's phosphorus criteria for Spring Lake. (photo: HAB Aquatic Solutions)

Battle Creek stressor identification report

Ramsey-Washington Metro Watershed District • Woodbury, Maplewood, and St. Paul, Minnesota

In 2014, Battle Creek was added to Minnesota's impaired waters list for biological impairment of the fish and macroinvertebrate communities. Working with the MPCA and Ramsey-Washington Metro Watershed District, Barr analyzed water quality data and fish and macroinvertebrate survey information collected over the past 30 years to develop a stressor identification report. Following the U.S. Environmental Protection Agency CADDIS stressor identification process, various measures of biological integrity—index of biological integrity, tolerance indicator values, biological metric analytical techniques, etc.—were compared to water quality data to determine which ecological "stressors" (e.g., turbidity, low dissolved oxygen, heavy metals, etc.) are primarily responsible for biological impairment within the stream ecosystem. The Battle Creek stressor identification report was submitted and approved by the MPCA in 2016. Following recommendations developed in the stressor identification report, a TMDL for total suspended sediment was developed and completed in 2016. The TMDL report has been submitted to the MPCA and is under final review.



Barr recently applied the CADDIS process to identify ecological stressors in Battle Creek in response to a MPCA-identified biological impairment.

Lower Minnesota River watershed TMDLs

Minnesota Pollution Control Agency, Riley-Purgatory-Bluff Creek Watershed District • Minnesota

Barr is currently finishing work on TMDLs for impaired waters within the Riley-Purgatory-Creek Watershed District. Lotus Lake and Lake Riley are on the 303(d) list for not meeting the MPCA's deep-lake eutrophication standards. Staring Lake, Lake Susan, Rice Marsh Lake, Hyland Lake, and Silver Lake are not meeting shallow lake standards, while Lake Lucy will require protection measures to consistently meet the eutrophication standards. Riley and Purgatory creeks do not meet Minnesota water-quality standards for pathogen indicator bacteria (*Escherichia (E. coli)*); Riley Creek is impaired while Purgatory Creek is in need of protection measures for excess loadings of total suspended solids. Barr found that watershed runoff and streambank erosion were significant sources of phosphorus to Lake Susan and Lotus, Silver, and Staring lakes; watershed runoff is important for lakes Lucy and Riley and Rice Marsh lakes; and phosphorus release from the bottom sediments during the growing season is another source of phosphorus that needs to be addressed for lakes Lucy and Riley and Lotus, Silver, Rice Marsh, Staring, and Hyland lakes.



Riley Creek does not meet Minnesota water quality standards for total suspended solids and pathogen indicator bacteria (*Escherichia E. coli*).

Barr determined the phosphorus load-reduction percentages needed for each source in each lake, as well as the total suspended solids loading reductions, to achieve the respective TMDL and applicable state water-quality standards. The primary implementation strategies Barr recommended are the deactivation of phosphorus from the bottom sediments through alum treatments, treatment and control of stormwater discharge with watershed BMPs, and streambank stabilization measures to address channel erosion throughout the watershed.

Purgatory Creek PC-SWMM modeling and vulnerability evaluation

Riley-Purgatory-Bluff Creek Watershed District • Eden Prairie, Minnesota

In 2013, NOAA released updated precipitation frequency estimates for the Midwestern states (*NOAA Atlas 14, Volume 8*). These estimates, which serve as an update to the U.S. Weather Bureau's Technical Paper 40 (TP 40) published in 1961, reflect the results of statistical analyses performed for a much longer period of recorded precipitation data. The results show significant increases in rainfall amounts in the Twin Cities area where the 100-year, 24-hour rainfall depth increased by approximately 30 percent when compared to TP 40. Recent studies of long-term extreme weather trends in the Twin Cities area found that precipitation amounts are predicted to increase significantly over what is currently used in floodplain assessments and infrastructure design.



Flood inundation areas and vulnerable structures/ roadways were mapped based on a range of rainfall depths.

Barr updated district's hydrologic and hydraulic model so that it could be used to evaluate the higher rainfall depths published in Atlas 14 as well as evaluate floodplain uncertainty associated with Atlas 14 rainfall depth, and estimate potential flood elevations as a result of future climate change (mid-21st century). Model results were used to develop flood-risk figures to illustrate the current and potential future flood risk along the creeks. The evaluation identified current and potential estimated future impacts to creek crossings and structures.

Assessment results identified resilient areas (i.e., flood risk to structures and crossings was not sensitive to change in rainfall depths), and areas where flood elevations are sensitive to rainfall depths. During the development of flood risk figures, input was provided by the district's technical advisory committee. Four sets of flood risk figures were developed: 1) water surface profiles; 2) variability in the 100-year, 24-hour floodplain; 3) annual flood-risk maps; and 4) flood risk over a 30-year period.

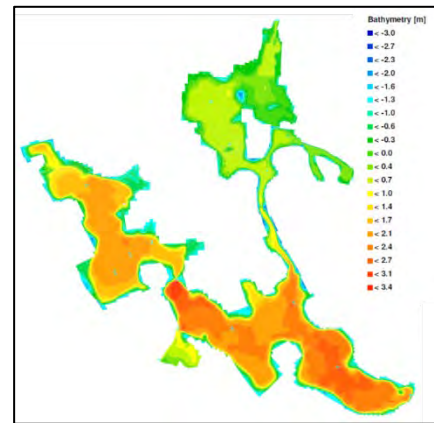
The district is using the figures generated from this study to inform communities of current flood risk and potential future flood risk within the watershed. This information provides the district and municipalities with a water management tool that looks at how future climate change could potentially impact infrastructure; it also helps the district and cities determine where flood mitigation might be needed.

complex Delft 3D modeling helps predict lake response to dredging Shell Rock River Watershed District • Albert Lea, Minnesota

Barr has been assisting the Shell Rock River Watershed District in improving Fountain Lake in southern Minnesota since 2008. The combination of a large watershed and intense agricultural land use has led to sedimentation and nutrient deposits in the lake's three bays, reducing water quality and lake depths, killing fish, and having a negative effect on public use.

The watershed district wants to dredge accumulated sediment from the lake to reduce the contribution of phosphorus from the lake bottom sediments and improve water clarity. However, state regulators expressed concern about the impact of dredging on Fountain Lake water quality and skepticism about the anticipated water-quality benefits. To better understand and document the lake's response to dredging, Barr developed a comprehensive three-dimensional hydrodynamic sediment-transport and water quality model using Deltares' Delft 3D software. Detailed sediment and water-quality data collected from the lake by Barr and district staff were used to calibrate the model to reflect observed conditions.

The three-dimensional modeling program enabled Barr to simulate water movement through the lake, water temperature variations, algal response to lake conditions, and movement of constituents such as phosphorus into and out of lake sediments over time. Through the modeling, Barr found that dredging the lake would increase periods of thermal stratification, resulting in less frequent mixing of the water column, reduced frequency and magnitude of algal blooms, and improved summer water clarity.



Delft 3D model output helped the watershed district and regulators understand and document the effect of dredging on lake mixing and phytoplankton (algae) growth. With bathymetry changes from dredging, Fountain Lake behaves more like a deep lake.

The Delft 3D model was also used to develop and evaluate several dredge scenarios, identifying options most likely to provide quantifiable improvements in water quality and so increase the lake's usability. This will help the watershed district make informed decisions and gain regulatory agency buy-in for the final dredge design and lake management plan.

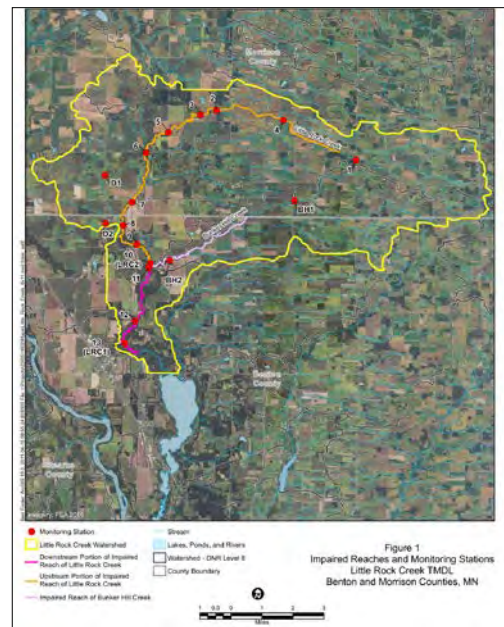
Little Rock Creek TMDL

Benton County Soil and Water Conservation District • Central Minnesota

Little Rock Creek is a DNR-designated trout stream located in central Minnesota near the city of Rice. The 67,650-acre watershed is split between Benton and Morrison counties. Little Rock Creek was added to the state's 303(d) list of impaired waters in 2002 for lack of cold-water fish assemblage since few trout were captured in the MPCA's 1999 fish survey. In 2010, impaired waters listings for dissolved oxygen and nitrates were added to the 303(d) list. A 2009 stressor identification report cited lower groundwater levels as a possible contributor to the impairments.

The Benton County SWCD hired Barr to perform TMDL studies for the multiple stressors associated with the fish impairment in the Little Rock Creek watershed. The SWAT model was linked with the MODFLOW and PEST models and calibrated to the current groundwater levels and streamflow observations in the watershed. The linked watershed modeling was then used to evaluate how cropland irrigation changes between the late 1990s and late 2000s affected watershed recharge and groundwater contributions to baseflow in Little Rock Creek. The results of the linked watershed modeling were also used in the 2000 QUAL2K water-quality model to simulate three mitigation scenarios—removing an artificial impoundment, doubling the groundwater flow into the system while maintaining the same chemical loads, or combining both mitigation scenarios.

The results of the modeling showed a combination of both types of mitigation would be required to meet the dissolved oxygen standard, the temperature criteria, and the drinking-water standard for nitrate. Reductions in groundwater use will be necessary to improve conditions in the stream and creating a more free-flowing system in the area of the impoundment will improve connectivity and temperature issues.



The SWAT model was linked with MODFLOW and PEST models and calibrated to the current groundwater levels and streamflow observations in the watershed.

design assistance

key team members



the leading edge of stormwater design

Barr takes a green infrastructure approach to stormwater management and BMP design, which highlights the importance of the natural environment in decisions about engineering and land-use planning. Designs created using this approach rely on the life support functions provided by natural ecosystems, with an emphasis on long-term sustainability. Rooted in ecology we design community-defining, enduring, technically-sound, beautiful and innovative sites.

We understand that your constituents want to get as much value as possible for their financial contributions to VLAWMO. Their goals (besides enhanced water quality) often include improved community health, improved livability and improved economic development. We form interdisciplinary teams of engineers, hydrologists, landscape architects, and ecologists to layer upon a stormwater solution the benefits of creating a site that looks great, accommodates people, and supports ecological function. By addressing economic, social, and environment issues in our designs, we add depth to water management projects.

Increasingly, BMPs are being implemented that reduce the rate and volume of runoff and associated pollutant loading. These techniques are being relied on as the space necessary for regional treatment practices becomes limited. Barr has become a national leader in designing high-functioning BMPs that are a beautiful addition to the community and further the cause of stormwater treatment.

Barr wrote and designed the Metropolitan Council's 380-page *Minnesota Urban Small Sites BMP Manual* and we have continued to assist MPCA with making updates to various sections of the *Minnesota Stormwater Manual* as well as an evaluation of the volume reduction benefits of highway swales. We also wrote portions of Ramsey County's *Erosion and Sediment Control Manual* and helped the Center for Watershed Protection prepare its guide for BMPs in cold-weather climates. Barr wrote many standard permit provisions and BMP requirements used by Minnesota watershed districts, cities, and counties.

We also commonly teach at workshops and seminars on the subjects of stormwater modeling and BMP design for a variety of audiences, including the University of Minnesota, Minnesota Department of Transportation (MnDOT), and Minnesota Erosion Control Association.

construction-related services

Barr assists clients with all aspects of project design and construction management, as well as with ongoing operations after projects are constructed. Services we can provide for VLAWMO include:

- Relative to project design, preparing all required contract documents, which typically include notice to bidders, instructions to bidders, form of agreement, general conditions, supplemental conditions, technical specifications, construction drawings, and addenda.
- Assisting with the bidding and contractor selection process by conducting pre-bid meetings, answering contractor and supplier inquiries, receiving the bids, preparing bid tabulations, conducting background checks on the apparent low bidder, providing a contractor recommendation, conducting pre-construction meetings, and other tasks as required.
- Helping inform the public of plans for various projects, including preparing press releases, conducting neighborhood meetings, preparing special information notices for targeted mailing lists, creating and updating a project website for the public and VLAWMO to access, and other tasks as required.
- Managing construction, including onsite review, testing, surveying, payment request preparation, change order preparation, preparation of memoranda, measurement and payments, and project closeout.
- Once a project is constructed, assisting with periodic review, monitoring, and maintenance.

Barr has provided these and other construction-related services on hundreds of projects for many watershed districts and water management organizations, including the Ramsey-Washington Metro Watershed District, Valley Branch Watershed District, Nine Mile Creek Watershed District, Capitol Region Watershed District, Minnehaha Creek Watershed District, Bassett Creek Watershed Management Commission, and Lower Minnesota River Watershed District.

relevant project examples

4th and Otter wetland iron-enhanced sand filter

Vadnais Lake Area Water Management Organization • Vadnais Heights, Minnesota

Barr recently completed a feasibility study, provided grant application assistance, and is currently implementing a project on behalf of VLAWMO to design and construct an iron-enhanced sand filter system to treat stormwater entering Birch Lake.

We used water-quality and water-quantity monitoring and modeling data, along with wetland permit conditions, to evaluate water-quality treatment options and complete the feasibility study. The results helped develop a successful BWSR grant application for project implementation funding. Barr is currently providing engineering services for design and implementation of an iron-enhanced sand filter at the 4th and Otter wetland location, including preliminary and final design, contract documents, bid administration, and construction oversight.

sustainable site design for watershed organization headquarters

Mississippi Watershed Management Organization • Minneapolis, Minnesota

The Mississippi Watershed Management Organization built a new headquarters along the Mississippi River near the Lowry Bridge in northeast Minneapolis. The site serves as a model for sustainable design, provides outdoor classrooms, and demonstrates alternative stormwater techniques. Barr was brought in for site remediation, site master planning, and landscape design.

We worked closely with the project architects and client to develop a context-sensitive site design that exceeded client expectations while working within the constraints of the polluted urban infill site. Ecological principles provided the basis for the design, which works with nature to filter stormwater, restores habitat on the Mississippi flyway, conserves energy in the building, and sequesters carbon. Features designed for the site include:

- a parking lot shared with the tavern next door to eliminate the need for two separate parking lots, resulting in a decrease in non-permeable surface area and an increase in off-hour usage of the lot
- cisterns to harvest stormwater for indoor use
- a tree-rill system to water trees
- rain gardens to treat water and slowly release it into the Mississippi River
- permeable pavement to reduce runoff during storm events and diminish pollutants
- a natural turf amphitheater for an outdoor classroom
- overlooks and paths to provide views and access to the Mississippi River



The MWMO headquarters site design project won a 2014 Minnesota Brownfields ReScape Award in the Environmental Impact category.



One rain garden includes the Filter Media Test Lab. This feature directs runoff through three buried pipes containing different filtration media: clean sand, iron-enhanced sand, and spent lime.



The headquarters before, during, and after construction. Barr provided construction management and oversight services on this project.

greenway design for stormwater treatment and flood mitigation

City of Minneapolis • Minnesota

The 50-acre North Minneapolis neighborhood surrounding Dowling and Penn avenues has been plagued with localized flooding during large rain events. Additionally, stormwater runoff from this neighborhood was contributing to water quality problems in Crystal Lake.

Barr was hired by the City of Minneapolis to address both of these issues by creating a greenway on 37th Avenue North. On the avenue, six city blocks of paved street were removed so that precast concrete boxes—the largest 18 feet wide and 10 feet high—could be placed underground as flood storage detention cells. Almost 1,400 lineal feet of underground boxes now protect homes from a 100-year flood event.

The project treats stormwater through biofiltration to remove phosphorus, debris, and sediment before water reaches Crystal Lake, and also through sump catch basins and installation of SAFL baffles to limit scouring of material from the sumps, even during large storm events. This cost-effective device was designed at the University of Minnesota by a team of researchers, including two current Barr employees.

On two blocks of the avenue, the road was narrowed to a single traffic lane with bike contraflow to further slow traffic and increase pedestrian safety. Three blocks of the avenue were converted to a bike/pedestrian path and greenway with no vehicle traffic. We worked with area residents to minimize impacts to the avenue's existing landscape, removing 28 trees but planting 64 new ones, and working to save mature trees. Additional trees will increase rainwater interception and evapotranspiration as the trees mature. Barr also helped the city secure approximately \$950,000 in state funding for water quality improvements associated with the project.

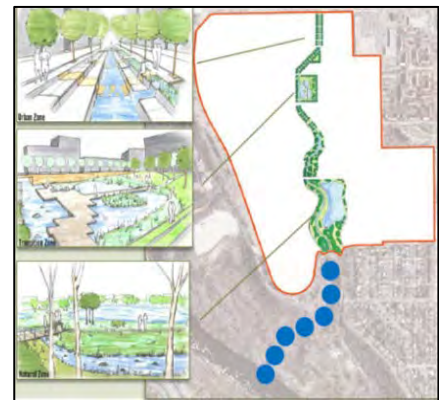


The completed greenway benefits residents and the traveling public by reducing flooding, reducing impervious surfaces, improving water quality, and enhancing public space.

Ford assembly plant public space and stormwater sustainability assessment

Capitol Region Watershed District, City of Saint Paul • St. Paul, Minnesota

The Capitol Region Watershed District, working with the City of Saint Paul, hired Barr to help develop master plan concepts for managing stormwater and use of public space for the site. We gathered input and developed a district stormwater management concept that links to stakeholder goals related to daylighting Hidden Falls Creek, restoring naturalized stream flows, placemaking, and sustainability. To help stakeholders understand and compare the relative value of the alternatives, Barr developed a customized decision-support approach. Benefits and functions were compared to costs and impacts using traditional methods such as cost estimates and innovative analytical sustainability tools such as life-cycle assessments and sustainable return on investment. The analysis and highly visual report provide decision-making support for selecting and articulating the value of resilient stormwater-management alternatives to the community and a potential developer.



Central Corridor light rail transit green infrastructure

Capitol Region Watershed District • St. Paul, Minnesota

Barr worked with the Capitol Region Watershed District, City of Saint Paul, and other consultants in a two-phase project to develop low-impact stormwater treatment practices appropriate to the urban Green Line (also referred to as the Central Corridor), which provides a light rail transit link between the cities of Minneapolis and St. Paul.

In the first phase of the project, Barr developed several concepts and assisted with development of a final design that treats stormwater through underground infiltration trenches, incorporates an ambitious street-tree and stormwater-treatment design, and improves the aesthetics of the transit corridor. We also

completed plans and specifications for construction of three stormwater planters that were installed along the light rail corridor in 2011.

In the second phase, we assessed eight locations along the Green Line, considering their respective suitability for infiltration/filtration practices. We selected five locations that were most feasible for construction and maintenance and would best promote water quality, creativity, and education. We then designed rain gardens and stormwater planters for these locations, incorporating public art where possible. These 10 practices at five locations were completed in 2012.



In 2014, the City of Saint Paul honored this project with the Sustainable Saint Paul Award for Water Quality. The project was also honored by the Minnesota Association of Watershed Districts as the 2014 project of the year.

Barr developed graphical renderings for the four types of stormwater treatment practices (rain gardens, stormwater planters, infiltration trenches, and tree trenches). Interpretive signage was placed at the practices at 22 locations along the Green Line in 2013 to educate the public on the importance of water quality and how the practices function. The interpretive signage was also translated into Hmong and Spanish and placed on the district's website.

streets reconstructed using living streets framework

Ramsey-Washington Metro Watershed District • Maplewood, Minnesota

A first of its kind in Minnesota, Barr designed and oversaw implementation of an innovative living street design for Maplewood's Bartelmy-Meyers street reconstruction project for the Ramsey-Washington Metro Watershed District. The framework allows the City of Maplewood to design street reconstruction projects that can be implemented with more efficiency and at a lower long-term cost than traditional roads, while also reducing impervious surfaces and treating runoff.



The rain gardens, trees, and infiltration basin will sequester 40 tons of CO₂ per year, as well as filter and infiltrate 50 percent of the stormwater runoff.

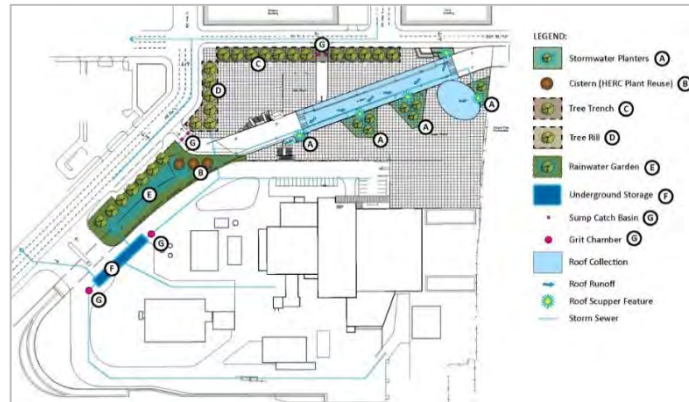
We worked closely with city staff to educate residents about the value of the street changes, resulting in half agreeing to have a rain garden on their property. The 7,000 feet of residential street included:

- narrowing the streets from 32 feet to 24 feet, reducing pavement by 1 acre
- adding 1.5 miles of sidewalk on one side of the street
- installing 32 new rain gardens throughout the neighborhood
- planting 120 drought-tolerant street trees throughout the neighborhood
- creating a regional infiltration basin as an attractive feature in the local neighborhood park

The project was supported in part by a \$550,000 Clean Water Fund grant from the State of Minnesota and a grant from the Ramsey-Washington Metro Watershed District.

water reuse planning in the heart of the city Hennepin County • Minneapolis, Minnesota

One of two regional multimodal transit hubs in the Twin Cities metropolitan area, Target Field Station (originally known as the Interchange) is a fast-paced design/build project completed in spring 2014. Barr developed a conceptual stormwater management system that worked within the proposed design of the project site, prior to the issuance of the request for proposal for the project. This included technical evaluation and hydrologic, hydraulic, and water-quality modeling of the system to demonstrate that it would meet stormwater management standards for the City of Minneapolis as well as providing technical specifications, preliminary details, and initial sizing for the system. We addressed comments from the city, and the design was approved by city staff with the understanding that the city would accept the final project design with limited review and comment if it was incorporated into the system.



Conceptual design of an innovative stormwater management system, including stormwater reuse in an industrial facility, which reuses approximately 1 million gallons of stormwater per year

Although the Mississippi Watershed Management Organization does not have permitting authority within the City of Minneapolis, we met with its staff early in the design process to verify that our design addressed its concerns as well. These discussions created support for the project and opened the door for funding through the Mississippi Watershed Management Organization's capital improvement grant program to incorporate innovative stormwater BMPs, including tree trenches, bioretention/filtration basins, and stormwater reuse in industrial processes at the adjacent Hennepin Energy Recovery Center (HERC). We also worked with HERC and city staff to coordinate the details of the proposed stormwater reuse and to develop the stormwater pollution prevention plan and erosion control plan for site demolition and mass excavation as well as a stormwater operations and maintenance plan for the site.

grant application assistance

key team members



Greg Wilson



Hal Runke



Erin Anderson Wenz



Karen Chandler



Greg Williams

a proven funding approach that transforms concepts into reality

Barr has helped hundreds of watershed districts, cities, and other public and private clients find and obtain financial support for their water and natural resources projects, with awards ranging from \$10,000 to \$10 million. Our record of success covers a broad range of project types, including those related to dam removal, stream restoration and stabilization, natural-resource recreational usage, watershed and stormwater management, flood control, brownfield redevelopment, and wind power.

strategic coordination to capitalize on financial opportunities

Barr maintains a grant and funding-source database, including information on eligibility, program objectives, and submittal deadlines. We'll look at your project holistically to identify all potential monetary sources.

For example, while contamination remediation may not be part of an initial project, our experience suggests that environmental issues are frequently encountered. If that occurs, we'll help you navigate and turn it into a funding opportunity, like how we leveraged environmental cleanup opportunities to secure more than \$9.6 million from five sources to help a city client complete the New Brighton Exchange—one of Minnesota's most complex brownfield redevelopment projects.



Barr helped the City of Duluth and a developer convert a foundry located near the St. Louis River Bay into a multi-use arena, hotel, restaurant, and sports complex. In addition to environmental services, we obtained legal liability assurances for six financial partners and secured and managed four brownfield redevelopment grants totaling \$2.2 million.

Most grant sources also require committed project partners and in-kind support, with collaboration across multiple jurisdictions (e.g., states, tribes, counties, municipalities, regional organizations, etc.) typically preferred. We routinely facilitate and coordinate multi-program funding packages.

well-defined projects that yield compelling submittals

We'll use our 50-plus years of experience with water resources rehabilitation and redevelopment projects to fully scope and develop a credible project that catches the attention of funders. We'll tailor your submittal to address the specific organization's concerns and program goals.

Securing grants also requires skillful application completion, identification of permitting and compliance issues, and, often, grant planning studies. Pairing grant writing and technical expertise is instrumental to our success.

Our in-house grant writers prepare local, state, and federal grant applications for a wide range of public and private clients. Our multi-disciplined technical experts help inform grant development and implement any needed studies, such as completing a federal environmental review and Amtrak-ridership cost/benefit analysis that helped obtain a \$10 million U.S. Department of Transportation TIGER grant to help raise mainline rail tracks and bridges affected by flooding in Devils Lake, North Dakota.



We also helped a city client obtain more than \$1.6 million in state and local brownfield-cleanup grants to turn a former dump into a lakeside residential development. The project—featuring townhomes, commercial buildings, walking trails, and floating-dock lake access—is a key element of the city’s downtown revitalization strategy. Barr also conducted environmental assessment, remediation planning, geotechnical evaluation and design, and construction observation.

post-award compliance to secure future funding

Most grant awards require reporting and compliance. Funding agencies want to know that a program was successful and that grant money was used to get the “biggest bang for the buck.” We’ll help you anticipate and comply with grant requirements, report on the use of funds, and promote program successes—which often helps clients access additional financial support.

cost-sharing programs to help finance improvements

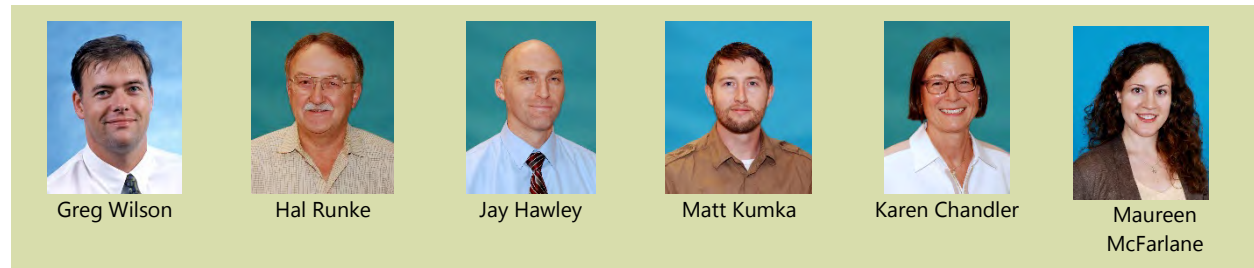
As an alternative to, or in concert with, grant funding, we can help create new or updated ordinances that establish financing mechanisms, such as stormwater utility fees and stakeholder cost-sharing programs. Generated funds can help cover the costs of restoration and improvements to water quality, river access and use, and ecology and habitat. For example, Barr helped a watershed management district update its management plan to strengthen existing policies and develop new stakeholder cost allocations. The revised plan established a “savings account” to help fund future water-quality improvement projects.



For the redevelopment of a former Minneapolis industrial complex into a beautiful, new destination brewery, Surly Brewing Company hired Barr for environmental site assessments, remediation oversight, vapor barrier design, and deep groundwater supply-well upgrades. Barr also helped the city and Surly secure \$2.5 million in brownfield-cleanup grants from local, county, and state agencies to assist with site characterization and remediation.

meeting attendance and presentations

key team members



education and outreach

Knowledge is key—and Barr is ready to help water management organizations educate their boards and constituents about water-related issues. Whether it's facilitating a public meeting about policies or plans, making presentations to boards, or conducting stormwater BMP "how-to" workshops, Barr can employ education as a component of design projects or an independent service. A sampling of our education and outreach offerings includes:

- seminars and brochures on earth-friendly landscaping and plantings
- seminars on innovative stormwater BMPs
- workshops on lakescaping
- detailed maps and instructions for volunteers to control invasive species
- attractive, easy-to-understand interpretive signs
- natural resource and management plans for lay people and experts

Barr uses a community-based approach for participation that is inclusive, transparent, and open—providing everyone an opportunity to listen, learn, and participate. We understand that the best solutions often come from stakeholders. This also leads to greater acceptance and buy-in from stakeholders of selected solutions. We use many techniques in the public participation process, but tailor them to the needs of our clients and their constituents. Our public participation methods and techniques include:

- focus group meetings and interviews
- steering and advisory committees
- public presentations and open houses
- interactive worksheets
- priority-ranking exercises
- community walkabouts
- web-based communications and reporting
- Facebook and other social media

interpretive signage

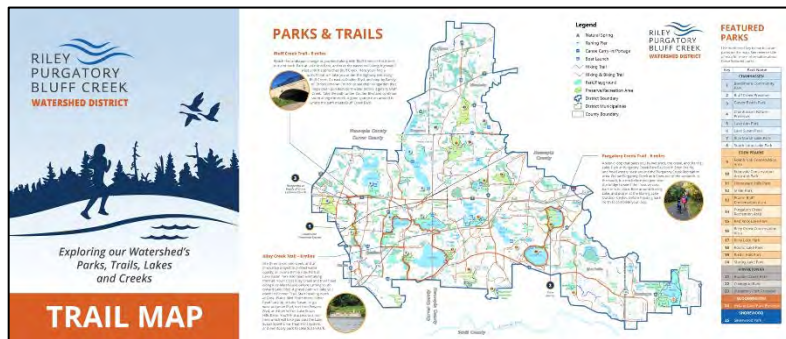
We believe in the old adage that a picture's worth a thousand words. Barr uses illustrations and easily understood text to create educational materials and interpretive signage that make complex topics comprehensible and interesting. Our signage is designed to target a wide range of audiences, from school children to mall shoppers to pedestrians to motorists viewing signage from their cars. The image shown on the next page is an example of an interpretive sign Barr recently developed to accompany a rain

garden installed at Family of Christ Lutheran Church in partnership between the church, Riley-Purgatory-Bluff Creek Watershed District, City of Chanhassen, Carver SWCD, and Clean Water Land and Legacy Amendment. The signage serves to educate the public on the importance of water quality measures and encourages homeowners to implement similar but smaller solutions on their own properties.



engaging communications

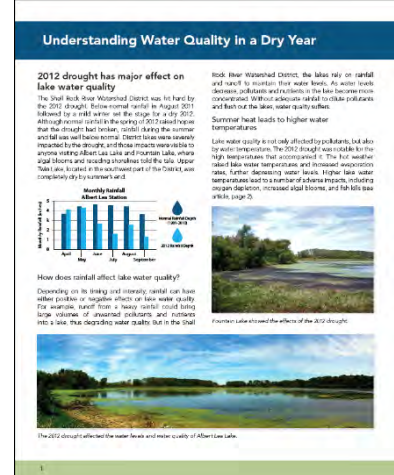
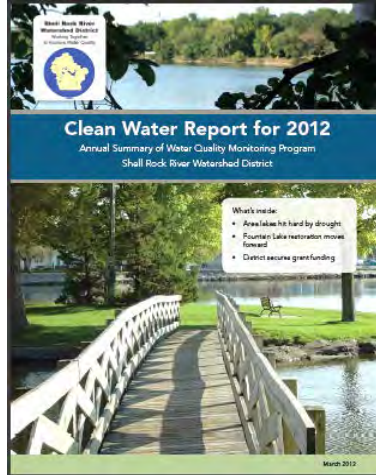
Educating watershed constituents is an important role for watershed organizations. To effectively engage people and convey key information, it is critical to tailor the communication to the targeted audience. Barr has experience translating technical information for use by nontechnical audiences, including developing informative yet easy-to-understand presentations, water quality reports, and brochures. For example, we worked with Riley-Purgatory-Bluff Creek Watershed District staff to create a custom, foldable, pocket-size trail map that not only identifies the district’s primary trails and parks, but also showcases the district’s purpose, goals, and signature projects.



graphics

Barr provides clear and compelling communications that illustrate environmental problems and solutions and inspire stewardship. Presentation graphics combine illustrative renderings, images, and text to communicate environmental design projects to clients and stakeholders. Our team works seamlessly between manual, hand-drawn illustrations and digital rendering tools to create graphic products that are engaging and informative. We often supplement empirical data and reporting with two- and three-dimensional illustrations that help explain complex environmental issues and design concepts to non-technical audiences. Our work includes interpretive signs and pamphlets, environmental identity systems, and interactive digital tools and features that engage the public.

Infographics have also become a standard tool to condense and relate complex processes and data to non-technical audiences. Our team of designers specializes in producing infographics that are approachable, engaging, and specific to the content being conveyed. Barr has created infographics that illustrate the flow of resources and energy, the processing of natural resources, and the relationship between human development and natural systems, among many others.



technology/website enhancement

Your website is perhaps the most valuable resource in your education toolbox. It gives citizens a place to connect, get involved, and learn about your efforts to manage area waters. Barr helps clients enhance their websites and make wise use of technology to work more efficiently and effectively.

website design and development

We've helped many clients design or redesign their website, making sure the site is simple to use, easy to maintain, and visually appealing. We specialize in database-driven functionality, which is especially important for applications related to mapping. Depending on your needs, we might apply this kind of functionality to develop maps that show visitors the boundaries of VLAWMO, what waters are nearby, and information about clean-water projects in the area.

We're also able to make sites and applications mobile-compliant, so people can access what they need on any just about any web-enabled device.

mobile and interactive applications

We're especially excited to explore ideas for interactive applications, such as the mobile inspection tool for Riley-Purgatory-Bluff Creek Watershed District permit inspections. We understand that you may have an interest in developing a sort of audio tour, which would be available at various spots throughout the VLAWMO, providing more information about each particular site. For example, a person might see rock riffles in a streambed and wonder what they're all about. A QR (quick response) code, similar to the barcodes used by retailers, on a nearby interpretive sign would be accessible by a mobile device and provide an audio narrative, photos, and more information about efforts to keep that area clean and healthy.

We believe strongly in the self-service concept—websites that let customers help themselves by locating information and finding answers to questions. Customers like self-service for its speed and convenience; clients like it because it saves money. We can also design improvements to your existing website—for example, linking it to a database or incorporating new programming technology for faster information processing.

database services

If you're still looking items up in three places, crunching numbers on your hand calculator, or printing numbers from one computer system so you can reenter them in another, you probably have too much

data and not enough real information. The right database can end that inefficiency. Our customized database applications are:

- web-based, to make them easy to learn and easy to use
- easily modified for new versions of Windows and for hardware upgrades
- designed to meet your specific needs, so you don't have to shoehorn your procedures into a programmer's idea of business
- able to integrate maps, photos, video, and sound
- designed with the help of people who understand the engineering and scientific aspects of your problems

Moreover, we can help you with your existing databases through services such as installations, upgrades, and tuning.

project collaboration websites

Barr frequently creates project collaboration websites that give clients the ability to instantaneously share information with multiple team members. Each project-specific website—secure and accessible only to designated individuals—allows team members to easily locate or exchange information and check on project tasks. The website is a handy tool for both you and Barr because all communications are located in a central, easily accessible place for access anywhere, 24 hours a day.

Collaboration websites include areas for items such as communications (including meeting schedules and minutes and contact information), task and budget summaries, and document files of all sizes.

Barr can customize a collaboration website to your needs. For example, if you need to track data on six project locations, we can create six different sections within the site, or even six separate sites to which access can be restricted. Other ways we can customize your site include adding online interfaces for items like laboratory data and construction permit information.

Clients for which we've provided website and database services include:

- Minnesota DNR
- Bassett Creek Watershed Management Organization
- Nine Mile Creek Watershed District
- Valley Branch Watershed District
- Enbridge
- Koch Pipelines
- Anoka County
- Essar Steel
- Flint Hills Resources
- Hibbing Taconite

relevant project examples

11CHF story map

Mississippi Watershed Management Organization • Minnesota

The Mississippi Watershed Management Organization and Barr collaborated to build an ESRI story map to tell the story of one watershed, a 2,100-acre urban watershed that includes Fridley, Columbia Heights, and Hilltop. Barr had previously assisted the watershed management organization with constructing detailed

hydrologic, hydraulic, and water-quality modeling of this watershed. The organization was looking for a range of alternatives to sharing the details of this project with the public in a digestible and engaging format. The story map helps the public connect themselves and their neighborhood with their water resource (the Mississippi River) and stormwater infrastructure (much of it buried). The story map includes multimedia, a story tour, and a geoprocessing tool created by Barr to dynamically trace the route of a drop of water from the watershed to the Mississippi River over streets and through storm sewers. Outreach staff members are using this tool and narrative in the organization's stormwater park and learning center and at neighborhood events to educate their residents about the importance of clean water, complete with a call to action.

watershed district branding

Riley-Purgatory-Bluff Creek Watershed District • Minnesota

The Riley-Purgatory-Bluff Creek Watershed District desired to update its logo and create a consistent package of graphic images that brand the district. Barr worked with the district's board of managers and staff to:

- develop a new logo for the district
- create branded graphical standards and elements (including color scheme) to be incorporated across its website and printed materials
- create letterhead and business cards
- create templates for interpretive signs, creek signage, and PowerPoint presentations
- create graphical icons that symbolize the district's work to be used in its media
- develop a branded calendar template



Karen Kaul leads a workshop to explore graphic images that brand the Riley-Purgatory-Bluff Creek Watershed District.

We conducted a series of workshops that first examined the work and purpose of the district and discovered images that represent its goals and activities. We next explored, as a group, graphic options for the logo, branding, and templates. Through our work together, a customized set of graphics was produced. This set of graphics provides the district with visual recognition as their constituents repeatedly see the consistent set of graphics and colors. The feel of the graphics portrays the friendly yet professional philosophy of the district.

district green infrastructure forum

Capitol Region Watershed District, City of Saint Paul • Minnesota

In January 2017, the Capitol Region Watershed District and City of Saint Paul hosted a forum on district green infrastructure, which manages and treats stormwater in a shared manner—blurring the lines between private parcels and the public realm to treat stormwater more efficiently. The purpose of the forum was to examine the additional value of "district" green infrastructure and water reuse systems to redevelopment; foster technical knowledge exchange including funding approaches and lessons learned; and inspire amenity-driven infrastructure design and elevate capacity to implement "district" approaches, with a special focus on three key redevelopment sites: West Side Flats, Snelling-Midway, and the Ford site.

Barr assisted the district and city in planning and executing the six-hour forum; developing the content, forum materials, and handouts; prepping the invited speakers; and providing facilitation services throughout the forum. The forum had more than 40 attendees from the public and private sectors and, based on feedback received from attendees, was well received.

building community resilience to climate change through a public planning process

Riley-Purgatory-Bluff Creek Watershed District, Nine Mile Creek Watershed District • Minnesota

Barr is currently working with the Riley-Purgatory-Bluff Creek Watershed District and Nine Mile Creek Watershed District to implement a public planning process that educates and engages communities on the importance of climate change, current and anticipated impacts, and the need to build community resilience through planning. The project consists of facilitating a series of workshops designed to identify local impacts, assess vulnerability, and identify specific strategies to increase community resilience. These strategies can then be used to influence local comprehensive plans.

Barr is assisting with planning and facilitating the workshop series and creating the final report. Our first task is to conduct research that frames resilience issues for the cities within the watershed districts and present the data at a day-long educational workshop. This information will identify primary issues and involve facilitated discussions to have community members identify issues, trends, and risk factors pertinent to their communities. The next workshop will involve facilitated sessions to identify resiliency actions and projects to mitigate risks within the communities. Budgets are a limiting factor in all communities, so focus will be paid to sorting out the most effective solutions that can be implemented with the least budget. The final workshop will involve identifying and prioritizing long-term actions that can be incorporated into the cities' comprehensive plans.

Lake Susan spent-lime treatment system renderings and signage

Riley-Purgatory-Bluff Creek Watershed District • Chanhassen, Minnesota

Barr designed a spent-lime treatment system upstream of Lake Susan that was constructed during summer 2016. The system will remove phosphorus from approximately 50 acre-feet of water (16 million gallons) each year. The treatment system is located adjacent to a city walkway.

During planning, Barr prepared photographic renderings as a tool for educating the public, city staff, and Riley-Purgatory-Bluff Creek Watershed District board of managers about how the system would operate and fit into the proposed site. After construction, Barr worked with district staff to develop signage explaining the spent-lime system, an essentially hidden structure. To increase public awareness, signage was installed to help visitors understand the importance of phosphorus removal and how the spent-lime system removes phosphorus from water before it enters Lake Susan.

PROTECTING LAKE SUSAN Using a **spent-lime system** to remove phosphorus from water that flows to Lake Susan

An Important Resource
Lake Susan is an 88-acre lake next to Lake Susan Park. It is an important resource in the City of Chanhassen and the Riley Purgatory Bluff Creek Watershed District. The lake is a popular recreational water body used for boating and fishing.

Lake Susan is connected to four other lakes by Riley Creek. It receives stormwater runoff from 66 acres of land around it, and from two upstream lakes. The stormwater entering the lake carries debris and pollutants, including the nutrient phosphorus.

Why is Phosphorus a Problem?
Phosphorus is a nutrient that comes from sources such as fertilizers and decaying leaves and grass clippings. Excess phosphorus can cause cloudy water and algal blooms in lakes. Removing phosphorus from stormwater is a proven way to improve the water quality of lakes and streams.

Improving Water Quality
A spent-lime filtration system was constructed at a culvert where water flows into Lake Susan. The system is designed to remove approximately 45 pounds of phosphorus annually from the lake, which equals about 22,500 pounds of algae! The result is improved water quality and recreation.

WHAT IS SPENT LIME?
Spent lime is calcium carbonate that comes from drinking water treatment plants as a byproduct of treating water. Instead of just being thrown away, spent lime can be used to treat stormwater runoff.

FUN FACT! The spent lime used to clean Lake Susan is recycled from local sources, including the City of St. Paul water treatment plant.

HOW DOES A SPENT-LIME SYSTEM WORK?
The calcium within the spent lime binds with phosphorus. When nutrient-rich water flows through the spent-lime system, the phosphorus gets "stuck" to the calcium. The water flows out of the spent-lime system, but leaves the phosphorus behind.

YOU CAN HELP!
Reduce phosphorus at the source. Pick up leaves and grass clippings. Avoid using fertilizers. Run lawnmowers, snowblowers, and leaf blowers away from the street.

PROTECT. MANAGE. RESTORE. www.ci.chanhassen.mn.us www.rpbcd.org

Maplewood living streets community outreach

Ramsey-Washington Metro Watershed District, City of Maplewood • Minnesota

During 2012, Barr coordinated education and outreach efforts to the community in the Bartelmy-Meyers neighborhood as the first local living-streets demonstration project was brought to reality. From original concept design through construction, Barr worked closely with the Ramsey-Washington Metro Watershed District and City of Maplewood to bring the local community in as partners on this innovative project.

Once the project goals were understood, Barr developed a strategic community outreach strategy. Prior to detailed design, we circulated illustrative flyers designed to inform residents of the benefits of living streets and of the process that they would be a part of as the project developed. We then helped coordinate a series of informational open houses in order to hear suggestions and concerns and to recruit local project advocates. Leading up to construction, Barr staff went door to door in the neighborhood to help answer questions and find homeowners to host rain gardens in their rights-of-way.

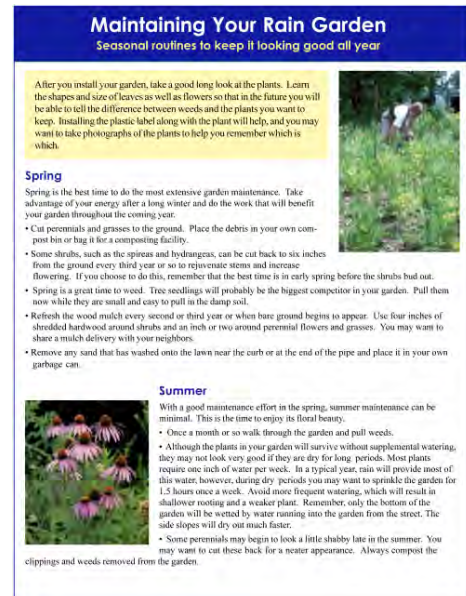
Throughout construction, Barr was onsite and readily available to alleviate concerns and customize small aspects of the design as necessary to meet property-owner goals. Finally, as construction was wrapping up, Barr designed rain-garden maintenance flyers to help the hosts prepare for the following growing season.

With years of experience in community outreach, Barr has developed customized processes to not only educate those affected by water-quality improvement projects, but to actively create an atmosphere of engagement and participation in order to create lasting community partnerships.

stormwater reuse for irrigation and education

Mississippi Watershed Management Organization • Minneapolis, Minnesota

Barr designed a stormwater collection, treatment, and distribution system for the Mississippi Watershed Management Organization's new office facility that includes a significant public-education component. This system collects roof water to be stored in a 2,000-gallon cistern. In addition to tree irrigation, the cistern water will be used for demonstrations of stormwater infiltration on the grounds and "wet classroom" experiments within the building. The second phase of the design included an artificial ravine to the Mississippi River that cleans urban stormwater runoff while allowing visitors to access the shore.



rain garden maintenance flyer

watershed district web mapping

Capitol Region Watershed District • Minnesota

On behalf of the Capitol Region Watershed District, Barr created the Trout Brook interceptor web-mapping application, which provides users with the ability to view and access GIS data including but not limited to Trout Brook interceptor information, stationing data, property ownership data, St. Paul storm-pipe data, and data on subwatersheds associated with the project. Additional information such as inspection photo locations has been added to the map, which enables users to view photos based on geographic location.

Other types of information can be accessed via a pop-up window. When a user clicks on a segment of the Trout Brook interceptor layer in the web map, a pop-up screen will appear, which displays a sheet map image along with a hyperlink for viewing other documents. By clicking on the thumbnail image in the pop-up, a sheet map based on the particular interceptor segment will appear in a separate browser screen. This document may be viewed, printed, or saved for later reference.



By clicking on a segment of the Trout Brook interceptor layer in the web map, a pop-up screen will appear, which displays a sheet map image along with a hyperlink for viewing other documents.

EQiS data management

Riley-Purgatory-Bluff Creek Watershed District, Nine Mile Creek Watershed District • Minnesota

Barr specializes in successfully managing environmental data to best utilize and leverage this valuable resource, from allowing ease of reporting and retrieval to providing verification to clients that their data is safe and secure. We exhibit expertise in all areas of analytical data management and design of best-fit data solutions for our clients, including developing data workflows, processing data, verifying data integrity, and easing data reporting and quick retrieval. Barr has experience integrating data into several software to allow data to be represented easily in maps, graphs, and reports.

Riley-Purgatory-Bluff Creek Watershed District

Barr has continued to work closely with the Riley-Purgatory-Bluff Creek Watershed District to manage its field and laboratory data in EarthSoft's EQiS software. Our services include:

- incorporating and consolidating historical data collected by Barr, past consultants, various city entities, and district staff, spanning 1971 to present
- working with laboratories to define and improve their laboratory results electronic data deliverable (EDD) specifications for continued data integrity in the managed database

A screenshot of the EarthSoft EQiS software interface. The window title is 'EQiS - Minnesota'. The interface shows a menu bar with options like 'File', 'Edit', 'Map', 'Reports', 'Tools', 'Window', and 'Help'. Below the menu bar is a toolbar with various icons. The main area displays a data table with columns for 'sample_id', 'sample_name', 'date', 'location', and 'status'. The table contains multiple rows of data, including sample IDs like '1494200', '1494201', and '1494202', and sample names like 'R1_L2_2_2012007' and 'R1_A_2_2_2012010'. The table is sorted by 'sample_id' in ascending order.

screen shot of the Riley-Purgatory-Bluff Creek Watershed District's EQiS data

- maintaining more than 76,000 analytical results from 180 lake stations, stormwater ponds, and stream sampling locations; this also includes managing the GIS data, when available, in conjunction to allow mapping analytical results and sampling history
- creating quarterly data exports for district staff to analyze and explore their analytical results over time, location, and parameter
- exporting and submitting an annual EDD to the MPCA of the district's analytical results from the prior year
- providing district staff access to and associated training for their analytical data through an online enterprise system

Nine Mile Creek Watershed District

Barr is working with the Nine Mile Creek Watershed District to manage its watershed data using EarthSoft's EQuIS software. Our services include:

- managing data that includes field-observed data (including biological and chemical data), laboratory-analyzed data from four laboratories, and 15-minute data collected with in-place data loggers
- maintaining data that spans 50 years of data collection at 100 unique locations; results are consolidated and stored to verify data integrity, which allows easy reporting across years, locations, sampling methods, and parameters
- exporting and reporting data in a standardized, client-driven format periodically for the district and its stakeholders, as well as annually for year-end reporting

SHSAM

Barr initiative

In 2009, Barr developed SHSAM (Sizing Hydrodynamic Separators And Manholes), a computer program for predicting the amount of suspended sediments removed from stormwater runoff by a given hydrodynamic separator/standard sump over a given period of time (e.g., 15 years). SHSAM consists of a simple continuous runoff model and a generic sediment removal response function.

The program predicts the removal efficiency of the tested models and can predict the removal efficiency of non-tested models. Experience has shown accurate results in test situations and reasonable results for non-test situations. However, the accuracy of the program depends on the information regarding the particle size, particle density, and influent concentration. Since the users often do not have that information, no warranty of accuracy can be given. In spite of that, the program is a powerful tool to determine the device type and size suitable for each specific site. In 2013, the program was upgraded to include the washout functions of a number of hydrodynamic separators and sumps.



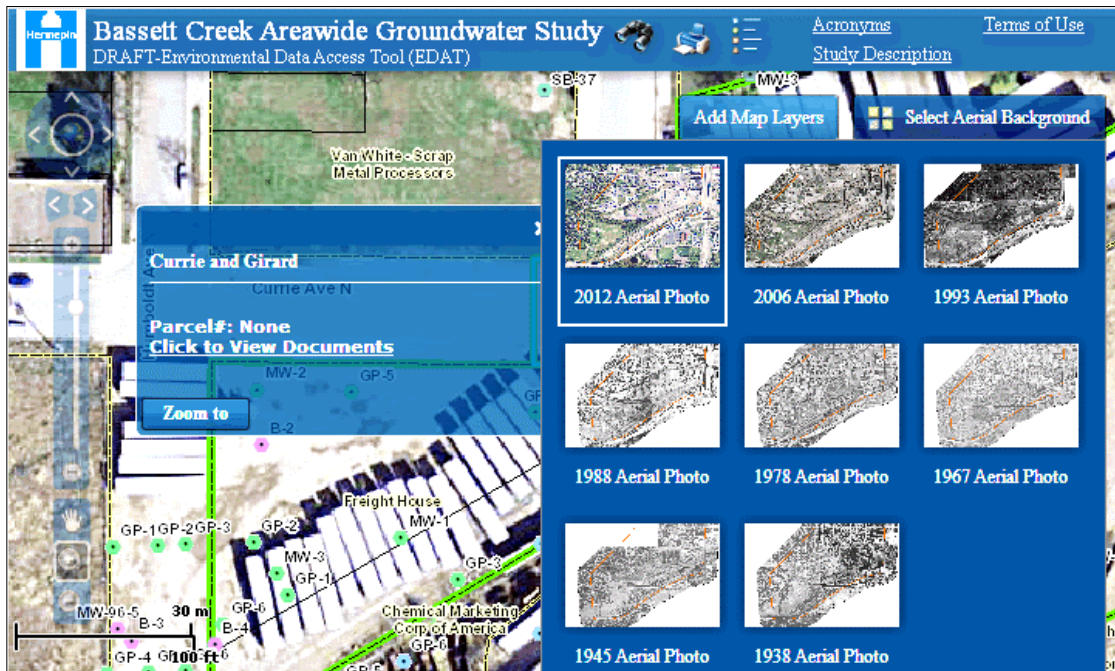
interactive mapping website

Hennepin County • Minnesota

The 284-acre Bassett Creek valley in Minneapolis is poised for redevelopment. The possibility of light-rail service has increased interest in the area, but the valley has a history of industrial use dating back to the 1800s and more than 25 contaminated sites.

Characterizing and addressing groundwater conditions site by site can be costly and may discourage developers and investors. Barr is working with Hennepin County on an area-wide groundwater study that will provide a more comprehensive understanding of groundwater conditions in this neighborhood and streamline the process for obtaining liability assurances for redevelopment. We have summarized and synthesized groundwater data, identified data gaps, and developed a web-based GIS mapping tool to share the study results, help users locate sites and access data, and facilitate developer and regulator decisions. Known as the Environmental Data Access Tool (EDAT), the website allows easy access and basic website features for locating sites, accessing data, and printing information.

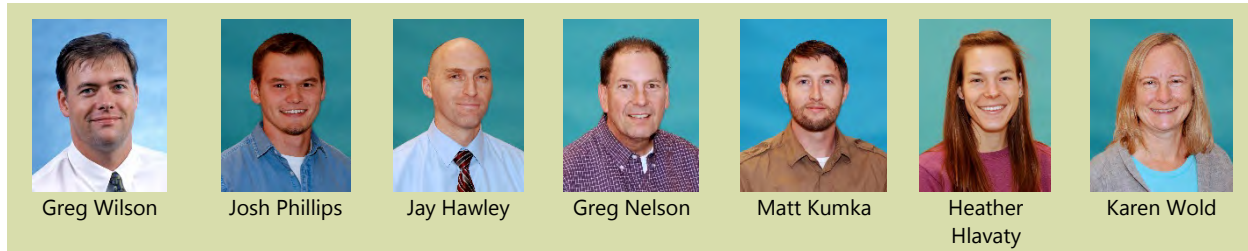
The project has received enthusiastic support from the U.S. Environmental Protection Agency, MPCA, City of Minneapolis, and local neighborhood associations.



EDAT allows potential property developers and others to access groundwater and other environmental data collected from multiple properties in the area. The site also allows for access to historical aerial photography from 1938 to the present to help users better understand historical land-use changes in the valley.

stormwater development plan review

key team members



Our experience and knowledge of practical, alternative, and innovative stormwater practices allows us to work with permit applicants to comply with VLAWMO rules. Our current work includes first-hand experience with ensuring that our projects comply with VLAWMO’s storm water and wetlands policies and standards, as well as the erosion and sediment control requirements.

We are currently assisting with water-resource permitting reviews for the following water management organizations and municipalities:

- Riley-Purgatory-Bluff Creek Watershed District*
- Bassett Creek Watershed Management Commission*
- Capitol Region Watershed District (for projects that discharge to the Trout Brook storm sewer)
- Elm Creek Watershed Management Commission
- Lower Rum River Watershed Management Organization
- Nine Mile Creek Watershed District*
- Ramsey-Washington Metro Watershed District*
- Valley Branch Watershed District*

** included assistance with initiating permitting programs*

Services we provide these organizations—services that we could also provide VLAWMO—include:

- reviewing development applications, preparing memoranda, processing comments and approval letters
- inspecting and reporting on active construction sites
- tracking efforts with a database
- administering the duties required by the Minnesota Wetland Conservation Act
- reviewing adjacent watershed organizations’ watershed management plans and preparing review letters
- reviewing community water management plans and preparing comment letters
- reviewing environmental impact documents and preparing comment letters
- inventorying and evaluating stormwater ponds and BMPs
- reviewing proposed innovative stormwater management practices
- designing and overseeing construction of stormwater management infrastructure including storm sewers, stormwater BMPs, stormwater detention ponds, flood protection measures, and dams
- inspecting infrastructure, wetland replacement sites, and wetland banking sites and submitting annual monitoring reports

- assisting counties, cities, and other municipal separate storm-sewer system operators (MS4s) with meeting their National Pollutant Discharge Elimination System permitting requirements

relevant project examples

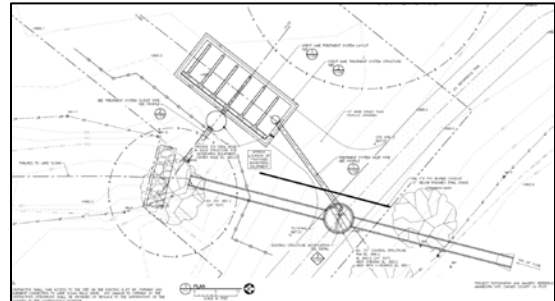
watershed district regulatory program

Riley-Purgatory-Bluff Creek Watershed District • Minnesota

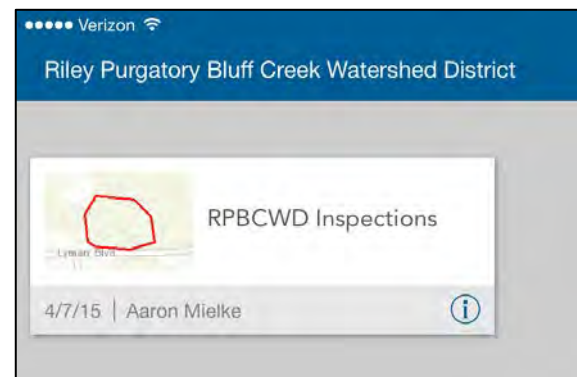
In 2014, Barr helped the Riley-Purgatory-Bluff Creek Watershed District reinstate the regulatory program based on the district's rule revisions, and since January 1, 2015, we have reviewed permit applications for the district. As the district's technical advisor, Barr assists permit applicants in meeting their project goals within the confines of the district's regulations and helps district managers and staff with evaluating requests for permit variances, financial assurances, and maintenance agreements. We guide applicants through the permitting process, including preparing and distributing review memoranda and presenting the application materials to district managers. Barr reviews permit applications for:

- floodplain management and drainage alterations
- erosion and sediment control
- wetland and creek buffers
- dredging and sediment removal
- shoreline and stream bank stabilization
- water-body crossings and structures
- appropriation of public waters
- appropriation of groundwater
- stormwater management

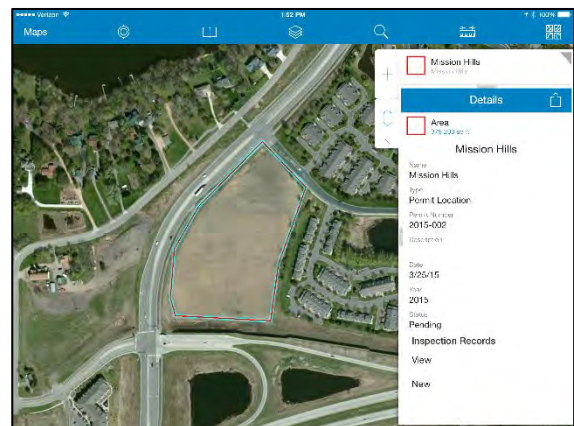
As construction season begins, Barr also handles routine site inspections of permitted activities. We developed and deployed a mobile, GIS-based mapping tool for the tracking and inspection of district permits and BMPs. This tool allows Barr inspectors and district staff members to easily identify their location as well as other pertinent information in real time in the field using a mobile tablet and mapping software. Inspection information is collected using the iPad and digital inspection form. This information is stored in an enterprise database. Reports generated from the data in the database allow the user to view active and inactive permits, inspection history, and corrective actions.



Grading and erosion control plans are a critical permit review submittal requirement.



Inspection information is collected using the iPad and digital inspection form.



watershed district permitting program

Nine Mile Creek Watershed District • Minnesota

Since 1973, Barr has administered the Nine Mile Creek Watershed District's permitting program, which provides oversight for a range of environmental management activities to help achieve compliance with district regulations and the Minnesota Wetlands Conservation Act.

In 2008, Barr helped the district implement revisions to its program based on the district's rule revisions. Since then, we have reviewed an average of 65 permits per year. Barr reviews permit applications for:

- floodplain management
- wetlands management
- stormwater management
- erosion and sediment control
- water-body crossings or structures
- shoreline and stream bank improvements
- sediment removal
- appropriation of public surface waters

As the district's technical advisor, Barr assists permit applicants in meeting their project goals within the confines of the district's regulations. We shepherd applicants through the permitting process, including preparing and distributing review memoranda and presenting the application materials to district managers.

In addition to permitting assistance, Barr handles day-to-day inspections of permitted activities and assists district managers and staff with evaluating requests for permit variances.

watershed district permit administration

Valley Branch Watershed District • Minnesota

As technical advisors to the Valley Branch Watershed District's managers, Barr reviews approximately 20 to 40 permits per year for conformance to the district rules and regulations and Minnesota Wetland Conservation Act. Some of the review items include stormwater rate, volume, and water quality; sediment and erosion control; wetland hydrology impacts, and buffers; and flood levels and associated minimum floor elevations. Barr works with permit applicants to achieve the projects' goals while still conforming to district rules and regulations. We

prepare permit review memoranda and forward them to the permit applicant and officials of the community where the proposal lies, present the permit application to the district managers, and process the approved permit. While the managers have their own inspector who handles day-to-day inspections of permitted activities, Barr inspects projects which could impact wetlands and performs other inspections as needed.



development of Minnesota minimal impact design standards

Minnesota Pollution Control Agency • St. Paul, Minnesota

From 2010 to 2014, Barr worked closely with the MPCA and a diverse stakeholder workgroup to develop minimal impact design standards (MIDS). The MIDS project represents the next generation of stormwater management in Minnesota, with an emphasis on keeping the raindrop where it falls to minimize stormwater runoff and pollution and to preserve natural resources. As the MPCA's primary consultant on the project, Barr provided guidance and technical assistance with developing performance standards for volume reduction and pollutant removal, design standards, and other tools to enable and promote implementation of low-impact development.

As part of the project, Barr developed the MIDS BMP calculator to assist designers and regulators in determining conformance with the MIDS performance goals. The calculator, with a user-friendly graphical user interface, computes the required runoff treatment volume for a given site and helps users quantify the runoff volume reduction, total phosphorus, and total suspended solids removal from a variety of low-impact development BMPs. The calculator is publicly available on the MPCA's website and used widely for stormwater permitting and preparing grant applications.



Barr developed a user-friendly computer program for the MPCA to help designers and regulators assess compliance with stormwater volume control rules.

fast-track permitting and installation for storm sewer

Capitol Region Watershed District • St. Paul, Minnesota

Barr assisted the Capitol Region Watershed District with a fast-track project to realign a 100-year-old storm-sewer interceptor to make way for new highway interchange bridges near downtown St. Paul. BNSF Railway agreed to the rare 30-hour shutdown of two mainline railroad tracks to allow removal and replacement of 120 feet of railroad track, installation of 162 feet of box culvert, open-cut excavation, and backfilling.



Months of planning preceded the effort and involved government agencies, consultants, and investigative contractors. The excavation needed to be completely dewatered prior to construction, requiring permits for disposing of contaminated groundwater and impacted soils and the design of a sophisticated track-monitoring system to verify that dewatering did not affect the surrounding railway.

Permitting and construction was completed successfully and rail service restored on time, minimizing disruptions and enabling MnDOT's highway project to move forward.



Vadnais Lake Area Water Management Organization Professional Engineering Services Proposal



Building a Better World
for All of Us®

Engineers | Architects | Planners | Scientists



Building a Better World
for All of Us®

February 6, 2019

RE: Professional Engineering Services Proposal
Vadnais Lake Area Water Management Organization

Stephanie McNamara, Administrator
Vadnais Lakes Area Watershed Management Organization
800 County Road E E
Vadnais Heights, MN 55127

Dear Ms. McNamara:

SEH is excited to provide this proposal because we are eager to use this opportunity to reintroduce ourselves to the Vadnais Lakes Area Watershed Management Organization. While other firms may have more prominent roles in providing regulatory assistance to watershed organizations, we believe that the services outlined in the RFP are a match for the services that SEH excels in. We look forward to the opportunity to serve as an extension of your staff and build a strong working relationship with you.

When it comes to investigating the feasibility of projects, and subsequently taking feasibility level studies to a final design project including plans, specifications, and construction observation, SEH stands above the typical water resources firms. We believe that this specialty will be a great addition to the VLAWMO workflow.

In addition, we currently assist and serve municipalities within the VLAWMO watershed boundaries with proposed and ongoing development reviews for water resources and environmental considerations and local, state, and federal agency requirements. Through this role, we have become familiar with the VLAWMO stormwater policy, but also the municipal policies, stakeholders, and design standards.

As a full service engineering firm headquartered in Vadnais Heights and located just down the street from the VLAWMO office, SEH can provide desktop or over-the-shoulder review at a moment's notice, in addition to the necessary, environmental and water resources services as outlined in the RFP out of our Vadnais Heights location.

SEH has assembled an exceptional team of engineers, wetland scientists, and construction professionals who are invested in the Vadnais Lakes area community and understands the high value of watershed management. I will be the main point of contact for these services due to her familiarity with the VLAWMO policies and water resources in the Vadnais Lakes area through serving as water resource engineer for projects in Vadnais Heights, White Bear Township and the City of Gem Lake.

Please feel free to contact me with any questions, or to discuss the information provided in this proposal.

A handwritten signature in black ink that reads "Emily Erdahl".

Emily Erdahl, PE
Water Resources Engineer
(Lic.MN)

SEH is a registered trademark of Short Elliott Hendrickson Inc.

Vadnais Lake Area Water Management Organization

Professional Engineering Services Proposal

Scope of Services

At SEH, we are proud to have the ability to serve as a trusted advisor to your staff. Our clients will attest to that ability. Studying the way you operate and seamlessly integrating our services into your “system” is fundamental to our business philosophy. Every client is unique in the way they operate, the services they require and their priorities. The key to providing successful and consistent service is having a thorough understanding of the client. When working with SEH, you can expect:

- Personalized, client-centered service
- A single contact person and “core team” to serve as an extension of your staff
- An honest, trustworthy interface that strives for a long- term, equally beneficial relationship
- A relationship which continuously works to develop and improve our capability to match your needs and expectations
- Responsiveness that equals your sense of urgency

Working as an extension of our Clients’ staff, we can provide project management expertise, lead environmental work and manage the permitting process. Our team of scientists and engineers are assets to the process due to their abilities to analyze project elements that could affect environmental review decision.

We believe success is about working together in collaboration and partnership. We have long standing relationships with our clients, serving as a strong member of their team. With that same collaborative spirit, we’ve developed long-standing positive working relationships with our regional regulatory agencies so that project details are understood early, and mutually-beneficial goals are determined for successful and efficient permit decisions.

The following sections of this proposal describe SEH’s experience in each of the primary service areas listed in the request for proposals. While this information is focused on the requested services, our extensive experience in other areas of water resources such as floodplain management, wetland and natural resource services, creates a well-rounded team of professionals who are eager to serve VLAWMO.

A. Stormwater Management

SEH offers diverse experience on water resources projects – from innovative water quality improvements, to comprehensive drainage plans, to large-scale hydraulic structures, and watercourse rehabilitation in urban settings. Our professional services include traditional and unique BMP design, erosion and sediment control plans, watercourse rehabilitation and streambank stabilization, invasive species management, wetland and environmental services,

hydrologic and hydraulic modeling, and local, state, and federal stormwater and floodplain permitting.

A.1 Stormwater Compliance

Achieving stormwater compliance is more complex than it appears at first glance. SEH provides expert guidance to facility owners, developers, and contractors to navigate and comply with local, state, and federal stormwater regulations. We are familiar with both sides of compliance from a development review perspective and a consulting perspective.

SEH stormwater design, compliance, and inspection services include:

- Highly trained, experienced and/or certified personnel to perform inspections in accordance with applicable local and state regulating authority
- Structural BMP design to meet the post-construction local and state stormwater treatment requirements
- Stormwater management plan review and updates
- On-site inspection reporting
- Audit services to uncover potential permit violations, identify solutions that minimize risk, and provide a clear approach to stormwater compliance
- Education and training services specially designed for land and construction management

A.2 Advanced Hydrologic & Hydraulic Modeling

SEH has an extensive team of water resources and hydraulic engineers on staff providing comprehensive approaches to hydrologic and hydraulic analyses across multiple modeling platforms from tradition one-dimensional steady flow analyses of riverine systems to two-dimensional unsteady flow analyses as part of complex bridge hydraulics projects. Our team has the ability to fit the model to the project by selecting from a myriad of modeling programs to ensure the most appropriate model and modeling methodology is utilized for the given application.

Our advanced hydrologic and hydraulic modeling services include:

- Floodplain analysis to estimate flood levels along lakes and streams and evaluate proposed projects
- Analysis of existing stormwater management systems and evaluation of proposed projects
- Hydrologic and hydraulic modeling studies, including 1D/2D modeling of watersheds, stormwater networks, and open channel systems
- Design of spillways and outlet works
- Analysis and design of channels and channel structures.
- Bridge hydraulics design and analysis, including 1D and 2D hydraulic modeling
- Design of flood risk management systems including levees, floodwalls, and interior drainage systems

B. Feasibility Studies

Our technical and support staff has extensive experience in developing thorough and useful feasibility studies. With each project we complete, we learn new lessons that can be applied to future projects. This experience benefits our feasibility studies in the following ways:

- Realistic estimates for engineering efforts.
- Realistic estimates of cost.
- Realistic scheduling and timelines.
- Early identification of obstacles that may threaten a project.

C. Design Assistance

Our team has vast experience designing various projects where stormwater management was either the focus of the work, or a necessary component of another project type. Through our experience with these designs, we have adapted to varying regulatory frameworks, site conditions, and client expectations. We have designed numerous stormwater projects which balance a multitude of requirements including water quality, water quantity, recreational and aesthetic values, and economic considerations. Members of our team have worked closely with various watershed organizations and clients to successfully design the following types of projects:

- Traditional BMPs such as raingardens, infiltration and filtration basins, constructed and restored wetlands, wet ponds, and dry detention basins
- Ultra-urban BMPs such as pervious pavement and pavers, tree trenches/boxes, infiltration trenches and underground infiltration and storage
- Watercourse restoration and streambank stabilization
- Invasive species management
- Temporary and permanent erosion and sediment control devices/systems
- Gray infrastructure such as storm sewer conveyance systems
- Water quality data collection program

D. Grant Applications

SEH offers a dedicated staff of engineers and scientists who are experienced in providing technical support for grant applications. In fiscal year 2018 we helped our clients secure over \$1.2 million in grants through the Clean Water Fund. Our close relationship with our clients allows us to effectively work together and provide the necessary engineering guidance to prepare successful grant proposals.

In addition to the BWSR grants, SEH has the resources and knowledge to know which other types of funding and grants a project may qualify for. SEH has assisted a multitude of Cities throughout the state with other less utilized funding opportunities such as the Minnesota DNR Flood Damage Reduction program and FEMA's Hazard Mitigation Grant Program. SEH assisted the Cities of Faribault, Melrose, Austin, and Crookston in moving their projects forward by obtaining Minnesota DNR Flood Damage Reduction program funds to complete millions of dollars in flood mitigation projects.

E. Understanding VLAWMO Stormwater Policy

SEH has the added experience of working with numerous clients as their city engineers. Each of these clients has small differences in their design standards. Because of this our staff understands the importance of becoming familiar with our clients policies and design standards. We pride ourselves on being able to provide personalized service that meets the needs of our diverse clientele.

Through our neighboring project experience in the Vadnais Lake Area, SEH staff is already familiar with the VLAWMO Stormwater Policy. Additionally, SEH has significant experience in assisting communities with the development of their own policies that effectively capture and encircle existing workflow while meeting the intent of agency requirements. We believe that this upfront knowledge and background in development of policies will help VLAWMO seamlessly enforce and update their policy as needed in the future.

F. Meeting Attendance

SEH's corporate office is located just down the street from the VLAWMO Office in Vadnais Heights. This will allow us to have more face-to-face interaction with VLAWMO staff, as well as save VLAWMO the cost of consultant travel time and expense. Our experienced staff of engineers, and scientists will effectively present information to technical staff including the Board, and Technical Commission, while our Resident Projects Representative help to build strong relationships with project stakeholders.

G. Stormwater Development Review and Comment of Development Applications

SEH has significant experience in reviewing development plans for private developers within the area, including but not limited to the City of Vadnais Heights, Gem Lake, and White Bear Township. SEH understands the importance of a detailed development review through all phases of planning and design and up until construction start.

With SEH's knowledge of stormwater within the area, we are aware of the local MS4 expectations alongside the Watershed Management Organization, as well as other pertinent stormwater considerations including the MPCA, DNA, MnDOT, and Army Corps, for example. SEH is able to review construction documents and present developers with clear and concise stormwater design expectations to meet the intent of all regulators within the project area.

H. Other Services

SEH offers a diverse portfolio of stormwater project experience which includes service areas outside of those listed in the VLAWMO request for proposals. Our team has the experience and knowledge to help VLAWMO with the following additional services:

- Watershed plan development and implementation
- Floodplain management, including estimating and communicating flood risk
- Public and Private BMP inspections, both surface and subsurface facilities using human or special equipment entry

- Environmental consulting including wetland services and preparation of environmental documents
- Water quality analysis and report preparation with recommendations for improvements
- Planning and design of parks and trails to provide educational and recreational opportunities in addition to addressing stormwater management needs

Beyond the project team identified in this proposal, our company diversity provides for easy access to experts in many disciplines. We have groups focusing on highways, traffic, transportation planning, structures, construction services, civil engineering, water/wastewater engineering, aviation, architecture and surveying. We also have a team of GIS specialists who could assist with data collection and management.

Primary Contacts and Key Personnel

SEH has established a project team that provides the experience required to manage projects, the relationships to promote agency support, and the technical skills to provide technically sound writing and analysis.

Emily Erdahl, PE

Primary Contact for Water Resources Engineering



Emily will service as the primary point of contact for VLAWMO. Emily serves as a water resources engineer who specializes in municipal and construction NPDES permit compliance. Emily has served the communities of Vadnais Heights and Gem Lake for 3+ years with stormwater assistance including Surface Water Management Plan Updates, MS4 program compliance activities, and developer reviews within the cities. Emily has assisted several communities in public participation and outreach efforts through water resources related presentations at public meetings. Emily also has experience in hydraulic and hydrological analysis, construction stormwater inspections, stormwater conveyance modelling and design, and culvert hydraulics analysis. Billing Rate: \$103/hr.

Brad Woznak, PE, PH, CFM | Regional Practice Center Leader

Secondary Contact for Water Resources Engineering



Brad is a Professional Engineer (PE) and Certified Floodplain Manager (CFM) with more than 21 years of experience in hydrologic and hydraulic analyses, watershed modeling, floodplain analyses, and preparation of construction plans and specifications. His project experience includes stormwater and river modeling, design of flood protection features, spillways, outlet works, stilling basins, drop structures, channels, interior drainage facilities, pumping plants, and erosion protection. Brad also has a wealth of experience with flood plain management. He has assisted many communities with Letters of Map Revision (LOMR) from FEMA. Brad led the effort for levee system accreditation for the City of Crookston, Minnesota. Because of his strong relationship with hydraulics staff at the USACE, Brad was invited to work in the USACE St. Paul District office for several months as hydraulic engineer on the Fargo-Moorhead flood damage reduction project. Brad performed the complex hydraulic modeling for the USACE on that project and led a team of USACE hydraulic engineers. Billing Rate: \$215/hr.

Rachel Pichelmann, PE, CFM

Water Resources Engineering



Rachel is a Professional Engineer and Certified Floodplain Manager with over nine years of experience in water resources engineering. Rachel's experience includes hydrologic and hydraulic modeling, storm water alternatives development and analysis, design of traditional and unique BMPs and hydraulic structures, and preparation of construction plans, specifications and cost estimates. Rachel has completed the analysis and design of various stormwater improvements ranging from small wet ponds and infiltration basins to complete drainage systems for major metropolitan highway interchanges. Rachel also has extensive experience with flood risk

modeling and mapping, and the use of hydrologic and hydraulic models to estimate and communicate flood risk. Billing Rate: \$140/hr.

Trent Imdieke, EIT

Water Resources Engineering



Trent Imdieke is an Engineer in Training with experience in water resources engineering and water quality funding. Trent's experience includes the design of stormwater best management practices, and hydraulic and hydrologic modeling. Trent also has experience providing technical assistance for water quality grants, which helped our clients achieve over a \$1 million in funding in 2018. Trent's work with the Mille Lacs Soil and Water Conservation District to fund a surface water management plan for the City of Wahkon is just one example of his experience at writing successful grant proposals. Billing Rate: \$86/hr.

Erik Bye

Water Quality



Erik is a water resources technician with his Master's degree in Water Resources Science with a concentration in Limnology and Oceanography. Erik's education focused on nutrient cycling in aquatic and wetland ecosystems with an emphasis in the biogeochemical analysis of sediment. Erik has experience with water quality sampling and monitoring techniques, water quality and sediment profile data analysis, and the preparation of reports on the overall health of lakes around Minnesota. Erik has worked on water quality projects ranging from small, urban lakes to the largest lake in the world, Lake Superior. The projects he has worked on have provided

stakeholders with a further understanding of the current status of the lakes, how they have changed over time, and a determination of the most threatening water quality issues that need to be addressed. Billing Rate: \$86/hr.

Deric Deuschle, CWD

Primary Contact for Natural Resources



Deric is a Senior Scientist, Aquatic Ecologist, and Certified Wetland Delineator (CWD) with 22 years of experience in environmental consulting and ecological research. He is the leader of SEH's natural resources team. He provides project management and technical leadership for wetland services such as delineations, permitting, monitoring and mitigation siting and design. Deric produces environmental documents including environmental assessments (EA), environmental assessments worksheets (EAW) and EISs. Deric brings expertise in threatened and endangered species surveys, tree inventories, water quality analysis, aquatic invertebrate ecology, aquatic invertebrate taxonomy, stream and large river ecology, fish and wildlife studies, nutrient loading analysis, Geographic Information Systems (GIS) and Global Positioning Systems (GPS). Billing Rate \$195/hr.

Rebecca Beduhn, PWS, CWD, PSS-IT

Secondary Contact for Natural Resources



Rebecca is a wetland biologist and Minnesota-certified wetland delineator. Rebecca has a background in wetland science, soil science, Geographic Information Systems (GIS), Global Positioning Systems (GPS) and water resource science. Rebecca primarily provides wetland services such as delineations, monitoring and permitting. Rebecca has completed master's thesis research on redoximorphic features correlation with actual zones of saturation and the development of a landscape model of water table depth across the entire hillslope. Billing Rate \$100/hr.

Scott Haupt, PE

Civil Engineering and Survey Coordination



Scott is a project management and senior municipal engineer with experience in design, inspection, and management of municipal and highway projects. Scott has worked on projects involving water main, sanitary sewer, storm sewer, and street construction. His responsibilities include preparing feasibility reports, construction plans, specifications, cost estimates, bidding documents, client coordination, private utility and regulatory agency coordination, attending city council meetings and construction administration. Scott serves as SEH's Client Service Manager for the City of Vadnais Heights. Billing Rate: \$160/hr.

Dustin Cesafky

Lead Technician and Resident Project Representative



Dustin is an engineering technician with experience in design and construction observation of transportation and civil engineering projects. His experience includes plan preparation, site grading, utility design, construction observation and surveying techniques. Dustin serves as the the lead resident project representative (RPR) for Vadnais Heights public and private street and utility projects. Billing Rate \$110/hr.

For more information on SEH Hourly Billable Rates see Appendix A.

Experience

In Minnesota alone, SEH provides City Engineering services to over 67 municipalities, which brings us in direct and frequent contact with the mayors, councils, and the community at large. This requires effective leadership, understanding community finances, and honestly, knowing the local “politics” to ensure mutually-beneficial outcomes are attained for the greater public interest. SEH has completed several successful projects for the communities within the VLAWMO area, including Vadnais Heights, Gem Lake, White Bear Township, North Oaks, Ramsey County and Washington County. Through completion of these nearby projects, we have developed strong working relationships with entities who may serve as project partners for VLAWMO.

Neighboring Project Experience

Vadnais Heights Surface Water Management Plan

SEH has completed several Surface Water Management Plans for the City of Vadnais Heights, with the most recent version completed in 2018. Using the past experience, SEH developed a strategy that involved collaboration with review agencies at the onset of the project with the objective of early involvement with agency representatives. SEH presented the final Surface Water Management Plan and the Plan’s objectives at a City Council Meeting.

Reference: Mark Graham, former Vadnais Heights City Engineer/Retired

Vadnais Heights General Engineering

SEH has continuously provided the City of Vadnais Heights with multidisciplined services for more than 29 years, since 1988. The relationship between the City and SEH has remained successful through all the years through clean and clear communication and problem solving to simplify project needs and yield successful City projects. Just some of the professional services that SEH has provided the City include:

- Municipal Engineering Services, including street and utility improvement projects and developer reviews
- Water Resources Engineering including NPDES MS4 updates, drainage studies, developer reviews, and BMP design
- GIS Services including hosting and maintaining the City’s GIS data on SmartConnect application
- Environmental Services including Phase I and II environmental investigations, response action plans, and field identification/observation

Reference: Jesse Farrell, Vadnais Heights Public Works Director/City Engineer
651.204.6050; jesse.farrell@cityvadnaisheights.com

Gem Lake Surface Water Management Plan

As part of the comprehensive plan update, SEH completed a Surface Water Management Plan update for the City of Gem Lake. SEH worked closely with City Staff to develop attainable and pragmatic goals and policies for the City to incorporate in future capital improvement projects related to surface water resources. The update was completed in 2018 and the final plan was presented at a City Council Meeting.

Reference: Jim Lindner, City of Gem Lake Council Member
651.429.7597; lindner1858@yahoo.com

Gem Lake NPDES MS4 Program Services

SEH has worked with the City of Gem Lake for several years on updating, maintaining, and developing their NPDES MS4 program. In addition to providing the City assistance in permit re-authorization most recently in 2013, SEH provides annual MS4 services to the City including MS4 inspection services, MS4 documentation, development reviews, annual reporting duties, and an annual stormwater presentation at a City Council Meeting.

Reference: Jim Lindner, City of Gem Lake Council Member
651.429.7597; lindner1858@yahoo.com

White Bear Township Water Resources and Wetland Reviews

SEH provides miscellaneous water resources services for the township including development reviews for conformance with local, state, and federal standards and regulations, including VLAWMO's policies. SEH provides technical memoranda of review findings and recommendations and also performs necessary follow-up reviews and meetings with the township and proposer as necessary.

Reference: Tom Riedesel, White Bear Township Planner
651.747.2761; tom.riedesel@whitebeartownship.org

694/Rice Interchange Project

This project proposes to replace the existing interchange ramp traffic control with three roundabouts to improve mobility and safety. The reconstruction of the intersection triggered the need for stormwater management including BMP design and stormwater drainage systems. With the project located in both the Ramsey Washington Metro Watershed District and the Vadnais Lakes Area Water Management Organization, the water resources design required clear communication and constant coordination between these two entities and the project stakeholders. A new infiltration basin and new filtration basin were proposed for stormwater treatment for this project.

Reference: Alan Rupnow, Ramsey County Environmental Resource Specialist
651.266.7162; alan.rupnow@co.ramsey.mn.us

Shoreview Pond Inspections

SEH worked with the City of Shoreview to complete inspections of their 129 stormwater ponds in an expedited timeline to assist the City in remaining compliant with their MS4 permit inspection requirements. Inspections were completed in the field using a GIS web-based collector application. Inspection documentation was customized using data collected in field and delivered to the City in an organized, easy to reproduce manner.

Reference: Tom Wesolowski, Shoreview City Engineer
651.490.4652; twesolowski@shoreviewmn.gov

Other Project Experience and Services

Included in Appendix B are SEH project fact sheets to demonstrate the wide variety of projects that the SEH team has worked on in the past.

For more information on SEH References see Appendix C.

Appendix A

SEH Hourly Billable Rates

SEH Hourly Billable Rates – 2019

Classification – Office Staff	Billable Rate ⁽¹⁾
Principal	\$160.00 - \$255.00
Project Manager	\$140.00 - \$230.00
Senior Project Specialist	\$135.00 - \$210.00
Senior Project Engineer	\$140.00 - \$215.00
Project Engineer	\$105.00 - \$165.00
Staff Engineer	\$85.00 - \$125.00
Senior Project Architect	\$120.00 - \$205.00
Project Architect	\$100.00 - \$150.00
Staff Architect	\$85.00 - \$110.00
Senior Project Scientist	\$130.00 - \$170.00
Project Scientist	\$85.00 - \$120.00
Staff Scientist	\$80.00 - \$100.00
Senior Project Planner	\$130.00 - \$200.00
Project Planner	\$95.00 - \$140.00
Staff Planner	\$75.00 - \$100.00
Project GIS Analyst	\$90.00 - \$150.00
Lead Technician	\$100.00 - \$160.00
Senior Technician	\$85.00 - \$135.00
Technician	\$65.00 - \$110.00
Word Processor	\$55.00 - \$99.00
General Clerical	\$55.00 - \$99.00
Graphic Designers	\$90.00 - \$125.00
Classification – Field Staff	Billable Rate ⁽¹⁾
Licensed Land Surveyor	\$110.00 - \$150.00
Lead Project Representative	\$95.00 - \$145.00
Sr. Project Representative	\$90.00 - \$135.00
Project Representative	\$70.00 - \$125.00
Survey Crew Chief	\$85.00 - \$125.00
Survey Instrument Operator	\$60.00 - \$95.00

(1) The actual rate charged is dependent upon the hourly rate of the employee assigned to the project.

The rates shown are subject to change.

Effective: January 1, 2019
 Expires: December 31, 2019



Appendix B

Other Project Experience and Services

Long Lake Ditch Channel Stabilization



CLIENT

City of Long Lake, Minnesota

REFERENCE

Mr. Terry Post
City Administrator
City of Long Lake
952.473.6961 ext. 2

COST

\$575,000 for design and construction

SERVICES

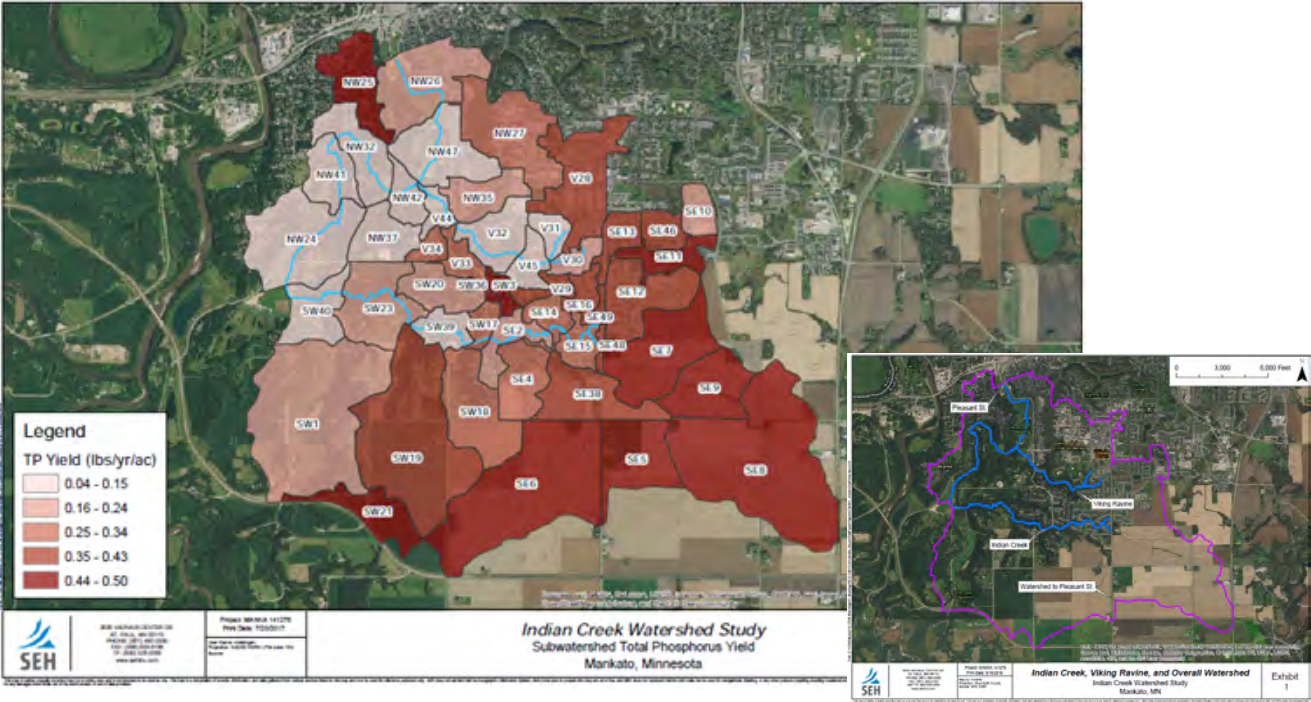
- Final design, plans and specifications
- Hydrologic and hydraulic engineering
- Natural restoration design
- Permitting
- Construction services

SEH assisted the City with the stormwater planning and feasibility analysis for the proposed downtown redevelopment. The main focus areas of the project were: evaluating natural resources existing in the ravine/drainage system and ponds; identifying water quality treatment needs to accommodate the redevelopment water quality plan; and preparing conceptual designs and cost estimates for stream stabilization restoration work and pond system expansion or enhancement. The project involved hydrologic and hydraulic modeling of the system in HydroCAD and XP-SWMM, and water quality loading analyses using P8. The feasibility analysis led to plans and specifications and construction administration of a subsurface gravel filter bed and streambed restoration constructed within an existing City park and stabilization of an eroded stream bank in the downtown area.

FEATURES

- Stream channel relocation, stabilization and restoration
- Subsurface gravel wetland for offline regional stormwater treatment
- Natural wet meadow vegetation provides stormwater treatment and insect and animal habitat
- Rehabilitation of failing sanitary sewer along original channel alignment
- Passive recreational benefits to the City park include increased wildlife viewing opportunities

Indian Creek Watershed Study



CLIENT

City of Mankato, Minnesota

REFERENCE

Mr. Michael McCarty
 Senior Civil Engineer
 City of Mankato
 507.387.8643
 mmccarty@mankatomn.gov

SERVICES

- Field data collection by Natural Resources, Geotechnical & Water Resources Professionals
- GIS integration using SmartConnect for data collection and management
- Natural Resources inventory and vegetation mapping
- Hydrologic and Hydraulic analysis including modeling and pollutant load assessment
- Geotechnical engineering for slope stability analysis and design
- Project prioritization and preliminary design

Description: The Indian Creek Watershed is a partially developed watershed with agricultural drainage systems connecting to the City’s storm water infrastructure. This study included field data collection, identifying existing and potential future erosion areas, performing a hydrologic and hydraulic analysis of the watershed, completing a sediment and pollutant loading assessment, and identifying projects intended to reduce erosion potential and pollutant loading from the watershed. Water quality analysis was also completed to evaluate alternatives intended to reduce TP and TSS loads to the Minnesota River. A variety of hydrologic and hydraulic models were used for these studies including xpswmm, HEC-HMS, and HEC-RAS. Average annual runoff, TP and TSS loads were estimated using “the Simple Method”. Planning-level cost estimates were developed for the various alternatives. Recommended projects included ravine stabilization measures and wetland restorations.

Denley Road Wetland Delineations



CONSTRUCTION PHASE

October 2005

FEATURES

- GPS survey of delineated wetland boundaries
- Wetland delineation using the 1987 Corps of Engineers Wetland Delineation Manual
- Electronic data transfer of GPS data, Corps Manual data forms and GIS coverages and a draft federal Environmental Assessment prepared for the project
- Wetland Delineation Report

SERVICES

- Wetland delineation and GPS surveying using a multiple-team approach for a linear project with many wetlands
- GPS and GIS data processing of wetland delineations
- Technical report preparation

SEH Wetland Scientists completed wetland delineation and Global Positioning System (GPS) surveys of approximately 45 wetland basins for a proposed 10-mile forest road reconstruction project in Minnesota's Superior National Forest. Two teams of two wetland scientists delineated wetlands within the proposed right-of-way and presented the findings in a Wetland Delineation Report.

CLIENT

City of Eden Prairie

PROJECT LOCATION

Eden Prairie, Minnesota

Riley Creek Channel Bank Stabilization Project Sites H2 and H3



REFERENCE

Ms. Leslie A. Stovring
Environmental Coordinator
City of Eden Prairie
952.949.8327

FEATURES

- Stream channel stabilization and restoration
- Installed grade control structures to reduce velocities within the stream
- Bank re-grading to reduce potential for erosion and sediment loading
- Reinforced the bank toe along the channel
- Utilized on-site materials for construction

SEH was hired by the City of Eden Prairie to design and oversee implementation of a bank stabilization project for two priority sites along the creek where 15 to 25 ft. high sections of bluff had eroded to near vertical slopes due to limited vegetative cover and fluvial erosion of the streambanks under a heavily wooded overstory canopy. An overabundance of large woody debris in the channel also resulted in localized areas of channel bed and bank scour.

SEH's solution was to remove much of the overstory canopy to allow sunlight to reach the channel area. The majority of the trees cut were not removed from the site, but were utilized as root-wads and woody "revetment" to assist in stabilizing the base of the large eroded bluffs.



CLIENT
City of Oakdale

PROJECT LOCATION
Oakdale, MN

Tartan Crossing



SERVICES

- Structural engineering
- Highway design
- Traffic engineering
- Mechanical engineering
- Electrical engineering
- Water resources engineering
- Final design
- Heavy civil engineering
- Landscape architecture and design
- Bicycle and pedestrian enhancements
- Survey

FEATURES

- pedestrian loop with public art elements and seating
- unique four-cell pond
- greatly reduced impervious area/increased control of runoff quality and quantity
- increased aesthetic appeal

This unique, award-winning regional infiltration/filtration basin was developed to serve a priority redevelopment area in Oakdale and meet the local watershed district volume control and treatment standards. SEH engineers and landscape architects created a system that combines the function of a treatment system with the art of showing the flow of water. This was accomplished through a series of four treatment cells connected by a low-flow channel and overflow weirs.



Community Development & Project Funding Services

FUNDING YOUR PROJECT.

We provide funding, economic development, and planning services to a wide variety of public and private clients throughout the country.

PROJECTS

- Public infrastructure (wastewater/ water systems, etc.)
- Housing development
- Housing redevelopment
- Planning
- Parks, trails, and other outdoor recreation
- Downtown revitalization
- Business expansion and recruitment projects
- Industrial/business parks
- Brownfields/contamination clean-up
- Energy related projects
- Transportation projects



A good idea, without the financial means to make it come to life, will remain just another idea. But when it comes to community and economic development, SEH can turn your ideas into reality.

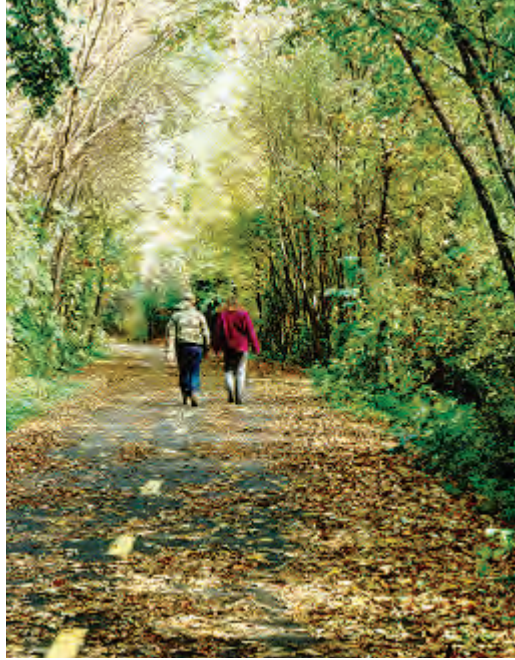
A state-of-the-art water treatment plant, a new commercial park built on a brownfield site, roadway improvements that promote safer routes to school. Many grants and low interest loans are available to help transform your great idea into a great project.

Our experts work with communities and the private sector to provide financially feasible solutions for projects. To do this, we access a variety of federal, state and local funding sources, including grants, low-interest loans, and tax incentives.

We serve clients across the country from our offices in Indiana, Minnesota, and Wisconsin. Our clients include counties, municipalities, tribes, businesses, farmers, lake associations, sanitary districts, development corporations, and more.



COMMUNITY DEVELOPMENT & PROJECT FUNDING SERVICES



PROJECT FUNDING SERVICES

Funding Research and Analysis
Grant and Low Interest Loan Applications
Grant and Loan Administration
Storm Water Utilities
Tax Increment Finance
Impact Fees

COMMUNITY DEVELOPMENT SERVICES

Community Planning
Sustainability, Energy, and Biomass
Business Recruitment
Business Retention and Expansion (BRE) Programs
Consultant to Economic Development Authority Boards
Economic Development Planning and Marketing
Project Site Development
Downtown Redevelopment
Industrial Park Planning
Incentive Negotiation

GIS SmartConnectSM

REAL-TIME COLLABORATION FOR REAL-TIME SOLUTIONS



With GIS SmartConnect, mobile field crews can gather and input real-time GIS data. Because SEH uses cloud-based technology, project managers in the office can view, analyze and update the real-time data. The GIS data can be turned into metrics to help decision-makers prioritize and plan real-time solutions.

GATHER AND CENTRALIZE REAL-TIME DATA

Because SEH GIS SmartConnect uses cloud-based technology, it helps improve the quality, accuracy and speed of data collection. The data you gather is real-time, secure, reliable and centralized which means your GIS data can be accessed and updated in the office or in the field using a computer, tablet or smart phone.

COLLABORATE AND SHARE REAL-TIME DATA

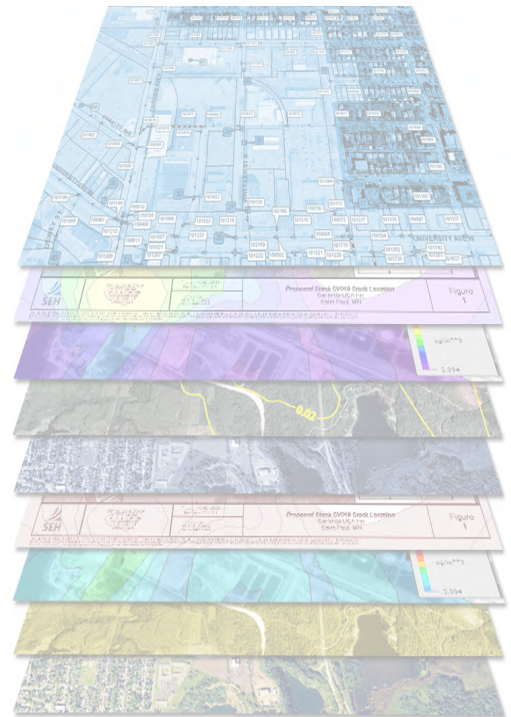
The use of GIS SmartConnect promotes data sharing between project managers, office staff and field crews. This ability to share real-time data increases work flow efficiencies and promotes collaboration within and between departments.

ANALYZE REAL-TIME DATA/MAKE INFORMED DECISIONS

GIS SmartConnect allows users to easily manipulate and analyze GIS data, conduct spatial analysis, overlay data layers, produce custom reports and integrate a host of additional data, systems and solutions. This integrated approach to managing real-time data improves your ability to make informed decisions, prioritize your projects, and develop and implement plans of action.



GIS SMARTCONNECT SM



SEH GIS experts can help you organize, update and share your data; increase efficiencies and streamline internal operations; and improve response times and service delivery to your customers and/or your community.

GIS SERVICES

- Web mapping applications
- Mobile device applications
- Asset management implementation
- Local government model implementation
- Strategic planning
- Hardware assessments
- Software assessments
- Systems architecture
- Application integration
- Data collection
- Data conversion/migration
- Mapping and modeling
- Training

GIS APPLICATIONS

- Asset management
- Citizen service requests
- Public notifications/ comments
- Emergency assessments
- Infrastructure inventories
- Hydrant inspections
- Water main break response
- Valve exercising
- Manhole inspections
- Inlet inspections
- Public tax parcel viewer
- Landfill monitoring
- Field inspection daily logs

GIS BENEFITS

- Reduce costs
- Improve data sharing
- Increase efficiencies
- Improve decision making
- Improve communication
- Increase data accessibility
- Improve record keeping
- Generate accurate reports
- Increase transparency
- Manage geographically
- Include field support staff
- Improve government activities
- Increase citizen engagement
- Enhance citizen services



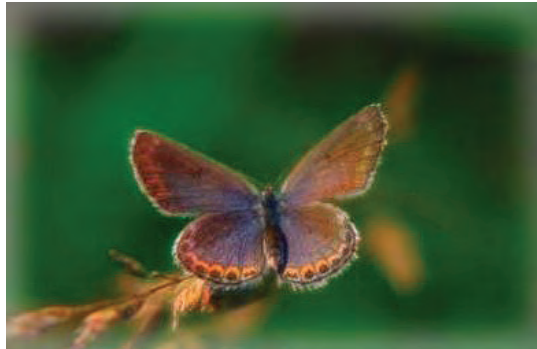
Rare and Protected Species Surveys

SEH delivers.

Our expertise includes implementing of projects administered by the following:

AGENCIES

Federal Aviation Administration
Federal Highways Administration
U.S. Army Corps of Engineers
U.S. Environmental Protection Agency
Natural Resources Conservation Service
Bureau of Land Management
Tribal Governments under Executive Order
State Departments of Transportation
State Departments of Natural Resources



EXPERTISE EVERY STEP OF THE WAY.

Our staff specializes in plants, animals, fisheries and invertebrate species of animals. We've completed numerous surveys for rare and protected species throughout the U.S., including the Upper Midwest, desert southwest, northern Rockies, southeastern U.S. and the mid-Atlantic states.

AGENCY COORDINATION THAT WORKS.

SEH has worked extensively with agencies to meet the requirements of the federal Endangered Species Act, Migratory Bird Act, Fish and Wildlife Coordination Act, National Environmental Policy Act and several states that implement their own statutes regarding protected species.



Stream Bank Stabilization Services

STREAM BANK STABILIZATION SERVICES

- Channel & Bank Stabilization
- Drop Structures/Grade Control Structures
- Energy Dissipation Structures
- Geomorphic Analysis
- Geotechnical Analysis
- 1D & 2D Hydraulic Modeling
- Temporary & Permanent Erosion Control
- Permitting & Inspections
- GIS Integration

OTHER SEH WATER RESOURCES SERVICES

- Bridges & Culverts
- Riverine Flood Mitigation
- FEMA Flood Map Revisions
- Stormwater Best Management Practices
- Low Impact Development
- Storm Drainage Systems
- MS4 Compliance Services & Training
- Urban Flood Mitigation
- Wetland Restoration
- Dams & Reservoirs
- Dam Removal
- Hydrologic Modeling
- Stormwater Pump Stations
- Stormwater Master Plans



Top left image: GIS display of field data collected as part of Mankato watershed study. Geotechnical, natural resources and hydraulic field data was compiled in GIS and used to identify high priority bank stabilization locations. Project also included preliminary design of stabilization measures intended to reduce sediment loads and protect existing infrastructure. Right image: Underwood Creek watercourse rehabilitation project in Milwaukee, Wisconsin. Project included removal of concrete lined channel, lowering of the adjacent floodplain, and construction of a meandering stone lined channel with riffle and pool sequences. Bottom left image: Cascade Creek slope stabilization project in Rochester Minnesota. Project included native plantings in the Armorflex-protected area with riprap and root wads at the base of the slope.

SEH offers a diverse portfolio of stream bank stabilization project experience – from bank stabilization prioritization studies to detailed design. Our designs have incorporated site-specific combinations of stabilization measures from those consisting of natural materials such as bendway weirs, root wads, locked logs, and reinforced plantings to measures consisting of hard-armoring techniques such as riprap and gabion baskets. SEH provides superior technical expertise, effective project management techniques, collaborative public outreach efforts, and effective permitting methods. We coordinate comprehensive teams of scientists, engineers, planners, and landscape architects to fulfill project needs.

SEH conducts on-site investigation to identify and prioritize bank failure locations, and collect critical information to be used in the design of the stabilization measure. We engage geotechnical and hydraulic engineers to understand the cause of the stability issue and identify an appropriate stabilization measure for each unique site. Our solutions are carefully selected to address the urgent nature of bank failures while also providing long-term stabilization.

Our approach to project development, design and construction is to listen to our clients and design a solution that fits their needs. From traditional design-bid-build to design-build and beyond, we offer a variety of project delivery methods.



SEH Drone Services

With better video capabilities than airplanes, drones provide an unlimited means of capturing data on a project site. Drones can help manage projects more efficiently, saving time and money and can be used on nearly any project.



HIGHLIGHTS

- DJI Inspire 2 X5S
 - Offers better resolution imagery, greater flight speed, and increased stability over industry standard
- FAA and MNDOT licensed operators are SEH aviation specialists
- MN Commercial Operator License: 20288
- General Liability Insurance: \$2 million

FULL SERVICE WORKFLOW

- Licensed operators perform pre-flight planning and airspace checks
 - Coordinate authorization for sensitive areas such as airports and public facilities
- Flight planning specifically to achieve client's needs
- Placement and survey of ground control points to increase accuracy
- Authorized pilot and visual observer, if necessary
- GIS specialist to analyze data, perform photogrammetric analyses, provide data to meet client's specifications

POSSIBLE DATA DELIVERABLES

- High resolution orthomosaic imagery (capable of <5cm resolution)
- Elevation surface (DEM, TIN, PLY)
- Contours available in AutoCAD or GIS compatible format
- Data spatially reference to meet client's needs
- Quality control reporting
- Cloud services available to preview data and perform basic analytics
- 4K video (30 fps)
- 3D overlay

DEMONSTRATED SERVICES

- FAA part 77 surface obstruction analysis
- Stockpile volume calculations
- Landfill and pit capacity volume calculations
- Up-to-date imagery used for construction oversight
- Live video feed for onsite project meetings
- 4K video for communications, marketing, or other purposes



Appendix C

Additional References

References



Maplewood Fire Station No. 1 (South Station)

Steve Lukin
Fire Chief
Maplewood Fire Department
651.249.2802

Mark Maloney
Director of Public Works
City of Shoreview, MN
651.490.4651

Brian Bachmeier
Director of Public Works/City Engineer
City of Oakdale, MN
651.730.2730

Jeff Oliver
City Engineer
City of Golden Valley, MN
763.593.8034

Marc Culver
Director of Public Works
City of Roseville, MN
651.792.7041

Russ Matthys
Director of Public Works
City of Eagan, MN
651.675.5646

Tony Kutzke
City Engineer
City of Woodbury, MN
651.714.3593

“The staff at SEH is like an extension of our city staff...”

“As Golden Valley’s City Engineer, I have had the pleasure of working with SEH for the last 20 years. The staff at SEH is like an extension of our city staff and we have worked closely together to rehabilitate and expand the City’s street and infrastructure systems. Their role in our Inflow and Infiltration Reduction Program has helped Golden Valley take significant strides in meeting our community wide wastewater flow reduction goals. SEH’s strong public outreach skills have helped build neighborhood consent or support for controversial transportation projects. They are trusted for their technical expertise and are able to help find affordable solutions to respond to challenging problems.”

– Jeff Oliver, PE City Engineer, City of Golden Valley

“I give SEH my highest recommendation...”

“I give SEH my highest recommendation for any municipal engineering services, particularly for telecommunications or protective coatings-related work.”

– Mark J. Graham, PE, Former Vadnais Heights City Engineer/Director of Public Service (retired)

“SEH has done an outstanding job for us...”

“SEH has done an outstanding job for us and with the team approach that they take I would highly recommend them for your project needs. Professionalism, dedication, knowledge and teamwork are just a few words I would use to describe SEH.”

– Steve Lukin, City of Maplewood Fire Chief, Maplewood Fire Department



Building a Better World for All of Us[®]

Sustainable buildings, sound infrastructure, safe transportation systems, clean water, renewable energy and a balanced environment. Building a Better World for All of Us communicates a companywide commitment to act in the best interests of our clients and the world around us.

We're confident in our ability to balance these requirements.

Join Our Social Communities





Houston Engineering, Inc.

February 6, 2019

VADNAIS LAKE AREA WATER MANAGEMENT ORGANIZATION

Proposal for

PROFESSIONAL ENGINEERING SERVICES

Collaborative engineering services to support watershed initiatives for 2019-2020





VIA Email: stephanie.o.mcnamara@vlawmo.org

February 6, 2019

Stephanie McNamara
Vadnais Lake Area Water Management Organization
800 County Road E East
Vadnais Heights, MN 55127

Subject: Collaborative engineering services to support watershed initiatives for 2019-2020

Dear Stephanie:

As you kick off 2019, it's a vital time to plan ahead for upcoming projects and define the direction the Vadnais Lake Area Water Management Organization (VLAWMO) will take for the next two years. At Houston Engineering, Inc. (HEI), we are excited to support VLAWMO more closely with key engineering services. Serving watershed management agencies is our mission. Through having the privilege of working with you this past year on the Lambert Creek drainage analysis, as well as the long-term collaboration with you on web development, we understand what makes your watershed unique, respect and admire your priorities, and support your dedication to your constituents.

HEI can provide engineering for all of the services identified in your request (see page 5 for more details). Our full-service team is comprised of water resource engineers, water quality scientists, wetland scientists, land surveyors, geographic information systems (GIS) analysts, and software engineers. This team allows us to provide additional, diverse services that can be designed to fit your specific needs.

Here are a few key ways the HEI team can best serve VLAWMO:

- **Transparency and Fiscal Accountability:** Our primary commitment is to provide transparent support and to be fiscally accountable in all of the work we do. We will earn and maintain your trust as your go-to engineer through clear communication and strict processes, allowing you to remain equally transparent and accountable to your constituents.
- **Tailored Project Support:** We understand VLAWMO manages diverse resources in an urbanized setting, including beautiful lakes and public drainage systems. Our team can help you drive implementation through the design and construction of projects that support your watershed goals. Together, we can build projects that are a clear marker of your work and impact your community. We can also collaborate with the District to secure funding and present your work in a clear and engaging manner with local stakeholders.
- **New Technology for Better Results:** HEI is known for integrating technology with science and engineering to create custom solutions for our clients. We have developed systems specifically designed to improve watershed issues, such as permit viewers and best management practice (BMP) databases. We can also help develop any custom technology solutions that you may need moving forward.

I will call to follow up on our proposal on Tuesday, February 12. If you have any questions before this time, please do not hesitate to contact us directly. We look forward to serving VLAWMO in the very near future!

Sincerely,
HOUSTON ENGINEERING, INC.

Nancy Stowe, MS, PE
Client Manager, WMO Engineer
Direct: 763.493.6681
nstowe@houstoneng.com

Barton L. Schultz, PE
Principal-in-Charge
Direct: 763.493.6662
bschultz@houstoneng.com

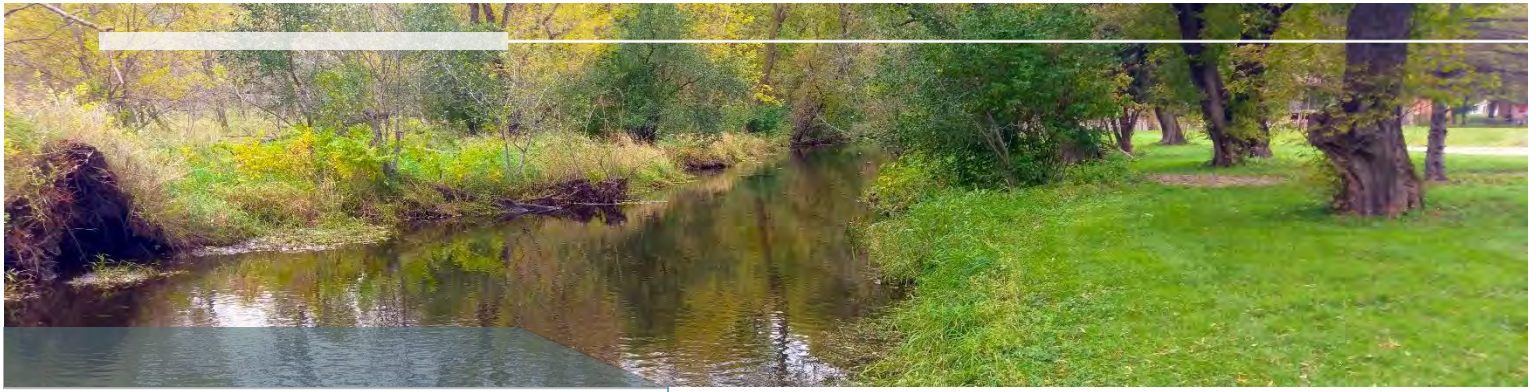


TABLE OF CONTENTS

Professional Engineering Services for 2019-2020

	Page
Company Contact	1
About Houston Engineering, Inc.....	1
Ability to Complete Projects in a Timely/Effective Manner.....	1
Project Team.....	2
Organizational Chart.....	2
Key Personnel Bios.....	3
Scope of Services.....	5
Introduction.....	5
(A) Stormwater Management.....	6
(B) Feasibility Studies.....	8
(C) Design Assistance.....	10
(D) Grant Applications.....	12
(E) VLAWMO Stormwater Policy.....	13
(F) Meetings/Presentations.....	15
(G) Stormwater Management Review.....	17
Additional Services.....	20
References.....	22
2019 Fee Schedule	23

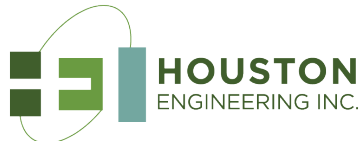
COMPANY CONTACT

Primary Contact



Nancy Stowe, as Client Manager, will serve as your main point of contact and Water Management Organization (WMO) Engineer while serving VLAWMO. Nancy has extensive experience serving similar organizations throughout the Midwest, specifically in the metro. She is eager to serve as your WMO Engineer to achieve VLAWMO's watershed goals.

Email: nstowe@houstoneng.com, Phone: 763.493.6681



ABOUT HOUSTON ENGINEERING, INC.

Houston Engineering, Inc. (HEI) is a community-focused engineering firm serving Minnesota with a variety of technical services key to natural resources management.

Conveniently located with nine offices across the Upper Midwest, we are committed to projects that can lead to visible improvements in the intersection of water quality and land stewardship. Our team includes engineers, scientists, and analysts, all seasoned in watershed management services.

QUICK FACTS:

Website: houstoneng.com

Local Office: Maple Grove, MN

Number of Employees Companywide:

205 professionals

Year Founded: 1968



HEI WILL HELP YOU REACH YOUR WATERSHED GOALS THROUGH PROJECTS, STUDIES, AND PLANNING

ABILITY TO COMPLETE PROJECTS IN A TIMELY/EFFECTIVE MANNER

We are committed to aiding VLAWMO in stormwater management, feasibility studies, engineering help with grant applications, policy, meeting attendance and participation, and stormwater application assistance.

To successfully complete our services within a solid timeframe, we have a deep bench of team members who will be committed to your projects. Once a project is identified under this contract, HEI will develop a customized schedule for the work. Projects are kept on budget using strict accounting methods and detailed project management. Our office in Maple Grove is a short half-hour drive from your offices, meaning we can easily stop by for projects meetings and presentations.



PROJECT TEAM

Organizational Chart

Below, we've introduced the team who will work day-to-day with VLAWMO staff. We are introducing discipline leads, each of which will be supported by more than 200 professionals. We can engage broader companywide support should specialty project or workload make this a necessity.



Nancy Stowe, MS, PE

Client Manager,
WMO Engineer



Bart Schulz, PE

Principal-in-Charge

Discipline Leads

A) Stormwater Management



Dan Bogart, MS, PE

Engineer III

C) Design Assistance



Lisa Odens, PE, CFM

Engineer III

E) VLAWMO Stormwater Policy



Kris Guentzel, MS

Engineer II

G) Stormwater Management Review



Greg Bowles, PE

Project Manager

B) Feasibility Studies



Alex Schmidt, MS, PE

Engineer III

D) Grant Applications



Drew Kessler, PhD

Project Manager -
Environmental

F) Meetings/Presentations



Nancy Stowe, MS, PE

Project Manager

Additional Support Areas

Public Drainage Systems



Chris Otterness, PE

Project Manager

Lake Management



Moriya Rufer, MS

Scientist III

Geographic Information Systems



Brian Fischer, MS

Project Manager - GIS

Survey



Jerry Neu

Engineering Specialist

Key Personnel

MANAGEMENT TEAM



Nancy Stowe, MS, PE, Client Manager/WMO Engineer

Nancy Stowe will serve as VLAWMO's main point of contact, serving day-to-day engineering needs and coordinating all project teams on

behalf of HEI. Nancy has 25 years of experience providing water resource engineering services, including hydrologic, hydraulic, and water quality studies to find solutions to the vast array of water resource issues encountered in today's landscape. Her experience includes projects involving rivers, lakes, dams and reservoirs, bridges and culverts, stormwater management, flood damage reduction, and water quality improvement. Nancy brings extensive experience applying hydrologic, hydraulic, and water quality models to water resource studies and design projects.

Nancy has enjoyed working with VLAWMO on the recent Lambert Creek project and looks forward to serving you more in the next two-year period!



Bart Schultz, PE, Principal-In-Charge

Bart Schultz will serve as Principal-in-Charge and provide senior guidance as needed. Bart has served as the Maple Grove Office Manager for more than a decade and ensures that HEI

projects are staffed with the resources and tools needed to make each one a unique success.

Discipline Leads

A) STORMWATER MANAGEMENT



Dan Bogart, MS, PE, Engineer III

Dan Bogart is a Water Resources Engineer assigned to lead stormwater management projects with VLAWMO. Dan serves clients with

comprehensive hydraulic and

hydrologic modeling for issues in highly urbanized areas. He has served on project teams for large-scale modeling in the Mississippi Watershed Management Organization and the City of Minneapolis, where stormwater issues are complex. Dan will work collaboratively to address VLAWMO needs and find a solution.

B) FEASIBILITY STUDIES



Alex Schmidt, MS, PE, Engineer III

Alex Schmidt will work closely with VLAWMO to develop feasibility studies. He provides engineering services focused on water resources,

specializing in modeling and designing urban stormwater best management practices (BMPs). Alex worked with the VLAWMO on the Lambert Creek Engineering project, where he helped determine feasible solutions for issues with ditch capacity. Alex has also worked on other notable Twin Cities metro projects, including the design of a variety of BMPs within Como Park in St. Paul, a collaboration with Capitol Region Watershed District.

C) DESIGN ASSISTANCE



Lisa Odens, PE, CFM, Engineer III

Lisa Odens will provide design assistance as needed, once projects progress to the conceptual and design phases. Lisa is proficient in hydrologic

and hydraulic modeling programs as well as design tools, including ArcGIS and HEC-GeoRAS. Lisa's background includes a variety of both urban and rural modeling, perfect for metro areas where project development may span multiple land uses. Lisa has recently completed projects with the South Washington Watershed District, including the design of stabilization practices to address erosion issues within Ravine Park and Lower East Ravine.

D) GRANT APPLICATIONS



Drew Kessler, PhD, Project Manager-Environmental

Drew Kessler will help VLAWMO with grant applications and funding requests, as needed. Drew specializes in water quality and watershed

management. His expertise is specifically related to using GIS for analyzing water resources and developing modeling systems that bring science into decision-making processes. Drew has completed many successful grant applications for a variety of watershed clients, by presenting practical water quality projects that can lead to visible improvements.

E) VLAWMO STORMWATER POLICY



Kris Guentzel, MS, Engineer I

Kris Guentzel will assist VLAWMO with issues relating to stormwater policy. Kris has been instrumental in many watershed planning efforts and can provide real world guidance on policy-related issues. Before joining HEI, Kris worked for the Anoka Conservation District, where he worked to address complex water resource problems. He is a certified Watershed Specialist and brings a unique perspective to our project team.

F) MEETINGS/PRESENTATIONS



Nancy Stowe, MS, PE, Project Manager

As Client Manager, Nancy will work collaboratively to develop meeting materials and presentations for a variety of VLAWMO needs. Whether the audience is staff, VLAWMO's

Board of Managers, policy-makers, city or county partners, or the general public, Nancy will help lead communications and provide technical support as needed. Having provided hundreds of presentations throughout her career, she understands the importance of developing a clear message and staying on topic to deliver project information. Nancy will engage other HEI staff as needed, whether it be another technical lead on the project or our communications staff who can help develop custom graphics or edit presentations to ensure a clear delivery.

Meetings and presentations are where VLAWMO shares the important work you are doing! HEI can help ensure easy-to-understand and technically defensible messaging.

G) STORMWATER MANAGEMENT REVIEW



Greg Bowles, PE, Project Manager

Greg Bowles will lead all stormwater management review activities required by VLAWMO. Greg has been leading the Rice Creek Watershed District permitting program for more than ten years, and understands the complicated rules and regulations that make up stormwater management in Minnesota. Greg provides an easygoing leadership for stormwater management issues, and will help ensure compliance for the VLAWMO, your partners, and constituents.

Additional Support Areas

PUBLIC DRAINAGE SYSTEMS



Chris Otterness, PE, Project Manager

Chris Otterness will provide senior guidance, as needed, for projects relating to public drainage systems. As the District Engineer for Rice Creek Watershed District, Chris has managed dozens of public drainage systems in various stages of their lifespan. He has engaged with the public and agencies, particularly relating to Minnesota public drainage law. He even helped author the update to the *Minnesota Public Drainage Manual* in 2016.

LAKE MANAGEMENT



Moriya Rufer, MS, Scientist III

Moriya Rufer is a Senior Scientist with 15 years of experience serving the water resources community. Moriya specializes in lake protection across Minnesota. Equally at home in the field taking water samples or behind a computer drafting comprehensive plans and reports, Moriya is a boon to any project team.

GEOGRAPHIC INFORMATION SYSTEMS



Brian Fischer, MS, GIS Project Manager

Brian Fischer leads services in the areas of GIS analysis and mapping, database design, custom application programming, and website development. Brian has led the way with using GIS and web technologies for various watershed district needs across the state of Minnesota. He has developed GIS-based permit tracking databases, water quality databases, BMP tracking databases, district websites, and interactive maps.

SURVEY



Jerry Neu, Engineering Specialist

Jerry Neu is a Survey Project Manager with HEI and coordinates all surveying efforts for HEI's metro office. Jerry brings extensive surveying knowledge as well as design experience that is integral to project success.

SCOPE OF SERVICES

Introduction



Since 1968, HEI has served local water management agencies, including water management organizations and watershed districts. This work has been an incredibly rewarding experience.

Our lasting and valued client relationships are achieved through consistent performance and the sustainable solutions we offer to complex water management problems. Working with both newly-formed local water management agencies and established ones, we offer the right mix of experience, innovation, and technically detailed solutions to water management problems.

From our traditional technical strengths of water resources engineering, surveying, and construction management, to our expertise in GIS, web applications, and environmental science, we continue to provide unequalled professional service to local water management agencies.

Our multi-disciplined team is comprised of water resource and civil engineers, planners, surveyors, grant funding specialists, and technology experts. This wide variety of technical knowledge will lead to the best possible outcome for your projects.



The start of any successful project begins with an identification of need followed by a reliable and well thought out project approach.

The service areas described in the following sections identify the needs of VLAWMO, followed by a discussion of how HEI's approach to these services provides your organization with a sustainable solution. Each section shows a representative sampling of projects completed in the service area.



What is HEI's added value?

We are committed to:

- Serving you transparently
- Understanding your needs and evolving with them
- Communicating clearly and often
- Engaging on your behalf

HEI can work with a retainer system for all services described in our proposal.

(A) STORMWATER MANAGEMENT

As a local water management agency, you must understand and manage the flow of water throughout your natural and man-made waterways. To fully understand how these complex systems interact and function, engineering studies involving modeling and analysis are implemented to analyze the hydrologic, hydraulic, and water quality properties of the system.

Hydrologic and hydraulic studies typically examine and quantify peak flow rates and velocities, volumes, and flood elevations. Because study areas vary greatly in scale and in the nature of the hydraulic network (i.e. storm sewer or open channel, lake system or riverine), no single hydraulic and hydrologic model is ideal for every study area and condition. Hydrologic and hydraulic studies should always begin with the determination of the most suitable modeling suite for the system being analyzed. Because of our broad base of experience with hydraulic and hydrologic models, we can proficiently utilize virtually any model which best meets your needs. Our team has developed tools for deriving model inputs through GIS that have greatly increased our accuracy and efficiency in model construction. This comes at a great cost savings to you, enabling us to spend less time keying in data and more time analyzing solutions. Efficient use of these models is also a critical benefit to you during time-critical water resources management events, such as pre-flood planning and flood event response services both during, and in the wake of, major flood occurrences.

Project Examples – Stormwater Management

H&H Modeling



1NE MODELING PROJECT FOR NORTHEAST MINNEAPOLIS, COLUMBIA HEIGHTS, AND FRIDLEY

Services

Hydrologic and Hydraulic Modeling

Background

The Mississippi Watershed Management Organization (MWMO) is one of many watershed organizations in the Twin Cities Metropolitan area. The MWMO contains portions of the cities of Lauderdale, Minneapolis, Saint Anthony Village, Saint Paul, Fridley, Columbia Heights, and all of Hilltop.

The Project

HEI worked with the MWMO to develop hydrology, hydraulics, and water quality models of a 2,100-acre storm drainage system, which outlets to the Mississippi River. The pilot study includes parts of Northeast

Minneapolis, Columbia Heights, and Fridley.

Our project team performed modeling using XP-SWMM, assessing water quality models, and leading meetings with the MWMO and a Technical Advisory Committee.

Following the extensive modeling, the project has currently moved into the planning and implementation phase of on-the-ground projects. ■

» Location

Minneapolis, Minnesota

» Client

Mississippi Watershed Management Organization

» Contact

Stephanie Johnson, PhD, PE
Programs Principal
612.465.8780

» Client Benefits

- Complex data collection from several participating cities.
- Models delivered electronically as a final deliverable.
- Detailed modeling for large watershed area.

H&H Modeling



RICE CREEK WATERSHED DISTRICTWIDE MODEL

Services

Hydrologic and Hydraulic Modeling, Floodplain Mapping, Flood Frequency Analysis

Background

HEI completed a Districtwide model for the Rice Creek Watershed District as a tool for managing their resources.

The Project

Our project team modeled the 186-square-mile watershed that has land uses ranging from urban to rural.

As a first step, HEI and the District established goals to guide the model development project. The main goal was to complete updated and consistent models for the District and to update flood elevations and floodplain mapping to be used in the regulatory program. An additional goal was to develop and implement a GIS-centered modeling framework, which

automates the generation of model input parameters using geospatial data.

Modeling specifications were created for survey data collection and for all types of model development, calibration, and verification. We completed hydrologic and hydraulic models of the entire District, including 14 SWMM models of subwatersheds, 1 Unsteady HEC-RAS model of Rice Creek, and flood frequency analyses of 18 lakes. The modeling strategy also included the methods and processes for organizing, maintaining, and distributing the basic information used by the models as well as the results. We are providing ongoing updates to the model to protect the District's investment in the project. ■

» Location

Blaine, Minnesota

» Client

Rice Creek Watershed District

» Contact

Phil Belfiori
Administrator
763.398.3071

» Client Benefits

- Protection of District's investment in modeling and surveying by standardizing model standards and documentation.
- Easy access to accurate flood elevations and floodplains across the entire District, using an interactive GIS map.

H&H Modeling



COMO PARK STORMWATER INVENTORY AND WATERSHED ASSESSMENT

Services

Stormwater Inventory, Water Quality Modeling

Background

To better improve and protect water resources throughout the District, the Capitol Region Watershed District (CRWD) retained HEI to perform a stormwater inventory and water quality assessment.

The Project

The project included two major goals: (1) perform a stormwater inventory to search, review, and summarize all available data, and (2) develop a water quality model to estimate pollution and water quality in an overall watershed assessment.

HEI assembled an inventory of storm sewer and stormwater best management practices (BMPs) in Como Park and its watershed.

Our team used P8 modeling to determine loadings and removals of pollutants to existing BMPs and the delivered load to Como Lake. CRWD will use this analysis to collaboratively develop a stormwater management plan with St. Paul Parks & Recreation. ■

» Location

Saint Paul, Minnesota

» Client

Capitol Region Watershed District

» Contact

Nate Zwonitzer
Water Resource Project Manager
651.644.8888

» Client Benefits

- Reviewed multiple data sources for a better understanding of existing data as well as gaps and issues.
- Study of how large urban watershed conveys stormwater runoff to Como Lake.

(B) FEASIBILITY STUDIES

A local water management agency sometimes receives a recommendation in a feasibility report that is neither practical nor constructible. Many times, even seemingly feasible projects fail because design and construction inspection duties are provided by an inexperienced engineer or technician. These potential pitfalls can be avoided by selecting a firm experienced in the construction of civil works projects.

We pride ourselves in knowing how to turn feasibility studies into constructed projects. This begins with asking the question “Can this be constructed?” during preparation of the feasibility report. Our entire construction engineering team is experienced through all stages of construction, from design and bidding to construction observation and contract administration. This experience and knowledge ensures a successful project for the local water management agency.

Project Examples – Feasibility Studies

Water Quality Study



THIEF RIVER FALLS WATER QUALITY STUDY

Services

Data Review, P8 Modeling, Targeted Location Recommendations

» Location

Thief River Falls, Minnesota

» Client

Pennington County SWCD

» Contact

Peter Nelson
Water Plan Coordinator
218.683.7075

Background

The Pennington County Soil and Water Soil Conservation District (SWCD) hired Houston Engineering, Inc. (HEI) to complete a water quality study of Thief River Falls.

This study identified potential locations for cost-effective water quality practices to reduce pollutants entering Thief River and Red Lake River.

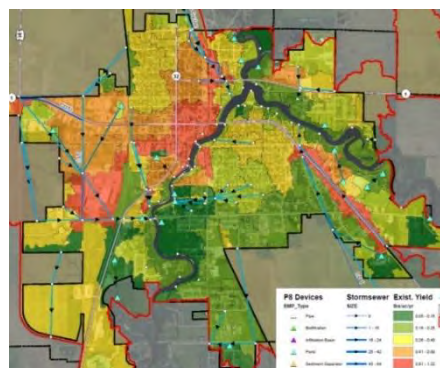
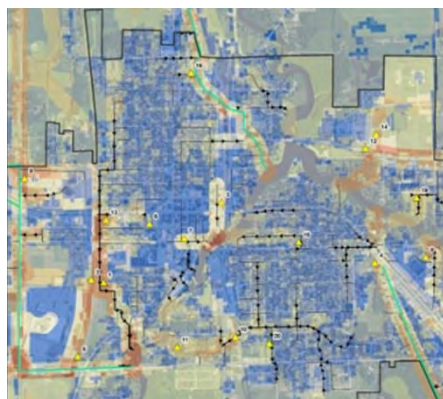
The Project

HEI prioritized three sites during the data gathering phase: Chief's Coulee, County Ditch 70, and storm sewer outflow in Tourist Park. These sites were part of a field assessment to document any evidence of potential sources of E. coli or inorganic nitrogen.

Once all data was gathered and reviewed, our team used the information to develop a P8 model to identify and quantify potential sources of water quality pollution.

The results from the P8 modeling were used to target locations for conservation practices and

stormwater best management practices (BMPs). HEI then ranked the BMPs by their effectiveness to help determine where projects should be constructed and so that their cost effectiveness could be maximized. ■



» Client Benefits

- Prioritized locations for cost-effective BMPs.
- Better positioning to secure Clean Water Fund dollars to implement practices.
- Measurable reduction in pollutants entering Thief River and Red Lake River.

BMP Feasibility and Design



COMO ZOO AND GOLF COURSE BMPs FINAL DESIGN

Services

Data Review, H&H Modeling, Stakeholder Input, Design Plans

Background

In 2016, the Capitol Region Watershed District (CRWD) and its many project partners hired Houston Engineering, Inc. (HEI) to complete a best management practice (BMP) feasibility study for six potential BMPs in Como Park.

The Project

Once the additional, necessary information was collected, HEI updated an existing hydrologic and hydraulic model to ensure the proposed BMPs would have no negative impacts to the existing pipe hydraulics in the complex hydraulics surrounding the BMPs.

These innovative BMPs are equipped with automated valves that will control water elevations in the ponds by lowering or raising storage based on water surface levels to promote water quality performance and flood mitigation. These valves can also be controlled remotely and include other smart features, such as weather forecasting.

The iron-enhanced sand filter benches will be retrofitted into existing ponds in a treatment train to ensure the highest possible water quality improvements. Design plans were completed at the end of 2018, and construction will take place in 2019. ■

» Location

Saint Paul, Minnesota

» Client

Capitol Region Watershed District

» Contact

Nate Zwonitzer
Water Resources Project Manager
651.644.8888

» Client Benefits

- Coordination and communication with a large stakeholder group.
- Stakeholder feedback is collected at several stopping points in the design process.
- Innovative IESF benches retrofitted into the existing ponds.

BMP Design & Construction



FRIDLEY MIDDLE SCHOOL BMP FEASIBILITY STUDY

Services

Assessment of BMP Effectiveness, Assistance with Grant Application, Design, and Construction Management

Background

The Fridley Middle School was chosen by the District as an ideal location to locate best management practices (BMPs) that could reduce nutrient loading to Moore Lake.

The Project

Houston Engineering, Inc. (HEI) helped determine BMP alternatives near the school and formulate a preliminary cost for each opportunity. HEI approached the project by assembling site drainage patterns and soil conditions around Fridley Middle School and determining the areas of concentrated nutrient loading. This information was used to identify potential BMP locations that would provide a high water quality

benefit. Rain gardens were recommended to provide water quality while giving the area an aesthetic enhancement and opportunity to provide an educational benefit.

After completing the feasibility study, HEI helped secure a grant from the Minnesota Pollution Control Agency's Clean Water Partnership program. HEI completed the design, construction plans, and specifications for the project. Construction management services during the bidding and construction phase of the project included staking and construction observation to ensure proper installation. ■

» Location

Fridley, Minnesota

» Client

Rice Creek Watershed District

» Contact

Phil Belfiori
Administrator
763.398.3070

» Client Benefits

- Concise technical memo described project background, BMP options, and costs.
- Artistic renderings helped stakeholders visualize the rain gardens.
- Design, construction management, staking, and observation services.

(C) DESIGN ASSISTANCE

Once the feasibility study has been completed, HEI can assist VLAWMO with design services. From conceptual to final construction plans, we can work with you for approvals every step of the way. Our team of skilled engineers will not only present designs that can be constructed and are sustainable; a major part of design is working to meet stakeholder goals and address multiple needs. HEI has completed many large-scale projects for Twin Cities metro clients, turning concepts into reality.

Project Examples – Design Assistance

BMP Feasibility



CURTISS POND FEASIBILITY STUDY, DESIGN, AND CONSTRUCTION MANAGEMENT

Services

Feasibility Analysis, Design, Construction Management

Background

Curtiss Field Park is a neighborhood park located in the City of Falcon Heights. Residents enjoy the park's baseball field, basketball courts, playground, walking trail, and park building. The park is also home to Curtiss Pond, a small stormwater pond that collects direct runoff from approximately 22 acres of residential neighborhood, commercial property, and portions of Snelling Avenue. The pond has a history of flooding, which limits the use of the park, damages park infrastructure, and presents a safety concern.

The Project

In 2013, Houston Engineering, Inc. (HEI) performed a feasibility analysis on behalf of the Capitol Region Watershed District to determine potential improvements to reduce the

risk of flooding. Based on the feasibility study, the District selected a preferred alternative, which included an underground infiltration system that contained 400 linear feet of 10-foot diameter perforated pipe. The system inlet structure was designed with an automated gate valve and control panel that receives weather data from the web and opens the valve to draw down Curtiss Pond prior to a predicted rainfall event.

In May 2013, our team designed the improvements and began construction management services including bid documents and specifications. Construction began in the summer of 2014 and was completed in fall of 2015. HEI provided construction observation services, including troubleshooting issues in the busy project area. ■

» Location

Falcon Heights, Minnesota

» Client

Capitol Region Watershed District

» Contact

Bob Fossum
Monitoring and Research Division Manager
651.644.8888

» Client Benefits

- Detailed analysis of alternatives provided to the District with associated costs to choose the best possible solution.
- Construction plans designed based on thorough analysis and consultation with the District and the City of Falcon Heights to determine the best solution.

BMP Design & Construction



Background

Ramsey County Ditch 2 conveys runoff from portions of Roseville, St. Anthony Village, and New Brighton through several small ponds and lakes before eventually discharging into Long Lake. Because the watershed's urbanization mostly occurred before modern stormwater management rules, the ditch is susceptible to flooding and exhibits poor water quality.

The District, in cooperation with the partnering cities, identified the opportunity to achieve both water quality and stormwater flow management as part of a common project through modifications to the pond and dam.

The Project

The Hansen Park project is a comprehensive water management project providing water quality, flood control, and recreational benefits. This design married together several innovative best management practices (BMPs) including:

- three-stage dam and outlet design
- targeted removal of sediments causing internal phosphorus loading
- unique iron-enhanced sand filter practice that will treat discharge water on a nearly 24/7 basis

The project provides an example to the public of water quality and flood projections showing progress to state water quality goals. ■

HANSEN PARK WATER QUALITY AND FLOOD CONTROL PROJECT

Services

Assessment of BMP Effectiveness, Assistance with Grant Application, Design, and Construction Management

» Location

New Brighton, Minnesota

» Client

Rice Creek Watershed District

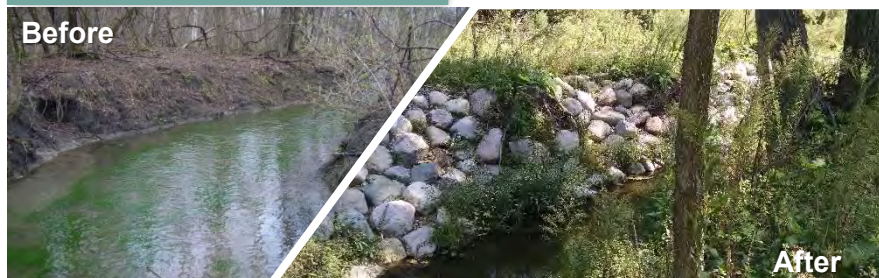
» Contact

Phil Belfiori
Administrator
763.398.3071

» Client Benefits

- A first-of-its-kind iron enhanced sand filter system enables continuous treatment of discharges under both high and low flows.

Erosion Control



Background

Portions of the Lower East Ravine, south of Highway 61 in Cottage Grove, MN, were severely eroding. Because of upstream development, erosion left unattended would only become worse. The South Washington Watershed District (SWWD) retained Houston Engineering, Inc. (HEI) to develop alternative concepts and designs to combat erosion in the ravine and restore the channel.

The Project

HEI prepared artistic renderings of alternatives to help stakeholders visualize the options.

Working with a variety of stakeholders, the final stabilization options were selected. Many of the criteria used to select the options centered around the park user experience.

The second feasibility study focused on the lower part of East Ravine, located entirely on 3M property. A shear stress analysis was also used on this reach in addition to a geomorphic assessment.

HEI and 3M constructed stabilization options to prevent erosion and meet on-site needs. HEI presented concept designs and helped navigate the permitting process. The project was constructed in 2016. ■

LOWER EAST RAVINE STABILIZATION

Services

Conceptual and Final Design, Artistic Renderings, Permitting, Construction Management

» Location

Cottage Grove, Minnesota

» Client

South Washington Watershed District

» Contact

Matt Moore
Administrator
651.714.3729

» Client Benefits

- Concept designs and renderings were created to help the SWWD and community visualize the restoration enhancements.
- Navigation of complex permitting.

(D) GRANT APPLICATIONS

HEI has provided assistance to many successful grant applicants. Whether helping to identify the outcomes, developing your project approach, estimating budgets, or identifying the necessary local resources, we are happy to provide information you need for your application.

Grants provide an excellent opportunity for you to:

- accelerate project implementation;
- fund construction of specific projects;
- work cooperatively with your partners; and
- develop and implement innovative projects.

HEI can help you develop competitive concepts and technical information for a solid application!

Project Examples – Grant Applications



(E) VLAWMO STORMWATER POLICY

Serving watershed management agencies is our passion. We work to understand the unique qualities of each watershed we serve as well as the priorities of the watershed management team, the staff, and their constituents. Your plan is the single most important guiding document for your local water management agency. All operations, projects, and services of your local water management agency are directed by the plan in some way, shape, or form. Your funding and needs are continually changing, so your plan must be treated as a living document to be updated and amended as new information and resources become available. **HEI is quickly becoming a thought leader in the new statewide watershed planning approach—One Watershed, One Plan (1W1P)—having led many projects and working on more 1W1Ps than any other firm in the state.**

The basis of watershed planning and stormwater policy is to create a clear vision for your watershed. Your vision should consider the unique characteristics of your watershed's physical, political, and social make-up and identify sustainable solutions to solve practical problems. Careful consideration of information from previous watershed projects and stakeholder interests are critical to our approach. The history of your watershed is important to us because it provides insight into the long-term results of prior management strategies and land use practices. For example, would it be most cost-effective to protect, rather than restore, a water resource to achieve your specific resource goal? We respect the experience, opinions, and wishes of your staff and constituents, and we listen carefully to the views of those who have a vested interest in the mission and future direction of your watershed.

Project Examples – VLAWMO Stormwater Policy

Watershed Planning



RICE CREEK WATERSHED MANAGEMENT PLAN UPDATE

Services

Capital Improvement Program, Annual Budgeting and Reporting, Watershed Planning, Goal Setting

Background

The Rice Creek Watershed District (RCWD) formed in 1972 and developed a Water Management Plan (WMP) in 1974, focused on flood control, drainage, water quality, erosion and sedimentation, land development, and preservation of open spaces for recreation and wildlife.

The Project

Houston Engineering, Inc. (HEI) has led the 10-year watershed management plan updates in 2007 and the current update that is underway.

Rather than taking a traditional approach to completing the plan updates focused on developing

background information with a less-than-user-friendly organizational format, HEI uses an approach heavily focused on implementation of specific projects, policies and programs, and water management goals for the District's water resources.

The District's plan creatively links District programs and planned projects to the specific financing mechanisms needed for implementation, including the use of water management districts.

The plan streamlines future project implementation by eliminating the need for amendments to trigger funding authorities. ■

» Location

Blaine, Minnesota

» Client

Rice Creek Watershed District

» Contact

Phil Belfiori
Administrator
763.398.3071

» Client Benefits

- Focus on implementation greatly improves ease of use and makes the plan a living, vital part of District operation.
- Framework provided by the plan assists cities with policies for rule compliance, saving valuable local resources.

Watershed Planning



Background

In 2013, the Minnesota Board of Water and Soil Resources (BWSR) charged local governments to develop a single plan to drive all planning, management, and project efforts. Unlike traditional efforts guided by multiple plans, One Watershed, One Plan (1W1P) encourages local partners to work together to develop a collaborative water management plan.

The Project

The team at Houston Engineering, Inc. (HEI) worked with partners in the Root River Watershed in southeastern Minnesota to help develop this groundbreaking project.

One of the most complicated factors of this project was the level of coordination and communication required between multiple parties.

To address this, HEI guided plan development with Root River partners through meetings with partners and the public, gathering watershed information and writing targeted implementation strategies.

The final plan has been approved by BWSR, making it one of the first 1W1P plans to be completed in the State of Minnesota. The final plan can be viewed here: http://fillmoreswcd.org/documents/RootRiver1W1P_Intractive-PDF-122816_reduced.pdf. ■

ROOT RIVER – ONE WATERSHED, ONE PLAN

Services

Watershed Planning, Facilitation

» Location

Southeastern, Minnesota

» Client

Winona County Soil and Water Conservation District

» Contact

Donna Rasmussen
Administrator
507.765.3878

» Client Benefits

- Assistance with new, uncharted pilot program.
- Meeting facilitation with stakeholders.
- Detailed plan writing and PTMApp analysis.
- One of the first two plans completed in Minnesota.

Watershed Planning



Background

Houston Engineering, Inc. (HEI) worked with partners in the North Fork Crow River Watershed to help develop this groundbreaking project.

The Project

One of the most complicated factors of this project was the level of coordination and communication required. To address this, HEI collaborated with the Crow River Organization of Water (CROW) to facilitate a series of stakeholder meetings with partners to develop the backbone of the plan, ensuring known issues and future goals were clearly defined.

HEI led partners through a series of productive discussions to gain consensus as a diverse group.

As the project progressed, HEI continued to gather watershed information, set measurable goals, and ultimately wrote a plan with targeted implementation strategies.

The team also used the Prioritize, Target, and Measure Application (PTMApp) to create output products to help partners target the best locations to place best management practices (BMPs) on the ground. ■

NORTH FORK CROW – ONE WATERSHED, ONE PLAN

Services

Watershed Planning

» Location

Wright County, Minnesota

» Client

Crow River Organization of Water

» Contact

Diane Sander
Watershed Coordinator
763.682.1933

» Client Benefits

- Assistance with new pilot program.
- Coordination with multiple stakeholders.
- Detailed plan writing services.
- Use of PTMApp to write a plan that is targeted and measurable for future projects.

(F) MEETINGS/PRESENTATIONS

Effective communication and facilitation is essential to develop a durable project that is both technically sound and supported by all stakeholders. HEI regularly guides technical discussions related to project components, facilitating meetings in a way that ensures productive discussions. Our facilitation leaders have the professional experience to understand both the technical details of a project as well as the social and political implications, allowing us to frame a successful discussion that addresses each of these mutually important factors.

Presenting project information in a meeting or more formalized presentation is one area where the WMO will always appreciate support. Confidently presenting technical results in an understandable way is a major benefit your engineering consultant can provide.

At HEI, the diverse range of topics we have presented on is only topped by the diverse audiences we present to. From leading public informational meetings to public hearings, we bring a bevy of local experience with communication recommendations and results. We know how to adjust language to the audience and have an in-house team of communications staff who can provide input on messaging, graphics, and presentation.

Project Examples – Meetings/Presentations

Communications



LAMBERT CREEK ENGINEERING

Services

Data Review, Field Survey, Modeling, Recommendations, Presentations

Background

As with many public drainage systems across Minnesota, Lambert Creek was constructed nearly a century ago. As an aging system in an urban environment, its capacity most likely has diminished while the flow and volume it is required to convey has increased due to drastic changes in land use.

The Project

In 2017, Houston Engineering, Inc. (HEI) began a project with Vadnais Lake Area Water Management Organization (VLAWMO) to explore the creek and the possibility for repairs to the system.

The results of this analysis will ultimately lead to the identification of

potential areas of maintenance needs and potential improvement practices.

Board Meeting

In August 2018, HEI presented findings to the VLAWMO Board of Managers. The presentation involved a clear overview of the issue with guidance for decision-making. Our team brought additional support from our in-house drainage law engineer.

City Council Meeting

In October 2018, HEI also presented project information at a local City Council meeting. Technical information was boiled down to a high level to fit the setting. ■

» Location

Vadnais Heights, Minnesota

» Client

Vadnais Lake Area Water Management Organization

» Contact

Brian Corcoran
Water Resource Technician
651.204.6075

» Client Benefits

- Technical recommendations provided in a clear manner with supporting graphics and data to provide stakeholders with a recommendation and next steps for action.



Update to the Minnesota Public Drainage Manual

- » **Location:** Statewide, Minnesota
- » **Client:** Minnesota Board of Water and Soil Resources
- » **Contact:** Tim Gillette, PE (651.297.8287)

The *Minnesota Public Drainage Manual* is an important resource used daily by many drainage practitioners across the state. The original manual was published in 1991 and needed an update. HEI worked to update the manual, which involved leading a series of stakeholder meetings. These served to inform the public of the update as well as obtain input on potential improvements to the manual. This helped ensure that the final revised document will better serve all of those who will use it daily to complete their jobs. The updated manual has recently been published as a web-based wiki site.

Check it out online at: drainage.pca.state.mn.us



One Watershed, One Plan Projects

- » **Location:** Statewide Minnesota
- » **Client:** Various clients, available on request
- » **Contact:** Various contacts, available on request

HEI has been leading several One Watershed, One Plan (1W1P) processes statewide, a new planning effort based on watershedwide implementation rather than traditional political boundaries. Plan development involved project partners from many jurisdictions, including counties, watershed districts, and soil and water conservation districts.

One of the most complicated factors is the level of coordination and communication required between multiple parties. To address this, HEI begins each planning process with a series of stakeholder meetings with partners to develop the backbone of the plan, ensuring known issues and future goals were clearly defined. HEI leads partners through a series of productive discussions to gain consensus with diverse groups. Meetings also help the team stay on target to meet milestone deadlines to reach Minnesota Board of Water and Soil Resources' ultimate timeline for completion

To produce a document that is durable for future implementation efforts, all participants needed to be involved. However, maintaining momentum toward decisions is key to meeting deadline requirements. HEI balances these two issues using a proven meeting framework. The **“debate and decide” method** ensures maximum group participation, consensus, and critical thinking to create the most robust plan. The approach also kept momentum going.

(G) STORMWATER MANAGEMENT REVIEW

Water resource permitting is a key element in the management activities of many local water management agencies. Rules, standards, and permitting can ensure that water resource issues resulting from construction and development are addressed before they become a problem. Standards can also serve as design criteria for capital improvement projects. Local water management agencies must make maintaining communication between the permit applicant and permit reviewer a priority. Diligence is required in rewriting poorly written or outdated rules and standards that lead to frustration among the regulated community.

You save time and energy, reduce frustration, and potentially save your constituents fiscal resources with our approach to permit and development review programs. Our approach is cooperative rather than confrontational. We work with permit applicants early in the permit process to clearly communicate the necessary steps to comply with the permit program and the methods to resolve any deficiencies in the submittal. Permit applicants are treated with fairness, consistency, and respect. Local water management agencies benefit from our assistance in the design or improvement of rules and development criteria, as well as suggestions provided to reduce your permitting workload. HEI has also introduced technology into watershed permit programs and workflows. This includes developing and implementing tools like a permit database and GIS map viewer application for district staff and consultants to access and manage their permit program data. Our unique GISViewer software combines web technologies with GIS to provide a complete solution for reviewing and managing permits.

Project Examples – Stormwater Management Review

Permit Review



WATERSHED DISTRICT PERMIT REVIEW

Services

Permit Review, Standards Development, Rule Interpretation and Implementation, Policy Guidance

Background

The Rice Creek Watershed District (RCWD) operates a permit program related to floodplain management, controlling the rate and volume of runoff associated with development and redevelopment, wetland impacts, and water quality.

The Project

Houston Engineering, Inc. (HEI) has administered this program in its role as District Engineer, working cooperatively with RCWD staff. Our approach has been to provide a measured level of guidance and technical support to permit applicants to minimize frustration. Activities completed include developing the technical aspects of rules, reviewing permit applications for

technical completeness, working with legal counsel to ensure compliance with the rules, preparing engineer reports to document conclusions, and assisting District staff with permit compliance following project construction.

Internal fiscal procedures implemented by HEI greatly assisted the District with managing permit-related costs.

Communication is also an important key to success with permit review. Our measured level of guidance and technical support minimizes applicant frustration. We also clearly document the permitting processes and procedures for use by others in the future. ■

» Location

Multiple cities within the District

» Client

Rice Creek Watershed District

» Contact

Phil Belfiori
Administrator
763.398.3071

» Client Benefits

- Receive expertise in hydrology, hydraulics, water quality, and watershed management in the permit review process.

Compliance Standards



Background

The South Washington Watershed District commissioned an update to their Watershed Management Plan. The updated plan set forth new standards which regulate development and redevelopment activities within the watershed. These standards provide the endpoints for managing runoff and protecting water resources.

However, a long-standing issue for the District has been a lack of consistency in modeling approaches and assumptions which affect how stormwater facilities are designed. The transition into new standards provided an excellent opportunity to resolve this issue.

The Project

HEI developed a standards manual and developers packet to assist developers with achieving compliance with the District's standards by creating a consistent analysis method.

Clear expectations are communicated to municipalities relative to stormwater design standards and criteria. Volume control and pollutant removal credits provide ease of comparison between BMPs and facilitate standards compliance. ■

STANDARDS MANUAL AND DEVELOPERS PACKET

Services

BMP Design Standards Manual, Pollutant and Volume Credits, Developer Submittal Requirements

» Location

Multiple cities within the District

» Client

South Washington Watershed District

» Contact

Matt Moore
Administrator
651.714.3729

» Client Benefits

- Reduced frustration within the development community by providing practical, implementable design standards.

Permit Review, Policy



Background

The South Washington Watershed District (SWWD) is in a rapidly expanding location. Portions within the cities of Woodbury and Cottage Grove are highly urbanized, while the southeastern portion remains relatively rural. One method used by the SWWD to manage and mitigate surface water and natural resources impacts in the District is to implement development standards and complete reviews to ensure compliance with the standards.

The Project

The South Washington Watershed District (SWWD) has periodically requested assistance from HEI for review of development standards for residential, commercial, and industrial

developments. Complete submittals are subsequently reviewed to ensure compliance with development standards and rules and policies of the SWWD.

The process includes reviewing construction plans, reviewing BMP design for standards compliance, ensuring hydrologic and hydraulic models reflect actual proposed site conditions and the results are defensible, verifying and checking calculations, and evaluating potential floodplain impacts.

One unique aspect is the constructive and engaging communication with applicants to ensure compliance. HEI works cooperatively with applicants to ensure a thorough understanding of the development issues and attain a long-term practical solution. ■

SOUTH WASHINGTON WATERSHED DISTRICT DEVELOPMENT REVIEW

Services

Permit Review, Rule Interpretation and Implementation, Policy Guidance

» Location

Multiple cities within the District

» Client

South Washington Watershed District

» Contact

Matt Moore
Administrator
651.714.3729

» Client Benefits

- Long-term solutions to potential increases in rate and volume of runoff achieved by actively engaging applicants.
- Thorough independent review verifies design of BMPs, particularly their longevity and sustainability.



RICE CREEK WATERSHED DISTRICT RULE REVISION

Services

Permit Review, Standards Development, Rule Interpretation and Implementation, Policy Guidance

Background

In 2013, the Rice Creek Watershed District implemented a new rule to address the development and implementation of new stormwater management rules by the Minnesota Pollution Control Agency.

The Project

Houston Engineering, Inc. (HEI) supported the District in the development of new rules by revising the existing rule based on implementation experience as the District Engineer, providing presentations to the Technical Advisory Committee and the regulated community, developing technical information to support decisions by the Board of Managers, and providing

guidance to the Board on staff relative to the implications of technical decisions.

An important component of the rule development process is developing credible engineering, technical, and scientific information for developing the specific standards forming the basis of the rule. These standards include the volume control, water quality treatment, peak runoff rate control, sediment and erosion control, and wetland replacement and mitigation. HEI developed four separate technical memoranda focused on key technical topics, which were subsequently used to establish standards within the new rule. ■

» Location

Multiple cities within the District

» Client

Rice Creek Watershed District

» Contact

Phil Belfiori
Administrator
763.398.3071

» Client Benefits

- Development of the legal framework for rule implementation facilitated by the availability of Technical Memoranda.

ADDITIONAL SERVICES

HEI has served 26 water management organizations and watershed districts and more than 30 counties throughout Minnesota, providing water management assistance in various forms.

We can continue to serve the VLAWMO with specialty services in addition to what was identified within your request.

Public Drainage Systems

Public drainage system management follows a consistent life cycle for virtually any activity related to a drainage system. Following the steps will foster good decision-making and decrease the likelihood of delays, cost overruns, and legal challenges.

HEI assists drainage authorities, landowners, and other stakeholders with all aspects of the public drainage system life cycle.



With more than 50 years of work, HEI understands the law and regulations that guide the process and actions that drainage authorities must follow to avoid risk and serve the benefitting landowners.

Our team is well versed in Minnesota Public Drainage law and recently authored the update of the *Minnesota Public Drainage Manual* with the Minnesota Board of Water and Soil Resources and Rinke Noonan Law Firm.

HEI has served the neighboring Rice Creek Watershed District for more than 10 years, managing dozens of ditch systems in urban-rural areas and finding creative solutions to complicated drainage challenges. Our first project with VLAWMO was related to Lambert Creek.

Lake Management

The VLAWMO manages several beautiful lakes, enjoyed by your community for recreation and natural function.

HEI has led several lake modeling projects to create management plans for Twin Cities lakes, specifically within the South Washington Watershed District.

We have also studied lakes for ecological restoration, bringing wild rice production back to Lake Ogechie in central Minnesota through adjustments to the lake levels at Buckmore Dam. We've produced similar ecological benefits on Lake Christina, after designing a comprehensive pump system to adjust lake levels for waterfowl habitat.



Geographic Information Systems (GIS) and Technology

With a unique team of in-house programmers, HEI can develop and implement custom technology needed to solve a variety of watershed issues. One example is a permit- and BMP-tracking web application we've developed for the Capitol Region Watershed District (CRWD).

The multi-phase process required the implementation of software that aggregated all the BMPs into one database as well as the management and tracking of many of the CRWD's programs.

We have also serviced local watershed partners with:

- interactive maps,
- customized Story Maps that can tell a project story through the context of geospatial information,
- drainage management software—DrainageDB—designed to house and organize relevant ditch records, and

- MS4 permit management software, uniquely designed for cities and partners to organize their permit-related information.

Whatever your technology need, our talented team can help you assess your options and develop web or mobile application technology.



HEI'S STORMWATER BMP DATABASE HELPS THE CRWD ORGANIZE IMPORTANT DATA

Survey

HEI has a full-service survey crew operating daily from our Twin Cities office. Using the latest technology and techniques, we can responsively help you obtain data needed for project development. Winter or summer, our team is at your service!

In addition to traditional field surveys, our team also uses tools such as aerial drones and RCV boats to capture field data in increasingly safe and effective ways.



HEI'S SURVEY CREW ASSESSING A PORTION OF LAMBERT CREEK WITHIN THE VLAWMO

What sets HEI apart from the rest?

- We strive to maximize the return on your investment and ensure that it is protected.
- HEI has built a reputation around designing and building high quality BMPs and restoration projects.
- We are vigilant about identifying and recommending ways to increase efficiency and provide value.
- HEI has an open book policy for all activities related to our consulting role.
- We stand accountable for our actions.

REFERENCES

HEI has served many metro water management organizations and watershed districts with similar needs. We urge you to reach out to our references to hear more about their experience with our team.

Phil Belfiori, Administrator

Rice Creek Watershed District

4325 Pheasant Ridge Drive, Suite 611

Blaine, MN 55449

763.398.3071 | pbelfiori@ricecreek.org

Reference Projects:

- HEI has served as District Engineer since 2008, providing a variety of services including modeling, stormwater compliance, permit review, technology support, project development, survey, public drainage system management, watershed planning, and much more.



Stephanie Johnson, PE, PhD, Programs Principal

Mississippi Watershed Management Organization

2522 Marshall Street Northeast

Minneapolis, MN 55418

612.465.8780 | sjohnson@mwmoo.org

Reference Projects:

- HEI has served the MWMO on large-scale modeling projects designed to provide planning and implementation support for flood prevention. We have also provided technology to support the MWMO's story sharing with the public.



Matt Moore, Administrator

South Washington Watershed District

2302 Tower Drive

Woodbury, MN 55125

651.714.3729 | mmoore@ci.woodbury.mn.us

Reference Projects:

- HEI has worked with the District on a variety of management projects including lake management plans, erosion stabilizations, environmental reviews, and ecological restorations.



Mark Doneux, Administrator

Capitol Region Watershed District

595 Aldine Street

Saint Paul, MN 55104

651.644.8888 | mark@capitolregionwd.org

Reference Projects:

- HEI has supported the District with a variety of innovative stormwater projects and custom technology solutions, such as a BMP database.



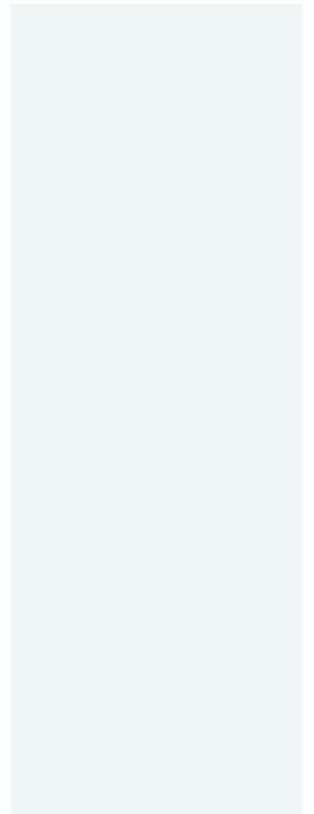
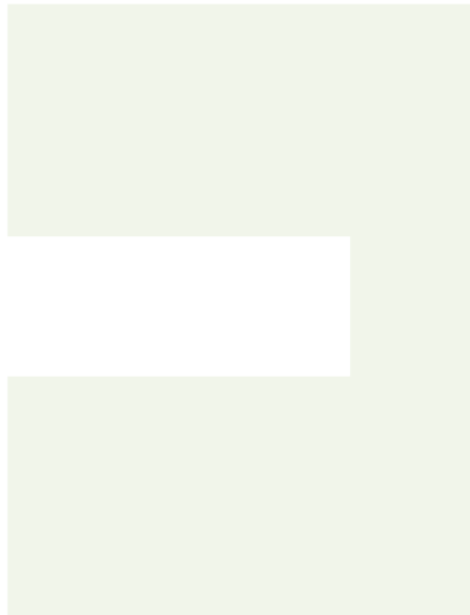
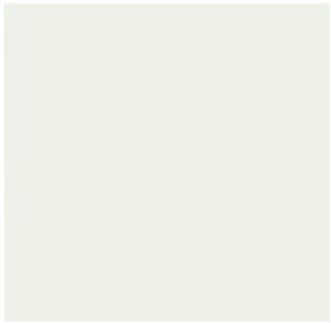
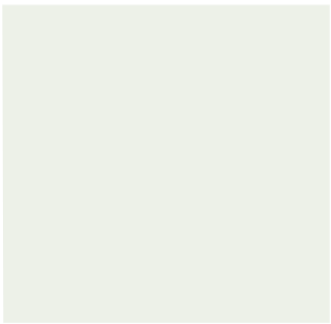
2019 FEE SCHEDULE

The following is a schedule of hourly rates and charges for engineering and surveying services offered by Houston Engineering, Inc. These rates are subject to a modest increase on January 1st of each year (typically no more than 5%).

Category	2019 Rates
Engineer I	\$121
Engineer II	134
Engineer III	151
Project Engineer	168
Project Manager	184
Sr Project Manager	202
Scientist I	\$121
Scientist II	134
Scientist III	152
Project Mgr – Environmental	178
Sr Project Mgr – Environmental	202
Hydrogeologist I	\$121
Hydrogeologist II	134
Hydrogeologist III	152
Sr Hydrogeologist	190
Construction Engineer	\$139
Sr Construction Engineer	165
Land Surveyor I	\$121
Land Surveyor II	139
Land Surveyor III	153
Project Mgr – Land Surveying	165
Sr Project Manager – Land Surveying	184
Survey Crews:	
1-Person Crew (+ equipment)	\$147
2-Person Crew (+ equipment)	178
3-Person Crew (+ equipment)	222
4-Person Crew (+ equipment)	248
Landscape Architect	\$129
CAD Technician I	\$82
CAD Technician II	95
CAD Supervisor	108
Designer I	\$127
Designer II	136
Sr Designer	146
Engineering Specialist	155
Technician Intern (all areas)	\$82
Technician I	\$95
Technician II	108
Sr Technician	121

Category	2019 Rates
Right-of-Way Technician	\$110
Right-of-Way Specialist	184
GIS Analyst I	\$90
GIS Analyst II	105
GIS Analyst III	121
Sr GIS Analyst	139
Project Manager – GIS	152
Sr Project Manager – GIS	178
Software Engineer I	\$105
Software Engineer II	121
Software Engineer III	139
Sr Software Engineer	152
Computer Technician	\$146
Communications Specialist	\$82
Sr Communications Specialist	90
Administrative Assistant	\$77
Sr Administrative Assistant	82
Planner	\$133
Senior Planner	184
Legislative/Grant Specialist	\$171
Expert Witness	222
Drone Pilot	\$129
Drone Visual Observer	49

Chargeable Expenses	Rate
Subsistence	Actual Cost
Mileage-Vehicles:	
2-Wheel Drive	IRS Standard Rate
4-Wheel Drive	IRS Standard Rate + \$0.20/Mile
GPS Equipment	\$25/hour/unit
Robotic Total Station	\$40/hour
ATV/Snowmobile/Boat	\$15/hour
ATV with Tracks	\$30/hour
Hydrone RCV	\$50/hour
Small UAS	\$25/hour
Delivery, Postage, Printing	Actual Cost
Surveying Materials, Special Equipment, and other Materials required	Actual Cost
Subconsultants	Actual Cost + 10%



Houston Engineering, Inc. • 7550 Meridian Circle North, Suite 120 • Maple Grove, MN 55369 • 763.493.4522



800 County Road E E, Vadnais Heights, MN 55127
www.vlawmo.org; Office@vlawmo.org

To: Board of Directors

From: Dawn Tanner

Date: February 20, 2019

Re: V.C. Lambert Lake

We are considering Lambert Lake for 319 MPCA funds, partnering with Joe Magner from the University of Minnesota. The draft proposal and budget is included in the packet. Dawn will present a short PPT with the details of the project and rationale behind options being considered. A brief overview is that:

- VLAWMO needs to do maintenance at the site to repair or replace failing fiberglass sheet pile and dredge the pond
- We have an approved TMDL in place and a responsibility to be improving the creek system (i.e., reduce bacteria to the point that it is no longer impaired)
- Research just completed in the subwatershed allows us to identify source and concentration of bacteria deposited into the creek
- We are working with UMN to build designs to improve the system (add a meander) and remove bacteria (place a network of biochar treatment cells in the newly created meander)

Recommendation: We request support from the Board to go forward with the 319 application to do required and necessary maintenance and build new innovative BMPs.

Project title: VLAWMO Bacteria, Sediment, & Nutrient Reduction Project

1. Project summary:

Organization: Vadnais Lake Area Watershed Management Organization (VLAWMO)

Contractor contact name: Dawn Tanner

Title: Program Development Coordinator

Address: 800 East County Road E

Vadnais Heights, MN 55127

Phone: 651-204-6074

Fax: 651-204-6173

Email: dawn.tanner@vlawmo.org

Proposed Subcontractor(s)/Partner(s)

Partner Organization: University of Minnesota

Project Partner: Joe Magner, Research Professor, Dept of Bioproducts & Biosystems Engineering (UM-BBE)

Address: 1390 Eckles Ave.

St. Paul, MN 55108

Phone: 612-626-0875

Fax:

Email: jmagner@umn.edu

Partner Organization: City of Vadnais Heights

Project Partner: Jesse Farrell

Address: 800 East County Road E

Vadnais Heights, MN 55127

Phone: 651-204-6050

Fax:

Email: jesse.farrell@cityvadnaisheights.com

Frattalone Companies (Note: Frattalone has experience working on the Lambert Lake site. They have provided a tentative budget proposal, but we cannot go out for bid until funding is in place. Frattalone Co Inc. is a tentative subcontractor for the project. They plan to submit a formal bid when an RFP is announced.)

Subcontractor:

Project Partner: Cory Van Engen

Address: 3205 Spruce St, St Paul, MN 55117

Phone: 651-484-0448

Fax: 651-484-7839

Email: coryv@frattaloneco.com

LimnoTech (Note: LimnoTech has conducted a site visit. They have experience working on similar projects nationwide and would provide knowledge and expertise to the project, but we cannot go out for bid until funding is in place. LimnoTech is a tentative subcontractor for the project. They plan to submit a formal bid when an RFP is announced.)

Subcontractor:

Project Partner: Dendy Lofton

Address: 7300 Hudson Blvd N, Oakdale, MN 55128

Phone: 651-330-6038
Email: dlofton@limno.com

Subcontractor: Midwest Floating Island
Project Partner: Arlys Freeman
Address: 800 N Hampden Ave, St Paul, MN 55114
Phone: 651-645-5721
Email: afreeman@midwestfloatingisland.com

Project information

Latitude/Longitude: Ground Coordinates X: 495029.9485176 Y: 4989777.6082607
County: Ramsey
Total project cost: \$892,126.25 total grant funds: \$302,679.00 total match funds: \$201,447.25
Total loan funds: \$388,000

*Full time equivalents:

Project location:

a) Basin (check all that apply):

- Lake Superior Lower Mississippi/Cedar Upper Mississippi Minnesota Rainy
 Red River Des Moines Missouri St. Croix

b) Watershed name: Vадnais Lake Area HUC8: 07010206

c) Waterbody names and Assessment Unit Identification numbers (AUIDs): Unnamed Creek (Lambert Creek), AUID: 07010206-801

d) Listed 303(d) impairment including parameters, e.g., phosphorus, total suspended solids, etc., other documented water quality problem, or other (explain): Fecal Coliform, also flows into East Vадnais which is impaired for mercury

e) Reports addressing water bodies of concern (must have an EPA-approved TMDL by February 26, 2018): VLAWMO TMDL and Protection Study (August 2013), Prepared by Wenck Associated, Inc., File #2255-08

f) Is there an EPA-approved Nine Element Plan approved for this watershed? (30 points) No

Organization type: Local/Regional government (county, SWCD, WD, etc.)
 State government
 Joint powers organization of local government

Interested in this proposal being scored for 0% Interest Clean Water Partnership Loan funds (no obligation)?

Yes No

2. Statement of problems, opportunities, and existing conditions

Project background (15 points)

The Vадnais Lake Area Watershed has a high proportion of impervious surface including residential (40%), and industrial, commercial, major highway (10%). There is also a high proportion of open water including lakes, wetlands, and streams (30%). Surface water in the watershed is of high importance because of the role in providing drinking water to the metro area. The Charley-Pleasant-Sucker-East Vадnais chain of lakes for St Paul Regional Water Service (SPRWS) provides drinking water for 446,000 residents of St. Paul and surrounding suburbs. Lambert Creek is a priority in the watershed for a number of reasons. Lambert Creek is impaired for bacteria. Lambert Creek flows into East Vадnais Lake, which is the main reservoir for SPRWS before water enters the McCarrons Water Treatment Plant. Lambert Creek is connected to other impaired waterbodies including Goose Lake. Goose Lake is the headwaters of the creek, impaired for nutrients, and a major focus of ongoing VLAWMO efforts. The Lambert Creek and Goose Lake Subwatersheds receive stormwater runoff from ~1/5 (4.6 acres) of the Vадnais Lake Area Watershed. Lambert Creek is also in need of improvement due to BMPs that were implemented and innovative ~15 years ago but are now in need of updating and improvement. Specifically, Lambert Lake was built to allow sediment collection; that has been successful, but a reconstruction project by MNDOT in 2016 on 35E sent a far larger sediment load than planned into the system. It is now filled in to about 80% of capacity. A fiberglass sheet pile weir was

put in place on the north end of Lambert Lake in 2004. That fiberglass sheet pile is now at the end of its lifespan and bowing into the lake. It is in urgent need of replacement. VLAWMO is seeking loan funds to repair and restore failing infrastructure at Lambert Lake.

When Lambert Lake was built, it was designed to facilitate sheet flow across the wetland. Dense stands of native Phragmites and cattails short-circuit the flow so that it moves rapidly through a channel instead of the targeted sheet flow. Increased storm frequency and intensity consistent with climate change are causing flooding problems. There is a need to increase storage to buffer against storm events, slow water moving through the system, remove bacteria, and increase resilience.

Lambert Creek and Lambert Lake are in the same HUC 12 subwatershed (#070102060802) (See attached Map #1). The mainstem of Lambert Creek flows through a series of four wetland basins (Sobota Slough, Rice Lake, Grass Lake, Lambert Lake). These wetlands represent former lake basins that were ditched and drained around the turn of the century. Present-day hydraulic properties of the basins include fluctuating water levels, short residence times, and channelized flow (Engstrom 1991). Proposed BMPs for this proposal are located on Lambert Lake, which Lambert Creek flows through, and located directly on the impaired waterbody. BMPs proposed for this project with a combination of loan and grant funds include dredging and removal of accumulated sediment in Lambert Lake, reinforcing failing fiberglass sheet pile with steel sheet pile, a meandering channel to increase water storage and improve ecosystem function, and adding biochar cells into the meandered channel to remove bacteria.

The water quality concern to be addressed with proposed BMPs is high bacteria counts. Monthly geometric means of *E. coli* exceeds the State standard (126 cfu/100mL) for most months. The acute standard of greater than 10% of measured values at or above 1,260 cfu/100 mL during the month is also exceeded during most months (Wenck Associates, Inc. 2013). Data were collected from 2006-2010 for TMDL development. Those trends have continued in the years following, and bacteria data collection along Lambert Creek is part of VLAWMO's ongoing monitoring program. Following approval of the TMDL, sources and timing of high levels of bacteria in the creek were the focus of a 4-year research project completed in 2018. The research divided timing into 2 periods, first looking at bacteria levels during dry periods for 2 years and the second looking at bacteria levels following storm events for 2 years. Results of that research showed that nonpoint delivery of bacteria to the creek occurs following storm events. Molecular testing was used to determine the sources of *E. coli*. Sources were found to be mostly avian with some canine. *E. coli* appear to be collected throughout the subwatershed, possibly including regrowth of *E. coli* as it reproduces in the environment. Bacteria are flushed into the creek in stormwater runoff. Lambert Lake is an appropriate location for proposed BMPs as the last receiving wetland in the chain before Lambert Creek flows into East Vadnais Lake.

Target goals or reductions needed to meet water quality standards for the water body will require a 55% reduction, which includes a margin of safety. The geometric mean of all data collected within the impaired reach for all months is 260 MPN/100mL (Wenck Associates, Inc. 2013).

Project impact (25 points)

The purpose of this project is to repair and enhance failing infrastructure and implement new BMPs to remove bacteria, increase storage, provide resilience, and improve ecosystem function on Lambert Creek, which is an impaired stream that flows into East Vadnais Lake, a major reservoir for St. Paul's drinking water supply. This project will remove bacteria, nutrients, and possibly heavy metals from the system. It will also allow sediment deposition, slow the rate of water moving through Lambert Creek, and improve wetland function for filtering and storing water, reducing flooding issues in the subwatershed.

[Explain results of Measurable Outcomes section] See #4 below

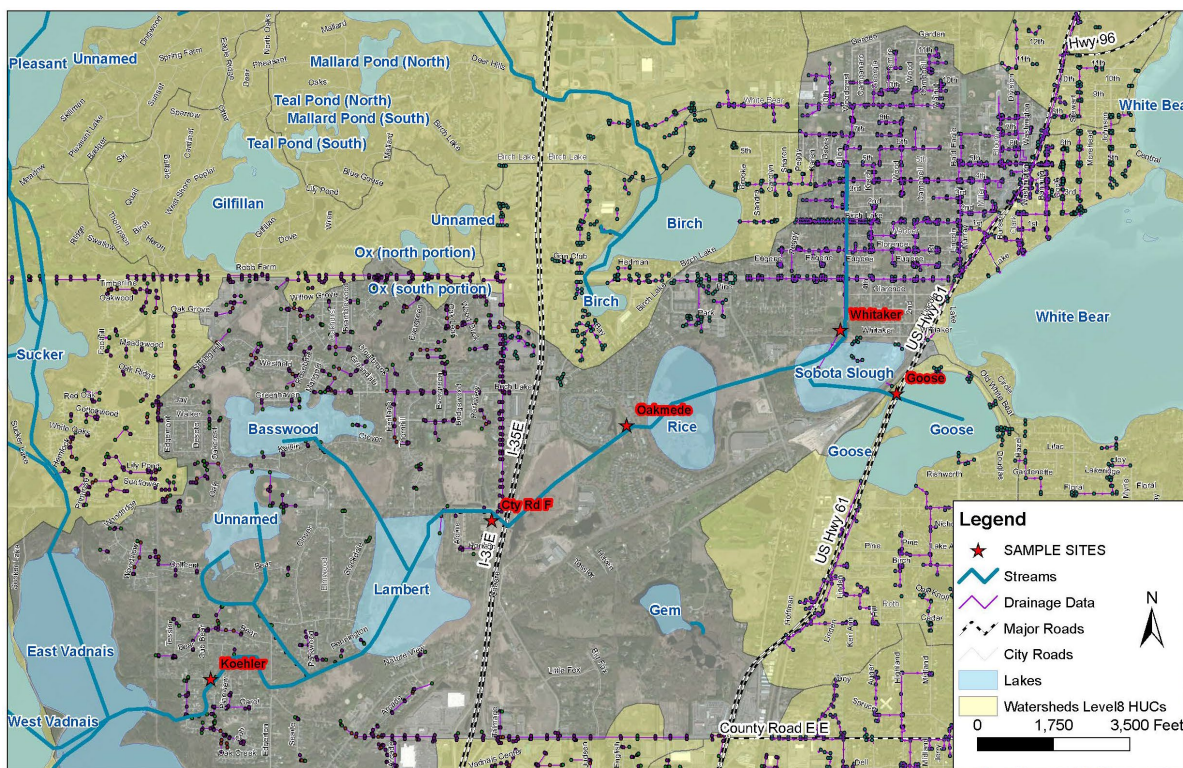
Information has been gathered on Lambert Creek beginning in the early 1980s. In 1991, Lambert Creek was the focus of an analysis of sediment stratigraphy, phosphorus cycling, sediment phosphorus, and phosphorus content of interstitial waters (Engstrom 1991). This work was conducted to better understand the consequences of decades of dumping of sewage sludge into Lambert Creek. The sewage sludge was deposited into Sobota Slough and Goose Lake. The waste traveled down the creek, collecting in wetland sediments. Additionally, the high bounce in the system is a result of extensive ditching that channelized flow and reduced residence times reducing the possible function of the wetland network in filtering out pollutants. These wetlands are sustained by diffuse nonpoint sources and exceed what could be retained by internal nutrient cycling. As part of this proposal, we are seeking to reverse detrimental modifications that were done in past decades to restore wetland function and improve water quality.

Bacteria loading to Lambert Creek is predominately from nonpoint urban stormwater with a small contribution to the load from wildlife and canine pet waste within the watershed. As part of the TMDL for Lambert Creek, recommendation for priority load reduction strategies included streambank restoration, infiltration basins, and researching the source of bacteria. The 107 BMP cost shares that have been added in the subwatershed since 2007 were prioritized to help meet the goals of reducing nonpoint stormwater delivery into the creek (See map of cost shares and capital improvement projects, Map #2). Implemented cost shares with local citizen involvement include pervious pavement, infiltration basins, and stream stabilization at Oakmede, Lower Lambert, and Koehlar.

The most critical pollution sources come from stormwater from MS4s: Gem Lake City, MN DOT, Ramsey County, Vadnais Heights City, White Bear Lake City, and White Bear Township. These MS4s have been involved in building additional stormwater BMPs into their city designs and planning process. MN DOT reworked a major roadway in the Vadnais Lake Area Watershed to allow pretreatment of stormwater. Their efforts with VLAWMO resulted in delisting Gem Lake in 2018. Gem Lake is just south of Lambert Creek. The City of White Bear Lake is working diligently to enforce upgrades of BMPs citywide.

Specifically, White Bear Lake is permitting and requiring a large landowner (car dealership) that has previously sent untreated stormwater from their large network of parking lots untreated into Goose Lake to fund a professional shoreline restoration, remove deltas built up in the lake from their snowplowing practices, and add sand-iron filters on-site. These additions will improve water quality in Goose Lake. Goose Lake outlets directly into Lambert Creek.

Extensive monitoring has been the focus of VLAWMO's efforts following establishment of the TMDL to build provide the research need regarding understanding source and concentration of bacteria loading. From 2008-2014, 5 locations on Lambert Creek were sampling twice per month from May through September. Samples were collected for nutrients and bacteria. From 2014-2018, continuous sampling was done in 4 subwatersheds upstream from Lambert Lake during wet and dry periods to identify bacterial sources. Bacterial sources were found to be primarily avian and are collected with stormwater runoff from streets, gutters throughout the subwatershed. Variation was found among samples but results among sites were not significantly different. Bacteria is collected fairly uniformly in stormwater across the subwatershed (Burns & McDonnell 2014; final results and report pending).



This figure shows monitoring sites for bacteria study conducted by Burns & McDonnell and VLAWMO.

The Whitaker Treatment Wetlands is a large research project that was completed in 2018 with support from LCCMR. The Whitaker Treatment Wetlands is a sub-surface treatment wetland project adjacent to Whitaker Pond in White Bear Township at the headwaters of Lambert Creek. Whitaker Pond captures drainage from a 640-acre area to the northeast in White Bear Township and White Bear Lake. The wetland cells receive stormwater in 3, 10x40-foot experimental cells. Each cell contains a different media to test their effectiveness at removing bacteria and nutrients. Results are being collected by researchers at the University of Minnesota and will be shared semi-annually with VLAWMO.

The suite of BMPs implemented so far have helped reduce untreated stormwater delivered to the creek. Research has been conducted to better understand nonpoint sources of bacteria in the subwatershed. Adding BMPs to Lambert Lake including adding a meander to the stream and installing biochar cells will remove bacteria, reduce nutrients and slow water to allow sediment deposition, improving storage and resilience. The repair and enhancement of existing BMPs is required to maintain the system, prevent a system failure, and support function of the new, proposed BMPs.

Organization (10 points)

Dr. Dawn Tanner, Program Development Coordinator at VLAWMO, will serve as Project Manager for this project. Dr. Tanner has worked at VLAWMO since October 2018. Prior to that, Dr. Tanner conducted research, managed grants, and taught at the University of Minnesota for 8 years. She earned her MS and PhD at UMN where she conducted research in the Galapagos Islands, Ecuador; Borneo, Malaysia; and taught field techniques and water-quality, among others. While at VLAWMO, Dr. Tanner has taken over grant management for Watershed-based Funding Grants (BWSR) and reporting in eLink, planned and facilitated stakeholder meetings, written articles to promote watershed activities, conducted wildlife monitoring in the

watershed, acquired MN DNR permits, built plans for aquatic vegetation management, become certified in pesticide application for treatment of invasive species, written and revised Sustainable Lake Management Plans (SLMPs), and written and is coordinating habitat-restoration proposals. She is working closely with Dr. Magner to build and implement plans for Lambert Creek.

Dr. Joe Magner, University of MN, Dept of Bioproducts & Biosystems Engineering (UM-BBE) Research Professor, has over 40 years of experience working with non-point source pollution across varying scales. He was involved in program development of clean water partnership in 1986 up to his most recent work, the development of WRAPS before retirement from the MPCA in 2013. As a research scientist with the MPCA, Dr. Magner in cooperation with other staff developed protocols for assessing lacustrine systems. Dr. Magner published several papers evaluating the performance of wetland biogeochemical exchanges within a watershed context. Dr. Magner has been involved with 4 successfully completed 319 projects.

Stephanie McNamara, Administrator at VLAWMO, has 29 years of experience with VLAWMO. She oversees all VLAWMO activities and focuses her efforts on building partnerships for project implementation, managing grants and budgets, implementing projects that demonstrate improved water quality, including delisting Gem Lake, which was on the Impaired Waters list for nutrients. She has partnered with engineering firms and the University of Minnesota to research innovative BMP installation and supervise monitoring efforts to demonstrate water-quality results in the Vadnais Lake Area Watershed.

Brian Corcoran, Water Resources Manager, has 11 years of experience with VLAWMO. He conducts and supervises monitoring activities in the Vadnais Lake Area Watershed. He administers the Wetland Conservation Act (WCA) and works with developers to build new projects in ways that improve water quality whenever possible and protect existing wetlands and water quality.

Tyler Thompson, GIS Watershed Technician, has 4 years of experience with VLAWMO. He manages grant-reporting activities and focuses on GIS and data management. He interfaces with engineering firms, City representatives, and planning entities to provide engineering designs and land cover information for modeling and project development. He supervises the cost share program and works closely with landowners to help them implement funded projects to reduce nutrients delivered to VLAWMO waterbodies.

Nick Voss, Education & Outreach Coordinator, has 3 years of experience with VLAWMO. He conducts education and outreach activities, builds annual reports, maintains social media, and actively works with media and local organizations to build new programs and expand understanding of and public exposure to water quality projects.

Landowner readiness/willingness (15 points)

VLAWMO has been working with landowners in the Lambert Creek area for many years. As part of the TMDL, a Citizen Advisory Committee was involved in the development process. Stakeholder meetings are ongoing in the watershed, especially focused around Goose Lake, which is the headwaters of Lambert Creek.

The most recent stakeholder meeting was held in January 2019, where ~40 residents, business owners, agency representatives, VLAWMO staff, and an engineering representative discussed upcoming projects. The group focused on improvement of the headwaters and individual opportunities to reduce nonpoint nutrient loads into Goose Lake and Lambert Creek. Following that meeting, residents are organizing and proposing native planting projects including shoreline stabilization in large areas around Goose Lake. These new efforts add to a long history of cost share projects in the subwatersheds of Goose Lake and Lambert Creek. Citizen groups and individual stakeholders have worked closely with VLAWMO to put in a network of 104 cost share projects since 2007 to reduce nutrients in the Goose Lake and Lambert Creek subwatersheds.

A metro-wide adopt-a-drain effort is rolling out in 2019, led by Hamline University Center for Global Environmental Education and the Watershed Partners. VLAWMO is utilizing this tool to support an adopt-a-drain volunteer pilot program in the Goose Lake subwatershed. VLAWMO is partnering with the City of White Bear Lake to promote and implement this effort. We selected Goose Lake because of the impaired status of both waterbodies and to strive for nonpoint nutrient runoff improvement. Group stormdrain clean-ups and other watershed education activities with public exposure are planned for summer 2019 with partner organizations, including a coalition of local churches and the Frassanti Academy. The City of White Bear Lake is also leading enforcement to implement a number of BMPs focused around a large car dealership that is a point source for untreated stormwater runoff (e.g., a sand-iron filter, shoreline restoration, and removal of deltas formed as a result of improper snow removal).

Stakeholder efforts specific to Lambert Lake and Lambert Creek include a review (completed in fall 2018) requested by local landowners to evaluate the potential for increased dredging in Lambert Creek to reduce flooding on their properties. VLAWMO workshops are offered each Spring to educate and advocate for native plantings and other turf alternatives as strategies for living close to the Lambert Creek and its floodplain. These workshops will continue in May 2019.

Engineering modeling showed that the dredging proposed would lower the high-water level only slightly, at great cost, and only shorten the timeframe when portions of yards were flooded. That dredging proposal was not pursued. However, landowners in this area request additional storage to build resilience in the system.

Stakeholder involvement also includes financial investment to ensure continued access to Lambert Lake. In 2004, VLAWMO acquired drainage easements on the 5 parcels immediately adjacent to Lambert Lake at a cost of \$135,300 (See Map #3). This ensures access for construction and maintenance efforts for VLAWMO. The main access road is on an individual

stakeholder's property. VLAWMO communicates regularly to share information, notify about visits, and maintain open communication. The largest parcel affected by the construction proposed for this project is owned by the City of Vadnais Heights. VLAWMO is communicating and collaborating with Vadnais Heights City Engineers and Permitting and has support from the City.

3. Goals, objectives, tasks, and subtasks (5 points)

Goal: Install suite of BMPs to address bacteria impairment, provide increased stormwater storage, and capture sediment in the Lambert Lake area of Lambert Creek

Objective 1: Repair and enhancement Lambert Lake

Task A: Excavation and replacement of fiberglass sheet pile

Responsible Party: Excavation company for Task A; VLAWMO for Task B

Objective 1 Timeline: January-March 2020 (Start date is weather dependent. Work can begin when the peat is frozen.)

Objective 1 Cost: \$388,000 in loan funds

Objective 1 Deliverables: Repaired pond and system ready for addition of meandering channel

Objective 2: Design new meandering channel through Lambert Lake

Task A: Assess the nature and depth of peat/sand and the groundwater flux

Task B: Based on substrate condition design a meandering channel to optimize water storage and contact time with Biochar Cells.

Responsible Party: UMN working with Engineering firm

Objective 1 Timeline: January-March 2020

Objective 1 Cost: \$34,000 grant, \$33,772 match

Objective 1 Deliverables: Plans and Specs to sent to earth moving contractor

Objective 3: Build meandering channel through Lambert Lake

Task A: Dredge pond

Task B: Test sediment for proper removal

Task C: Offsite removal of sediment (if needed)

Task D: Construct meandering channel

Task E: Test sediment for proper removal

Task F: Offsite removal of sediment (if needed)

Responsible Party: Engineering firm working with Excavation company

Objective 3 Timeline: January-March 2020 (Start date is weather dependent. Work can begin when the peat is frozen.)

Objective 3 Cost: \$190,670 grant, \$104,000 match

Objective 3 Deliverables: As-builts for meander construction

Objective 4: Design and install Biochar Treatment Cells

Task A: Lab test Biochar Cell performance using UMN flume

Task B: Work with vendor to design and create Lambert Lake Biochar cells

Task C: Design placement of Biochar Cells in selected locations of the meandering channel

Task D: Install Biochar Cells

Responsible Party: UMN working with Midwest Floating Island and Engineering Firm

Objective 4 Timeline: January-December 2020

Objective 4 Cost: \$18,009 grant, \$ 10,000 match

Objective 4 Deliverables: A final product with documentation of lab performance and plans showing the location and placement of Biochar Cells

Objective 5: Design and implement performance evaluation of BMPs

Task A: Design sensors and sampling protocol

Task B: Install sensors and sampling access ports

Responsible Party: Engineering Firm working with UMN (Marchetto and Magner)

Objective 5 Timeline: January-December 2021

Objective 5 Cost: \$25,000 grant, \$10,000 match

Objective 5 Deliverables: Constructed sensors and sampling ports placed into the system.

Objective 6: Monitor BMP performance

Task A: Collect data

Task B: Analyze data

Task C: Write a report illustrating BMP performance

Task D: Enter data into databases (EQuIS, eLINK)

Responsible Party: VLAWMO working with UMN (Magner and Graduate Student)

Objective 6 Timeline: January-December 2022

Objective 6 Cost: \$35,000 grant, \$27,080 match

Objective 6 Deliverables: Report of BMP performance, summary of projects completed, and pollutant reductions as part of semi-annual and final reports.

Objective 7: Grant administration, monitoring and community engagement

Task A: Communicate results and deliver site-specific programming

Task B: Finalize reporting and grant administration

Responsible Party: VLAWMO

Objective 7 Timeline: January-September 2022

Objective 7 Cost: \$12,448 match

Objective 7 Deliverables: Education and Outreach programming delivered and published on VLAWMO website

4. Measurable outcomes (15 points)

List the specific measurable outcomes on the targeted waterbody(s) this project would achieve and project deliverables for the approved TMDL. Examples include number and brief description of BMPs to be completed, estimated pollution reductions, cost per pound of pollution reduction. Use requested grant funds for this calculation, not total project costs. Ranges of reduction and cost are acceptable. Note: these approved models may be helpful to estimate load reductions, STEP-L, BWSR eLINK.

Please fill out table for **each water body** (the table can be cut and pasted for multiple water bodies):

Lake ID or stream AUID					
Phosphorus		lbs/yr		\$/lb	%
Sediment		tons/yr		\$/ton	%
Nitrogen		lbs/yr		\$/lb	%
Other (list): _____				\$/	%
				\$/	%

Explain the impact this project would have on the reduction goals for the watershed (e.g., the 300 lb/yr phosphorous reduction is 25% of the needed 1,200 lb/yr reduction of phosphorous in watershed A):

I think we can say we will develop load duration curves that will set bacteria load reductions for high, moderate, medium, low and baseflows. We don't need to have this nailed down in the application – this can be developed after we have been selected

for FY19 funding. As part of the work plan development and approval by EPA. We will measure performance above and below the channel and at selected Biochar Cells.

<insert text here, using Arial 9pt font>

Describe how an evaluation of the project will be done, including how success will be defined and measured. For example, a description of effectiveness monitoring could be included:

6. Proposed project budget *(Attach Excel spreadsheet)*

[Please submit the Proposed Budget Table as an attached Excel spreadsheet so that the formulas are reviewable and so the table is editable. Please include all grant and match dollars. Form can be found on the MPCA website at <https://www.pca.state.mn.us/water/section-319-funding-round#questions-and-addenda-2c6b689b>]

*[In section 3, you selected the objectives and tasks that are to be accomplished for the proposal. A **proposed project budget** lists the unit costs and quantities for the labor, equipment, and supplies that will be used to accomplish each objective and perform each task. For the purposes of the proposal, a simplified budget is acceptable; however, should the proposal be funded, more detail may be required at time of contract.*

Check to make sure the budget amounts add up.

All equipment paid for with grant funds is the property of the MPCA or EPA. When completing the project budget, please maintain the same order of suppliers (sponsor, contributing sponsors, subcontractors, or consultants) for each objective.]

References

Burns & McDonnell Engineering Company, Inc. 2015. Lambert Creek Bacterial Source Identification Study 2014 Final Report. Project Number 78186, Unpublished.

Engstrom, D.R. 1991. Sediment Stratigraphy in Storage Basins of the Lambert Creek/Vadnais Lake Watershed. A Final Research Report prepared for Vadnais Lake Area Water Management Organization. Unpublished.

Wenck Associates, Inc. 2013. Vadnais Lake Area WMO Total Maximum Daily Load (TMDL) and Protection Study. Wenck File #2255-08. Unpublished.

Budget

VLAWMO Bacteria, Sediment, & Nutrient Reduction Project
Vadnais Lake Area Water Management Organization

Itemized project budget and expenditures



Proposed Loan Funds

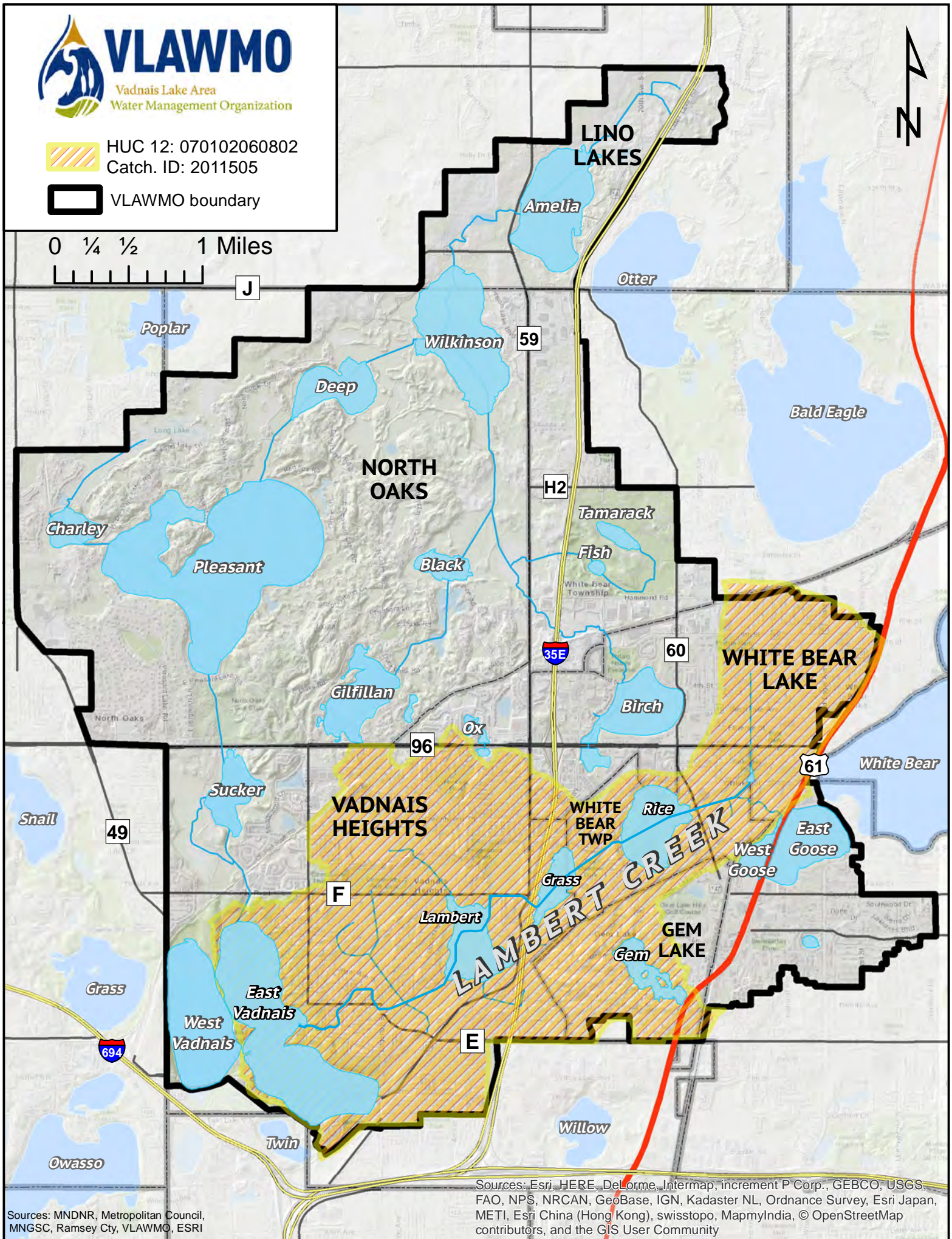
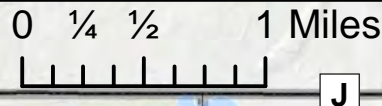
Objective 1: Repair and Enhance Lambert Lake	Cost category	Unit cost	Rate	Quantity					Loan Budget Total
Task A: Replace failing fiberglass sheet pile with steel sheet pile (420 total feet)	BMP Long-term Repair/Enhancement	\$388,000.00							\$388,000.00
Loan Total									\$388,000.00

Proposed Grant Funds

Objective: Enhance Lambert Lake, design, install, and monitor new, innovative BMPs	Cost category	Unit cost	Rate	Quantity	Grant	In kind match	Cash match	Total match	Budget total
Objective 2: BMP Engineering and Technical Assistance									
Engineering and Technical Assistance	Engineering	\$40,000.00			\$25,000.00		\$15,000.00		\$40,000.00
VLAWMO Staff Coordination	Coordinator	\$43.86	/hour	200		\$8,772.00			\$8,772.00
UMN engineering, substrate and groundwater analysis	Engineering	\$19,000.00			\$9,000.00		\$10,000.00		\$19,000.00
Objective 2 - Total									
					\$34,000.00	\$8,772.00	\$25,000.00	\$33,772.00	\$67,772.00
Objective 3: Install BMPs									
Task A: Dredge pond to remove accumulated sediment	BMP Maintenance	\$120,000.00			\$74,000.00		\$46,000.00		\$120,000.00
Task B: Sediment testing (3 samples)	Lab Analysis	\$2,335.00			\$2,335.00				\$2,335.00
Task C: Offsite removal of sediment	BMP Maintenance	\$30,000.00			\$15,000.00		\$15,000.00		\$30,000.00
Task D: Build 2,000-foot meander from Lambert Lake and reconnect to ditch	BMP Implementation	\$120,000.00			\$87,000.00		\$33,000.00		\$120,000.00
Task E: Sediment testing (3 samples)	BMP Implementation	\$2,335.00			\$2,335.00				\$2,335.00
Task F: Offsite removal of sediment from meander	BMP Implementation	\$20,000.00			\$10,000.00		\$10,000.00		\$20,000.00
Objective 3 - Total									
					\$190,670.00		\$104,000.00	\$104,000.00	\$294,670.00
Objective 4: Design and Install Biochar Cells									
Task A-C: Lab test, work with vendor to design, select placement	Engineering	\$22,509.00			\$12,509.00		\$10,000.00		\$22,509.00
Task D: Installation of biochar cells, includes perforated tubes, accessories, and support rods anchored through peat	BMP Implementation	\$5,500.00			\$5,500.00				\$5,500.00
Objective 4 - Total									
					\$18,009.00		\$10,000.00	\$10,000.00	\$28,009.00
Objective 5 & 6 - Monitoring									
Design sensors and sampling protocol and install	Engineering and Research	\$35,000.00			\$25,000.00		\$10,000.00		\$35,000.00
Staff Monitoring	Water Resources Manager	\$42.08	/hour	80		\$3,366.40			\$3,366.40
Bacteria Samples Lab Analysis	Lab Fees (Donated by SPRWS)					\$780.00			\$780.00
Nutrient Samples Lab Analysis	Lab Fees						\$7,080.00		\$7,080.00
Analyze Data, enter into databases, and develop research paper	Research	\$55,000.00			\$35,000.00		\$20,000.00		\$55,000.00
Objective 5 & 6 - Total									
					\$60,000	\$4,146.40	\$37,080.00	\$41,226.40	\$101,226.40
Grant Administration									
Staff Coordination	Administrator	\$69.17	/hour	65		\$4,496.05			\$4,496.05
Staff Coordination	Coordinator	\$43.86	/hour	120		\$5,263.20			\$5,263.20
Total									
					\$9,759.25			\$9,759.25	\$9,759.25
Education and Outreach									
Programming	E&O Coordinator	\$33.62	/hour	80		\$2,689.60			\$1,344.80
Total									
						\$2,689.60		\$2,689.60	\$2,689.60
Grant Total					\$ 302,679.00	\$ 25,367.25	\$ 176,080.00	\$ 201,447.25	\$ 504,126.25



 HUC 12: 070102060802
Catch. ID: 2011505
 VLAWMO boundary




Sources: MNDNR, Metropolitan Council, MNGSC, Ramsey Cty, VLAWMO, ESRI




Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

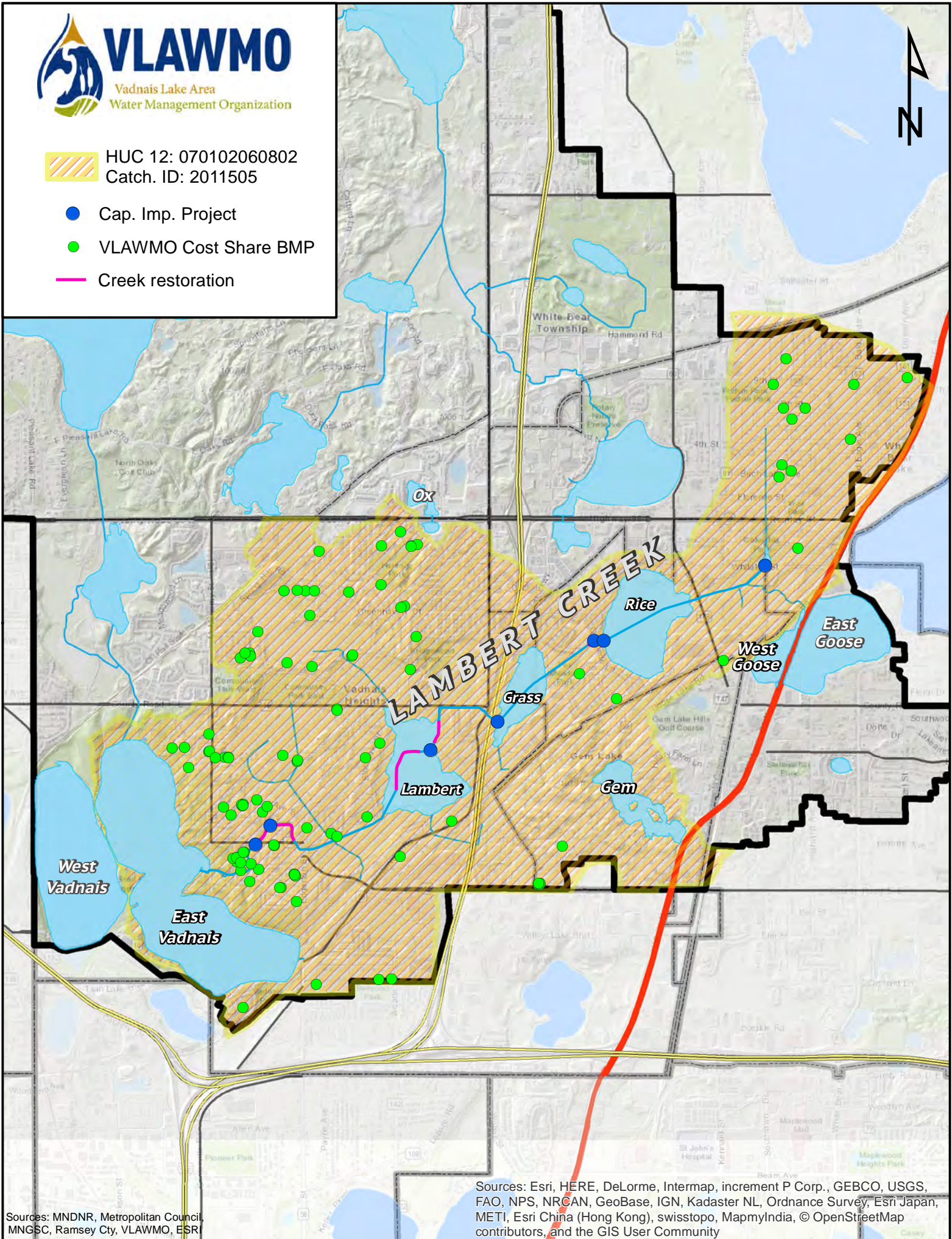


VLAWMO

Vadnais Lake Area
Water Management Organization

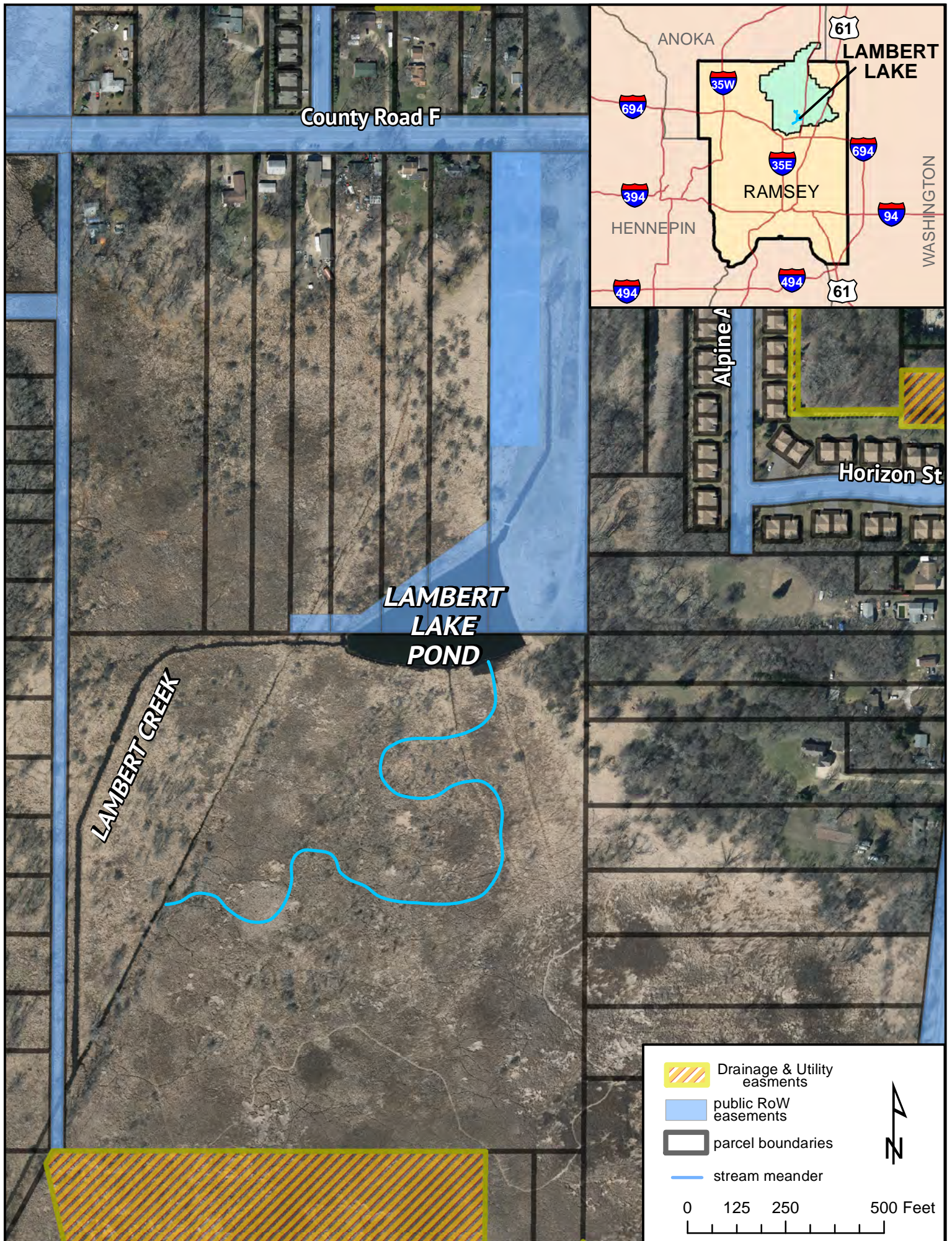
 HUC 12: 070102060802
Catch. ID: 2011505

-  Cap. Imp. Project
-  VLAWMO Cost Share BMP
-  Creek restoration



Sources: MNDNR, Metropolitan Council, MNGSC, Ramsey Cty, VLAWMO, ESRI

Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community





800 County Road E E, Vadnais Heights, MN 55127
www.vlawmo.org; Office@vlawmo.org

To: Board of Directors

From: Nick Voss

Date: February 20, 2019

Re: **V.D. 2018 Annual Report**

Please review the 2018 annual report draft for a vote for approval on the February 20th meeting. This is a draft report that contains the essential graphs and text that summarize 2018. Editing, design adjustments, and spell checking will continue in the weeks following the Board meeting.

A February approval for the report will give VLAWMO the flexibility to submit the report to BWSR on time and without coming up against the deadline. In previous years, approval of the annual report at the April Board meeting has brought VLAWMO's submission very close to BWSR's final deadline. An earlier approval also helps VLAWMO send the reports to the printer and have them in-hand earlier in the year. We appreciate any feedback you may provide and will integrate it into the final copy.

Other report documents in production but not requiring approval are the annual report summary (draft) and the water monitoring summary (complete), both enclosed in the BOD packet.



2018 ANNUAL REPORT



Vadnais Lake Area Water Management Organization (VLAWMO)

800 East County Road E
Vadnais Heights, Minnesota 55127

🌐 Website: www.vlawmo.org

✉ Email: office@vlawmo.org

☎ Phone: (651) 204-6070

📠 Fax: (651) 204-6173

📖 In compliance with Minnesota Administrative Rules | Chapter 8410 | Part 8410.0150



SECTION 1

Page 4

WHAT IS VLAWMO?
Introduction, Background

SECTION 2

Page 8

YEAR IN REVIEW
2018 Highlights

SECTION 3

Page 26

CHARTING IT OUT
2018 Review, 2019 Goals

SECTION 4

Page 34

LOGISTICS
Administration, Water Standards, Finances

SECTION 5

Page 36

APPENDICES (AVAILABLE ONLINE AT VLAWMO.ORG)

- A-1: Legal publication
- A-2: Audit
- A-3: Full Monitoring Report

WHO WE ARE

The people who make VLAWMO

Table of Contents

WHAT IS VLAWMO?

Introduction and
background

IN THIS SECTION

- » Letter from the Administrator
- » Background
- » Mission Statement
- » Map

Letter from the Administrator

Greetings!

- Stephanie McNamara, VLAWMO Administrator



Brian Corcoran, VLAWMO (Left)
Stephane McNamara, VLAWMO (Center)
Kari Andrist, EIT, Burns & McDonnell (Right)

Background

The Vadnais Lake Area Water Management Organization (VLAWMO) was formed in 1983 to protect the Vadnais Lake watershed area in northern Ramsey County and a small portion of Anoka County. Our organization was formed through a Joint Powers Agreement (JPA) that was ratified by the 6 cities within VLAWMO boundaries to comply with the State of Minnesota Metropolitan Surface Water Management Act (Minnesota statute Chapters 103A – 103H). We are governed by a 6 member Board of Directors that is represented by an elected official from each of the communities. VLAWMO covers approximately 25 square miles and includes portions of Vadnais Heights, White Bear Township, White Bear Lake, Gem Lake, Lino Lakes, and all of North Oaks.

OUR APPROACH

Managing a watershed area to protect our vital water resources has become the primary approach across the country. Since water flows across political boundaries, partnerships among local governments, regional, state and federal agencies are vital. Because Vadnais Lake is used as the drinking water reservoir for approximately 400,000 customers in the St. Paul area, VLAWMO frequently partners with the St. Paul Regional Water Service (SPRWS) on a variety of water quality monitoring and improvement projects.

OUR CORE PRINCIPLES

To guide our efforts towards achieving our mission, VLAWMO shares responsibility with its member communities to:

- » Protect surface water quality
- » Protect groundwater quality and recharge areas
- » Provide public education to promote good stewardship of water resources
- » Protect and manage wetlands through the Wetland Conservation Act
- » Collaborate with other public and private organizations
- » Manage stormwater and control flooding through the use of best management practices
- » Require good erosion control practices, both during development and as a part of good stewardship



Homer Morancey and Leon Garceau, ca. 1904
Image courtesy of Vadnais Heights Historical Society

Mission Statement

Our mission at the Vadnais Lake Area Water Management Organization is to protect and enhance the water resources within the watershed.

Activities we work on include: water quality monitoring, education and outreach projects, wetland protection, and water quality enhancement projects.



"How Watersheds Work" courtesy of Michigan Sea Grant (MICHU-10-728)



What is a Watershed?

A watershed is all the land area that drains to a specific water resource, such as a lake or stream. Watersheds range in size from a few square miles to an entire continent. As rain and melting snow run downhill, they carry sediment and other materials into streams, lakes, and groundwater.

The land use activities within a watershed have a direct impact on the quality of the water. 96% of the land use within VLAWMO is urban with a small area of agricultural land in the northern end.

Watersheds provide water for drinking, irrigation, streams, and activities such as fishing, swimming, and boating. In addition, watersheds also provide food and shelter for wildlife.

OUR GOALS

Accomplishing our mission requires a focus on common goals. The VLAWMO will pursue the following goals as a way of proceeding towards the mission.

- » Protect and improve surface water quality
- » Protect and enhance wetland resources
- » Protect and improve waters for wildlife habitat and recreation
- » Enhance public participation and stewardship
- » Make and enable informed decisions
- » Optimize public resources
- » Protect and improve groundwater quality and quantity
- » Analyze and use alternative funding sources
- » Improve communications
- » Prevent flooding

WHAT IS A WMO?

A watershed management organization (WMO) is a local government agency charged with protecting water resources within its boundaries. All land within the metropolitan area must be within an organized watershed (State Statutes Chapters 103B & 103D). Watershed Districts are governed by County Commissioners while Water Management Organizations are governed on the municipal level.

WHO PAYS FOR IT?

The Vadnais Lake Area Water Management Organization is funded by a stormwater utility fee. Property owners within the watershed are charged a fee to manage the stormwater that runs off their property. This public utility fee is determined by land use (eg residential, commercial etc), and is included on Ramsey County property tax statements. The authority to charge and collect a stormwater utility fee is governed by Minnesota State Law.

Water Resources in the Watershed

LAKES

There are 16 lakes within VLAWMO. East Goose Lake, West Goose Lake and Birch Lake are located in White Bear Lake. Tamarack Lake, Fish Lake and Ox Lake are Located in White Bear Township. Gem Lake is located in Gem Lake. Amelia Lake is Located in Lino Lakes. Pleasant Lake, Charley Lake, Deep Lake, Black Lake, Wilkinson Lake and Gilfillan Lake are located in North Oaks. Sucker Lake, East and West Vadnais Lake are located in Vadnais Heights.

East Vadnais Lake is the drinking water reservoir for the City of Saint Paul. East Vadnais Lake is supplied with water pumped from the Mississippi River in Fridley that flows via underground aqueduct into Lake Charley in North Oaks. The water then flows east to Pleasant Lake, then south into Sucker Lake, and then into East Vadnais.

LAMBERT CREEK

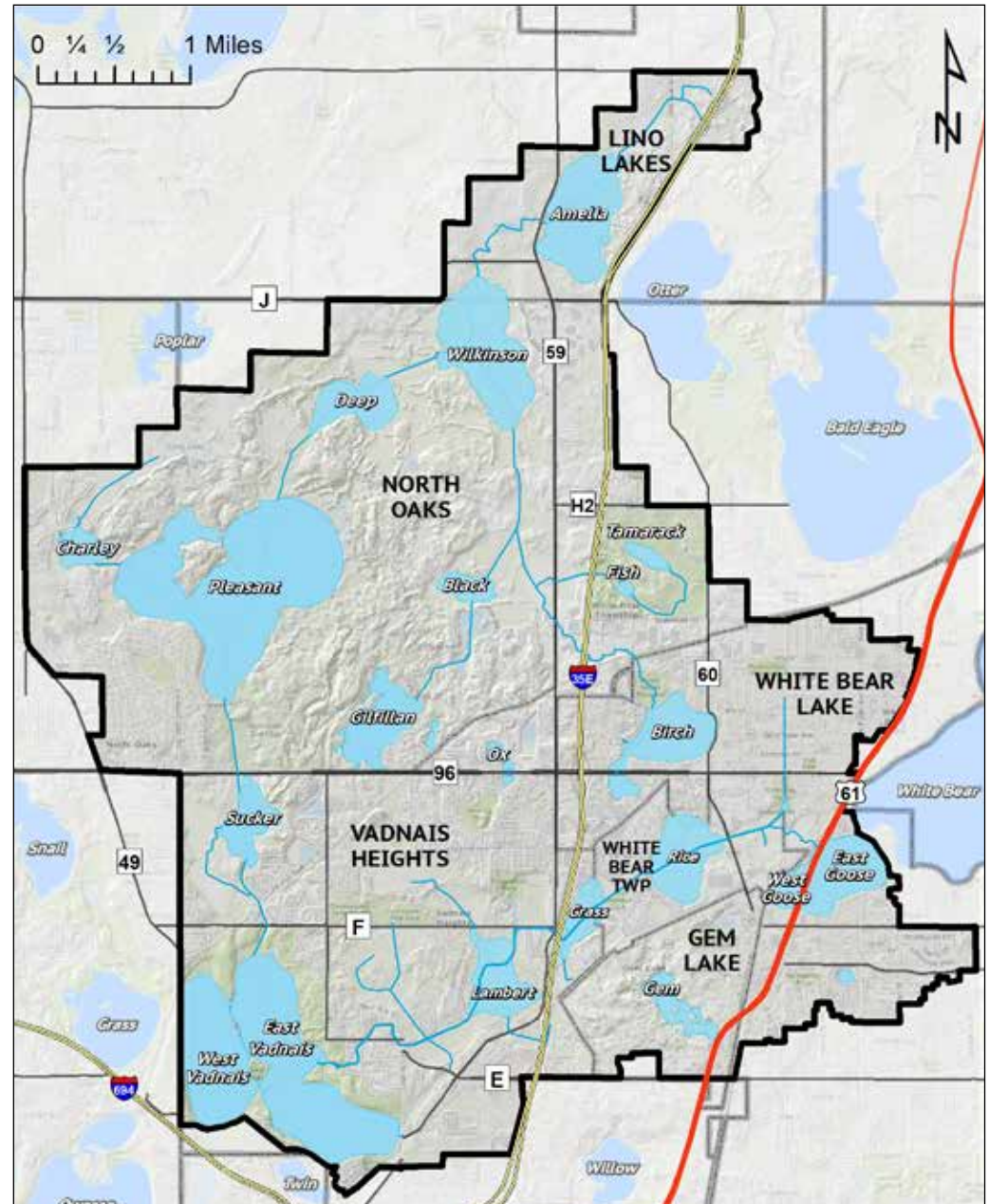
VLAWMO has jurisdiction over Lambert Creek, 4.5 miles of creek and wetland that runs from West Goose Lake and eventually empties into East Vadnais Lake.

WETLANDS

There are over 500 wetlands within VLAWMO. Tamarack, Grass, Wilkinson, Rice, Lambert, and Sobota Slough are a few of the largest tracts of wetlands in the watershed.

GROUNDWATER

Groundwater beneath the land surface of the Watershed flows to local lakes, the Mississippi River, and aquifers including the Prairie du Chien aquifer.



THE YEAR IN REVIEW:

2016 activities, projects, and improvements

IN THIS SECTION

- » What problems does the watershed face?
- » Project Updates
- » In the Community
- » Education Programs
- » Cost Share Programs
- » Community Blue
- » City Engagement
- » Outreach
- » Volunteer Activities
- » Be part of the solution!
- » Water Monitoring
- » Lambert Creek Maintenance

What problems does the watershed face?

IMPAIRED LAKES:

Several lakes in the watershed are on the State Impaired List for high nutrients. These include Wilkinson, Goose, West Vadnais, and Gilfillan Lakes, as well as Lambert Creek. Lambert Creek has the additional impairment of high E. coli bacteria levels. Our studies show that the E. coli is coming from canine and avian sources.

Improving these waterbodies requires cooperation between cities, land owners, businesses, and the watershed organization. Each home, park, and property connects to a waterbody through stormwater runoff and is part of the puzzle.



RISING CHLORIDE LEVELS:

Road salt has a permanent impact on fresh water, with no economical way to remove it once it's in the water. When it washed into lakes and wetlands, the chlorides in salt interrupt the natural nutrient cycling that fish depend on.

While some water bodies flush salt downstream to another watershed, some lakes in VLAWMO are accumulating salt. All of VLAWMO's lakes are currently below state standards, but VLAWMO is monitoring this closely to track changes and guide management.



SEDIMENTATION:

Erosion and sedimentation is a natural process that can be accelerated with human activity. Bare soil, degraded slopes, and poorly protected drainage routes are common sources of excess sediment.

Small amounts of sediment accumulate in stormwater runoff to create a big issue for lakes and streams. Sediment clogs wetlands, culverts, and drainage ditches, suffocates aquatic plants that stabilize lake beds, and carries excess nutrients with it.



DEGRADED WETLANDS

Many shorelines on lakes and ponds contain turf grass up to the water's edge. This causes problems for water quality and degrades nature's ability to protect water resources.

Sometimes wetlands are altered or filled in illegally. Even small infringements on wetland boundaries contribute to a state-wide struggle in preventing the gradual loss and degradation of wetlands and groundwater recharge.



*See page 17
for how to be part of the solution.*

Project Updates

WHITAKER TREATMENT WETLANDS

Grant Funds: MN Legislative-Citizen Commission on Minnesota Resources (LCCMR)

Location: White Bear Township

Completion: Spring, 2018

Cost: \$500,000

The Whitaker Treatment Wetlands are an innovative research project in treating stormwater runoff. VLAWMO is excited to partner with the University of Minnesota, White Bear Township, and Barr Engineering for this project. VLAWMO is thankful to receive a grant from LCCMR for this project.

The structure of three treatment 'wetlands' are fed water from stormwater runoff. This runoff is the start of Lambert Creek, which flows in to Vadnais Lake, and is impaired for E. coli bacteria and high nutrients. The polluted stormwater is pumped through the three wetland cells that consist of different engineered soils called *sorptive material*. The water is tested and directed into groundwater and Lambert Creek.

Water monitoring will help us understand which soil mixture is most effective at treating stormwater runoff and removing bacteria. Findings for this project could advance stormwater treatment across the country. The design was done by Burns and McDonnell Engineering. See page 20 for more on the project's findings so far.



Three wetland cells are filled with sorptive material .

SUCKER CHANNEL RESTORATION

Capital Improvement Project

Location: Vadnais Heights

Completion: May, 2018

Amount Awarded: \$20,000

The Sucker Channel restoration is a collaboration between Ramsey County Parks, Ramsey Conservation District (RCD), VLAWMO, and the Saint Paul Regional

Water Services (SPRWS).

This popular park and fishing destination was experiencing heavy erosion between Pleasant Lake and Sucker Lake, harming water quality in Sucker Lake and creating inefficiencies in the water filtration process. To improve aquatic habitat and protect this source of drinking water, the shoreline was stabilized with rip-rap, coir logs, and new vegetative cover.



VLAWMO created educational signage along the channel. Description of the project and how it helps fishing is provided in English, Spanish, and Hmong.

Planting was completed in partnership with Prairie Restorations, Inc. in Summer, 2018.



In the Community

COMMUNITY EVENTS

Staffing a booth at local events is a fun and valuable way to connect with community members. At events VLAWMO has the opportunity to share its work, provide brochures, give away prizes such as rainbarrels or tote bags, and answer questions for event goers. This year, community events served a dual purpose by also providing a place to conduct community surveys for the Education and Outreach Plan (p. 11).

VLAWMO booths were presented at the following 2018 events:

- » VHDEC Business Appreciation Event - March
- » Vadnais Heights Community Business Expo - April
- » Saint Paul Regional Water Service Open House - May
- » 2018 AquaFair, White Bear Lake Schools - June
- » North Oaks Plant Sale - May
- » WBL Marketfest: Conservation and Environment Day - July
- » Vadnais Heights Ice Cream Social - June
- » White Bear Township Celebration September
- » White Bear Lake Volunteer Fair - October



Vadnais Heights Ice Cream Social



Education Programs

SCHOOL PROGRAMS

VLAWMO staff provides water-focused activities for elementary, middle, and high schools in the watershed. If a school has a stormwater best management practice such as a raingarden on the grounds, this often becomes a living, outdoor classroom. Students learn how to maintain the raingarden, observe nature, work with topographic maps, and much more.



Activity examples and education tools for free rental can be found on the VLAWMO website at vlawmo.org/students.

Left: Students at Lakeaires Elementary gather with Drippy the VLAWMO mascot after hearing a story about local wildlife and wetlands.

Right: Students at Vadnais Heights Elementary explore the schoolyard with bottles of water to track the direction of stormwater runoff and assess ground absorption.



PUBLIC WORKSHOPS

VLAWMO offers a raingarden workshop each Spring. Participants in the raingarden workshop learned about the watershed, stormwater runoff, how to build and maintain a raingarden, and got a head start with tools to select plants and get funding assistance.

The native plant workshop is the most popular workshop for the second year in a row. This workshop dug deep into plant identification, planting plans and strategies, and how perennial vegetation is a valuable asset for the watershed.



Right: Raingarden workshop participants learn about the watershed, how raingardens work, and calculated runoff on their own properties.



Cost Share Programs

VLAWMO's Cost Share Program provides assistance to public and private landowners for implementing stormwater improvement projects. Qualifying projects support one or more of the following:

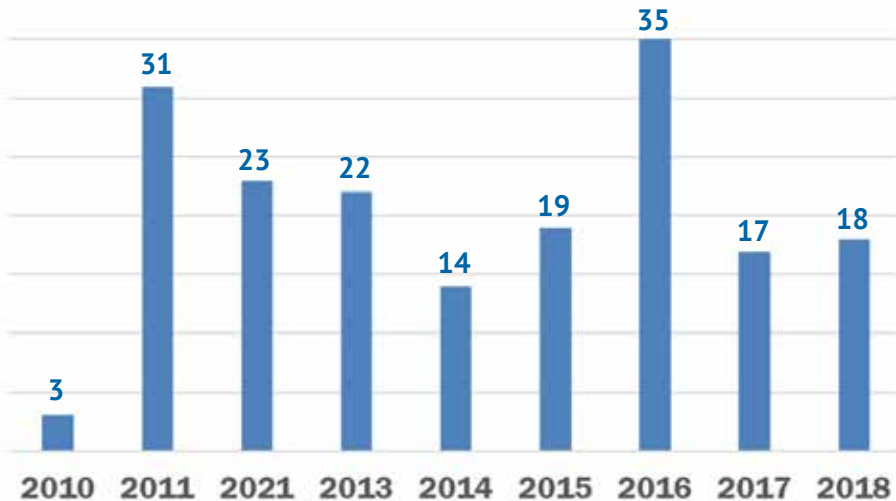
- » Prevention of flooding or mitigation of drought
- » Water quality improvement or increase in watershed storage capacity
- » Preservation, protection, and restoration of native plant and wildlife communities, especially along lakes, streams, and wetlands
- » Protection and preservation of groundwater quality and quantity

Funds vary by year and are granted on a first come first serve basis. Once the annual amount is depleted, applicants are advised to re-apply the following year.

There are 3 cost share programs:

- » Rainbarrel
- » Landscape Level 1
- » Landscape Level 2

Cost Share Grants by Year: Landscape & Rainbarrel



LANDSCAPE COST SHARE PROGRAMS

Landscape Level 1: Reimburses property owners 75% of the costs associated with implementing approved water quality improvement projects. The maximum reimbursement is \$2,000 for this program. Typical projects include raingardens, shoreline restoration, native habitat restoration, or pervious paver installation.

Landscape Level 2: Projects with a larger total cost (minimum total cost of \$5,000) and will reimburse 75% of the costs, up to \$20,000. The program was updated in 2015 to allow funding to be more available for applicants.

VLAWMO uses Minimal Impact Design Standards (MIDS) to measure the impact of landscape improvement projects. The impact of 2018's projects are estimated to improve water quality by:

- Reducing phosphorus by **.307 lbs** per year.
- Reducing suspended solids by **56 lbs** per year.
- Infiltrating **123,172 gallons** of water into groundwater annually.



A 2018 raingarden install in Vadnais Heights

LANDSCAPE LEVEL 1 SUMMARY

For Landscape level one, **17** grants were awarded funding for a total of \$15,481. Funding for the year was not completely utilized.

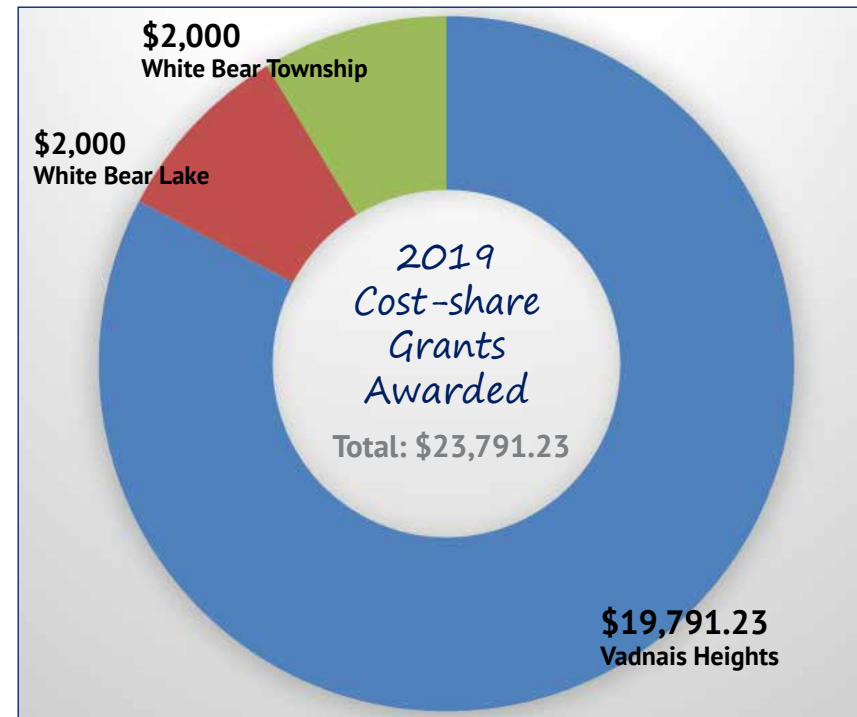


Of the 17 level one grants, 3 were native plant restorations totaling 10,775 ft². 2 were raingardens totaling 5,282 ft². 1 was a shoreline restoration totaling 4,500 ft². 2 were pervious pavement or infiltration driveways totaling 15,950 ft².

2017 project square footage:	2018 project square footage:
45,596 ft²	56,507 ft²

LANDSCAPE LEVEL 2 SUMMARY

1 landscape level two grant was awarded for a total of \$7,700. The project was a native plant restoration in Vadnais Heights, covering 20,000 sq ft.



RAINBARREL COST SHARE PROGRAM

The Rainbarrel Program reimburses residents 50% of the cost towards the purchase of up to 2 rainbarrels. Applicants are limited to \$125 maximum reimbursement per rainbarrel.

RAINBARREL SUMMARY

In 2018 VLAWMO awarded grants for **9** rainbarrels, for a total of \$610.23. A total of 92 rainbarrel grants have been awarded since the program began in 2007. Each time the barrels are filled, up to 4,850 gallons of rain water is available for reuse. If each rainbarrel gets filled 10 times throughout the year from various storm events, up to 46,000 gallons of water is available for reuse. 5 additional rainbarrels were awarded in 2018 as prizes for public events.

Community Blue

DESCRIPTION

Community Blue is an education focused grant program for community groups within VLAWMO. It funds educational events and resources as they relate to water resources, and provides support in making existing stormwater, wetland, or watershed improvements into educational tools with public exposure.

PROJECTS IN THE WORKS



Connect the Drops

Growing Green Hearts, an organization specializing in watershed education in public school and religious settings, has networked between several local congregations for this project. Following a multi-congregation kick-off event, Growing Green Hearts will lead youth and community members in watershed education sessions and service projects. Service project examples include outreach and education for smart salting, building raingardens and native plantings, cleaning and adopting stormdrains, and more. Partners include Frassatti academy, Christ the Servant Lutheran Church, and Peace United Methodist.

Clean Stormdrains

Residents in the John Mitchell Neighborhood of Vadnais Heights are taking action to clean out their stormdrains and promote watershed best practices such as water-friendly yard care. Project is led by Ceci and Ed Shaplan, who serve as Master Water Stewards for VLAWMO.

Picture Posts at Birch Lake

Working with the Birch Lake Improvement District (BLID), two picture posts are to be placed near Birch Lake. One will be on the shoreline, the other in the Rotary Park Wetland just to the north of Birch Lake. Both posts will be a way to monitor changes in the water quality, shoreline condition, vegetation, and other unforeseen surprises that may be missed without attention.

City Engagement

SMART SALTING LEVEL 2

A Smart Salting level workshop was hosted in April, 2018 in partnership with Ramsey Washington Metro Watershed District and Fortin Consulting. The level 2 workshop focused on the Winter Maintenance Assessment Tool (WMA_T). This tool allows public works and maintenance staff to track progress in salt use and improvements, learn strategies from the tool interface itself, create charts for presentations, assess costs, outline future goals, and engage in conversation with staff across MN for discussion and shared learning.



TURF MAINTENANCE WORKSHOP

VLAWMO hosted Fortin Consulting to hold a turf maintenance workshop in September, 2018. The workshop covered best practices for fertilizer application, mowing, watering, and more. 19 participants attended, representing county, city, and school district staff.



Outreach

ADOPT-A-DRAIN

The adopt-a-drain program is a convenient and practical way to make a positive impact on a nearby water body. Residents, community groups, or businesses commit to checking their stormdrain 3 times/month, with a rate of cleaning that is up



RAINBARREL WINNERS

The tradition continues at VLAWMO's Spring and Summer events. Fair goes at MarketFest, Taste of Vadnais, the North Oaks Community Fair, and Vadnais Heights Farmer's Market had the opportunity to enter to win a free rainbarrel upon signing up to our seasonal email list. 6 rainbarrels were given away, allowing VLAWMO's audience to grow while capturing and re-using stormwater runoff at the same time. We guarantee our email lists are spam free.

PICTURE POSTS

In October, 2018 VLAWMO launched a picture post project in North Oaks. One post is located at the inlet of Deep and Pleasant Lake, the other at Charley and Pleasant Lake.

These posts allows volunteers to easily and consistently and regularly photograph the Pleasant Lake shoreline and the nearby wetland surrounding the Deep Lake channel. Photos are uploaded to the Picture Post website and will be a valuable tool for home owners, North Oaks, the Saint Paul Regional Water Service, and VLAWMO to better understand the subtle trends and changes that occur on the shoreline and in the water. Examples include tracking ice-out, algae blooms, erosion, shoreline trampling, vegetation changes, and more.



MEDIA

Our collection of videos and media is a tool for residents and cities to glimpse the work of the watershed. Our YouTube channel contains education videos, recorded presentations, event summaries, and more!

Videos produced in 2018 include:

- Raingarden Refresher Course
- Whitaker Treatment Wetlands: How does it work?
- Who Lives in the Watershed: Remote Cameras at Tamarack Nature Center



Visit our blog found at VLAWMO.org

Follow our social media with the handle: "@VLAWMO"



Volunteer Activities

Volunteers bring VLAWMO's work into the community. Volunteers help with water sampling, booth staffing, community outreach, advising VLAWMO on public interests and priorities, and leading by example.

CITIZEN LAKE MONITORING PROGRAM (CLMP)

VLAWMO would like to thank the following volunteers for their role in the Citizen Lake Monitoring Program, collecting water samples bi-weekly from May through September. The volunteers for 2017 were: Jim Grisim (Birch Lake), Justine Rowe (East Vadnais Lake) and Shannon Stewart (Tamarack Lake).

WATERSHED ACTION VOLUNTEERS (WAV)

VLAWMO is grateful for the volunteers who have supported the Watershed Action Volunteers in 2018: AFSA High School, St. Mary's of the Lake youth group, Rika and Rita Pennington, Bob Larsen, Suzanne Ryan, Diane Gorder, Connie Winterhalter, and Gina Schmidt.

2018 volunteer activities included:

- » Staffing booths at community events
- » Stormdrain stenciling and cleaning while promoting adopt-a-drain
- » Raingarden maintenance
- » Assisting with education efforts



AQUATIC INVASIVE SPECIES (AIS)

Partnering with Ramsey Soil and Water Conservation Division (RSWCD), VLAWMO is gathering volunteers to serve as citizen AIS detectors. While the RSWCD provides training and records of aquatic invasives across the county, VLAWMO helps plug volunteers into the effort. Together we're able

MASTER WATER STEWARDS

VLAWMO joined the Master Water Stewards program in 2018. This program is coordinated through the nonprofit Freshwater, who trains and prepares volunteers to be citizen champions in projects and outreach. After promoting the program and searching for two champion volunteers, VLAWMO is excited to host two Master Water Stewards in 2019, with close collaboration with stewards from neighboring watersheds.



Be a part of the solution!

How to help improve the watershed from home: Continued from page 8

WINTER:

Practice Smart Salting:

Shovel and scrape early on.

Spread salt with 2-3" between crystals.

Don't over salt: 1/2 - 2/3 of a coffee mug holds enough salt for one parking space.

Practice spot-treatment, apply salt, sand, or grit in cold temps and as a salt alternative.

Sweep up extra salt, sand, and grit when pavement is dry.



SPRING & SUMMER:

Adopt a stormdrain to promote local water quality.

Water with care:

Water lawn in the morning and evening to reduce evaporation. Use sprinklers that keep water low to the ground. Direct sprinklers away from pavement.

Mow with care:

Mow grass at 3" to hold moisture and reduce runoff. Keep grass clippings out of the street.

Leave grass clippings on lawn for free fertilizer, or fertilize sparingly.



FALL:

Core aerate the lawn to increase root depth, durability, and water absorption.

Continue adopt-a-drian efforts, cleaning out leaves and debris from stormdrains and the curb.

Mulch leaves with a mower for free fertilizer.

If you must use weed killer, do so now to make a bigger impact and use less compared to Spring/Summer.



ALL YEAR LONG:

Prevent illegal dumping in stormdrains: "only rain down the drain".

Plan a native planting or raingarden on your property. Plan with VLAWMO to make planting and installation easy and effective.

Restore shorelines with deep-rooted native vegetation.

Hire contractors certified in winter maintenance or turf maintenance best practices.

Respect wetland boundaries. Each wetland plays a role in the watershed no matter how small.



Water Monitoring

INTRODUCTION

VLAWMO's regular water quality monitoring program includes nutrient sampling on 6 Lambert Creek sites, and nutrient sampling on 12 of the Vadnais Lake Area Watershed lakes. Nutrients and pollutants sampled for data include: total phosphorus, chlorophyll-A, soluble-reactive phosphorus, iron, total nitrogen, nitrate, total suspended solids, and chloride. VLAWMO's specialty monitoring programs, such as E coli and winter chloride sampling, will continue. See the 2016 Annual Report Summary for a map of monitoring locations.

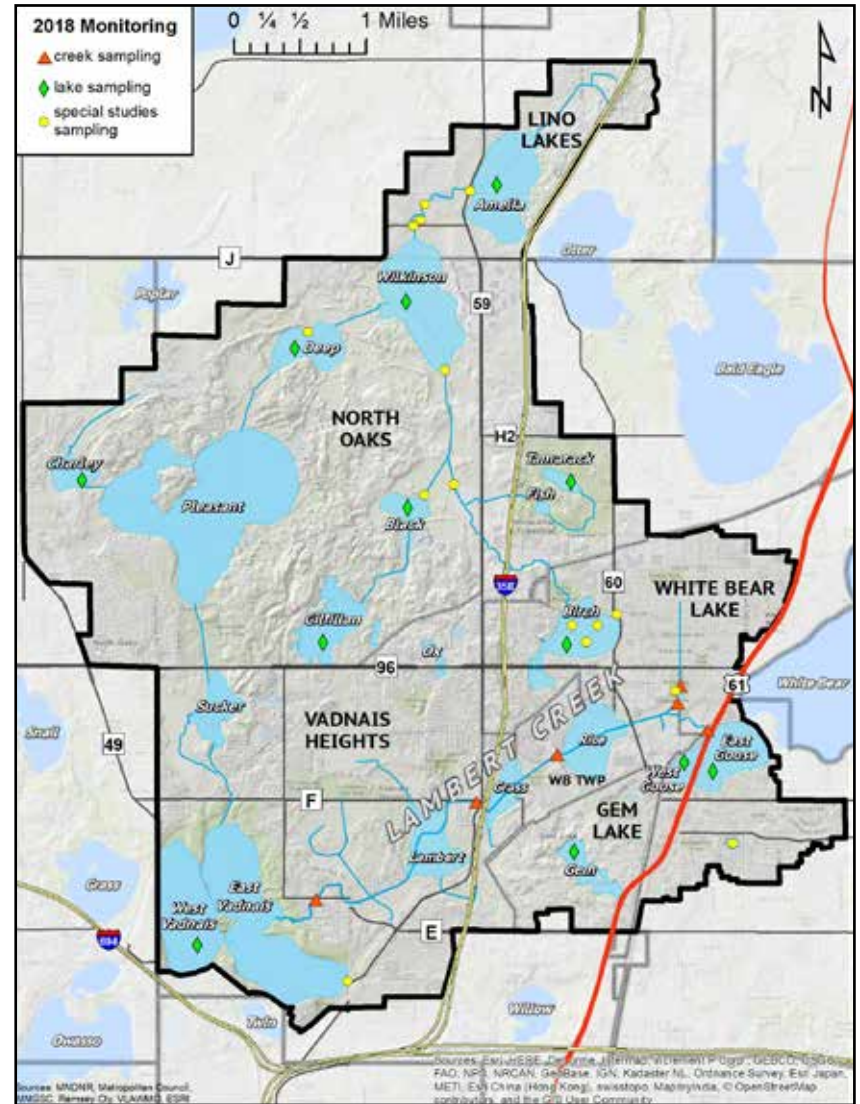
Part of VLAWMO's water monitoring includes rainfall measurements because rainfall and the timing of rainfall are factors that influence water quality. Typically, more precipitation implies more water runoff, which carries more contaminants from the land surface into water bodies.

Lakes are summarized with a grading system called the Trophic State Index (TSI). This system was developed in the 1970's to calculate average phosphorus, chlorophyll-A, and Secchi disk readings, and generate a summarizing number. Letter grades are developed from the Metropolitan Council matrix for annual averages.



VLAWMO staff monitoring Lambert Creek

VLAWMO Monitoring Locations



Monitoring results are used to guide local water policies and management, and to help prioritize and locate future water quality projects such as raingardens, underground retention basins, and shoreline restorations. The full 2018 monitoring report is available at: vlawmo.org/resources

WATER MONITORING HIGHLIGHTS

Gem Lake: Gem Lake's chemistry has improved, coinciding with a 2014 Highway 61 swale reconstruction. The improved swale may be capturing nutrients and sediment that drained into the lake from a large parking lot. After 10 years on the State Impaired List and continued monitoring, the Minnesota Pollution Control Agency (MPCA) officially de-listed Gem Lake in 2018. This success story demonstrates that lake improvements are possible!

Gilfillan Lake: One of VLAWMO's lakes on the State Impaired List, Gilfillan data show a nutrient increase over 5 years. An augmentation system was installed in 2012 to raise the water level, and also provided dilution that improved the water quality. Gilfillan and its subwatershed is now maintaining its water level on its own, as no augmentation has occurred since the installation.

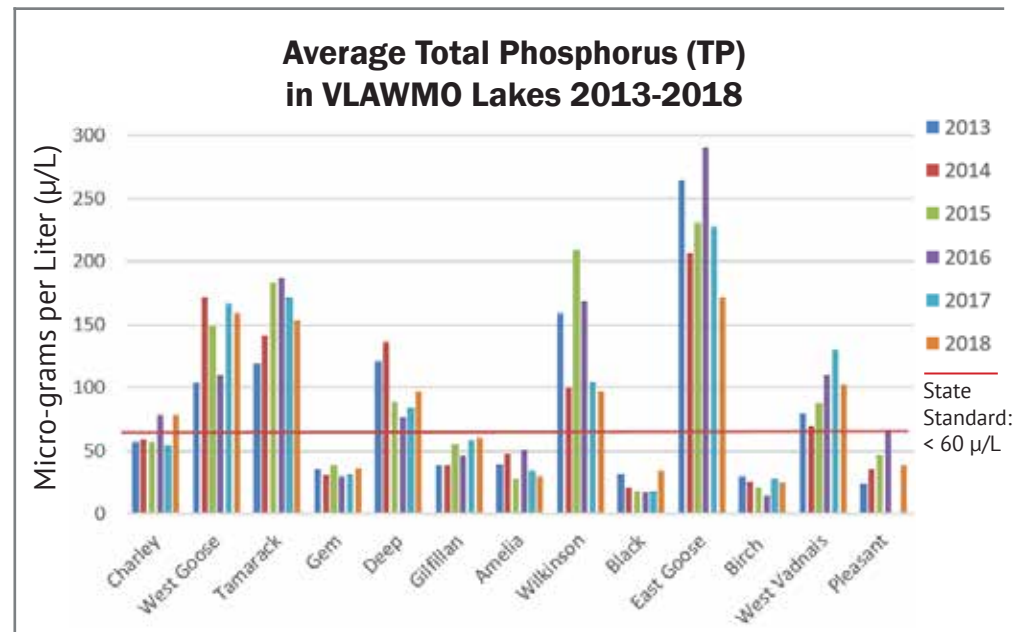
Goose Lake (East & West): Goose Lake has had high nutrient levels since VLAWMO began monitoring in 1997 (East) and 2006 (West). A 2015 bullhead removal (pictured right) made minor impacts to lake health, serving to reduce internal loading, which is one of several factors contributing to the lake's impairment. A 2017 fish survey indicated that the bullhead population is under control. Wood Lake/Oak Knoll Pond is a neighborhood pond that feeds into Goose Lake, is the focus of a spent lime treatment study in 2019. Follow the study and connect to public engagement meetings at vlawmo.org.

Wilkinson Lake: Wilkinson's phosphorus levels are above State standards but its Chlorophyll A level is below. Studies have detected high nutrient levels draining into Wilkinson from both North and South inlets. Because Wilkinson functions more like a wetland than a lake, it continually cycles nutrients through the water column. Its water quality may be especially sensitive to inputs from the surrounding watershed (sediment, agricultural runoff, grass clippings, etc). After 3 seasons of additional source monitoring, VLAWMO will use this data in a project identification and feasibility study. Visit vlawmo.org/waterbodies/lake-wilkinson for the full report. Reducing upland nutrient and sediment loads in the future are likely to promote the health of Wilkinson and downstream Deep Lake.

Tamarack Lake: A floating island wetland was installed at Tamarack in 2015 to reduce lake nutrient levels. Lake data indicates that the island was undersized, which helps inform future experimental treatments. Tamarack is currently on the State Impaired List.

» **Chloride Levels:** VLAWMO has been sampling chloride for 9 years with no significant changes detected. Birch Lake and East Goose have the highest chloride content and appear to be showing upward trends over the last few years. This is likely due to their close proximity to major roads. All of the lakes are below the current State standard of 230 mg/L, with Black Lake having the lowest chloride level.

**Find the complete 2018 Monitoring Report
and a summary at VLawmo.org/resources/reports**



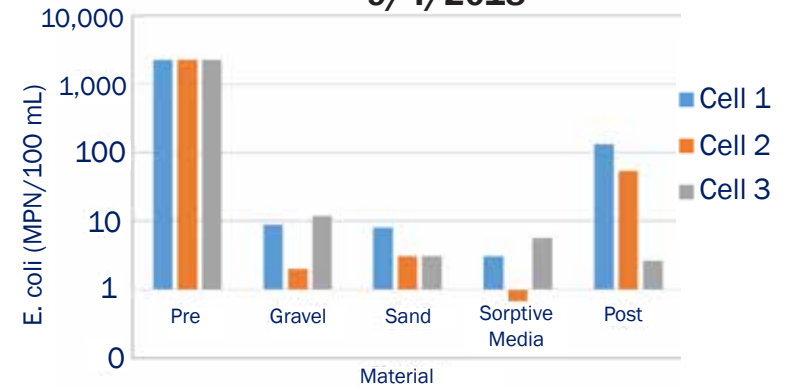
MONITORING SUMMARY: CONTINUED

WHITAKER TREATMENT WETLANDS

The Whitaker Treatment Wetlands is a research project investigating new ways to treat stormwater runoff. Completed in 2018, data will be collected until 2020 to analyze how various materials treat contaminants such as phosphorus, nitrogen, and E. coli bacteria.

Samples are gathered before (pre) and after (post) storm events and at various points within the 3 treatment cells. Each cell consists of layers of gravel, sand, and a unique mix of specialized sorptive media (concrete, peat, clay, tire crumb). Sampling is staggered over a period of days as water moves through the system. At right, E. coli levels are lower after water travels through the cells. The lowest level is seen in cell 3. These results may indicate that the composition in cell 3 is the most beneficial for removing E. coli bacteria. Research will continue until 2020 to replicate and investigate these results, making recommendations for future water treatment projects.

Whitaker Treatment Wetlands E. coli Samples Surrounding a Storm Event: 9/4/2018



LAKE GRADES

VLAWMO uses the Trophic Status Indicator to summarize lake health. The trophic status of a lake pertains to its nutrient levels, which helps assess lake health. TSI is calculated from monitoring data and converted into a lake grade for familiarity.

VLAWMO Lake Grades:

Lake	2017	2018	TSI Status
Amelia	B+	B+	Eutrophic
Birch	B+	A-	Mesotrophic
Black	A-	B+	Mesotrophic
Charlie	C+	C	Eutrophic
Deep	C	C-	Eutrophic
Gem	B	B	Mesotrophic
Gilfillan	C	C	Eutrophic
E. Goose	D	D-	Eutrophic - Hypereutrophic
W. Goose	D	D-	Eutrophic - Hypereutrophic
Tamarack	D-	D-	Eutrophic - Hypereutrophic
West Vadnais	D-	D-	Eutrophic - Hypereutrophic
Wilkinson	C	C	Eutrophic

VLAWMO staff monitoring West Goose Lake.



2018 ANNUAL REPORT

LAMBERT CREEK STUDIES



VLAWMO worked with Houston Engineering in 2018 to create a comprehensive survey of Lambert Creek.

The survey used historical documentation with hydrology & hydraulic modeling (H & H) to assess the main creek in addition to its branch ditches. Additionally, it sought to identify areas that may require repair or maintenance to return the system to its as originally constructed condition. If the original condition isn't possible, the model will aid in assessing which improved conditions are feasible. This concept of the current alignment of Ditch 14 and its branch ditches, based on past improvements, projects, and development is termed as As Constructed and Subsequently Improved Condition (ACSIC). The survey and model now serve as valuable tools for planning and decision making for Lambert Creek. Assets include:

- A survey and documentation of elevations for baseline reference.
- A guide for effectively re-establishing the ditch system.
- Documentation of 2, 10, and 100 year flood elevations.
- An XP SWMM model that enables analysis of improvements, providing guidance for cost-effective actions.
- Repair options that benefit future planning and decision making for reasonable function of the Ditch.

LAMBERT CREEK MAINTENANCE

In Spring of 2019 VLAWMO worked with the Institutional community Work Crew (ICWC) to remove tree and woody debris from a two mile stretch of Lambert Creek. Maintenance was needed to improve flow and efficiency of the creek.



ICWC clearing debris in Lambert Creek

VLAWMO staff documented creek levels at the Kohler road flume after a 3.75" rain event. Creek levels at the flume demonstrated a functioning drainage system, returning to average 3 days after the high water levels. The gauge at the flume indicates a 1' drop within the specified time frame.



CHARTING IT OUT:

Review of 2018 Goals, 2019 Projections

IN THIS SECTION

- » 2018 Work Plan Review
- » 2019 Work Plan

VLAWMO CORE ACTIVITIES



WATER PLAN STRUCTURE



2019 WORK PLAN PROJECTION

VLAWMO will put the 2017-2026 comprehensive water plan into action. The water plan structure (above) informs issues that will be addressed, goals that VLAWMO will set, and the strategies employed to reach those goals. See the 2017-2026 comprehensive water plan on our website under About > Why Water Matters for a more in-depth look at these plan components.

The tables for the 2018 review and 2019 work plan are color coded according to the VLAWMO core activities diagram (above). Each core activity also has a number, conveyed in the 2017-2026 comprehensive water plan.

ACRONYMS:

- WLA: Waste Load Allocation
- DNR: Department of Natural Resources
- MS4: Municipal Separate Storm Sewer System
- NEMO: Northland
- SWPPP: Storm Water Pollution Prevention Program
- STEM: Science, Technology, Engineering, Mathematics
- BMP's: Best Management Practices
- CIP's: Capital Improvement Project
- LGU: Local Governing Unit
- LCCMR: Legislative Citizen Commission on Minnesota Resources
- AIS: Aquatic Invasive Species
- TMDL: Total Maximum Daily Load
- TEP: Technical Evaluation Panel
- BOD: Board of Directors
- BMP: Best Management Practice (pertaining to stormwater treatment)
- RFP: Request for Proposal
- TEC: Technical Commission

2018 Work Plan Review



CAPITAL IMPROVEMENT PROJECTS

Project Name	Description	Goal: Going into 2018	Goal: 2018 Result
Sucker Lake Channel Restoration	This project is a joint effort in partnership with Ramsey County Parks, Ramsey Conservation District, and the St. Paul Regional Water Service. When completed it will restore approximately 700 linear feet of shoreline that has eroded. Includes fishing access locations to support the current use of the site.	Complete final planting and install educational signs.	Planting complete, educational signs installed.
Whitaker Treatment Wetlands	A stormwater treatment project partnering with the U of MN with funding through LCCMR grant funding. Stormwater from Whitaker Pond is routed to wetland treatment cells then infiltrated into shallow groundwater. The study will determine which of three sorption materials is most effective at filtering pollutants, contaminants, and bacteria.	Finalize installation and monitoring plan. Begin monitoring year one of two.	Project installed and year one of monitoring complete.
Goose & Wilkinson Lakes Project Development	VLAWMO worked with consultants in 2018 to assess all data and information collected on these water bodies, engage with stakeholders (see page 14), and determine the next best steps for nutrient reduction. Out of the potential projects that were discovered, work is now directed to selecting a project and its methods. Options include spent lime or alum treatment.	Continue assessment for BMP's, research grant opportunities and apply. Define BMP options.	Goose subwatershed assessment supported by Watershed Based Funding grant. Further monitoring completed in Wilkinson subwatershed.
Birch Lake: 4th and Otter Road Project Development	VLAWMO will work with a consultant to assess the options for BMPs at the 4th and Otter Lake Rd site. Conceptual designs of best possible projects will be completed and VLAWMO will work with its partners for a 2018 installation.	Capture stormwater from residential area and reduce incoming nutrients. Install successful project.	Project design complete. Operations and maintenance agreement in progress with partners.

Review of 2018 Work Plan

GRANT PROGRAMS

CORE ACTIVITY #

	Project Name	Description	Goal: Going into 2018	Goal: 2018 Result
3.4	Landscape Level 1	Establish relationships and provide grants to property owners within the watershed to install water quality enhancement projects.	Install at least 10 projects Achieve .25 lbs of phosphorus/year removed from local waters.	8 projects installed. .307 lbs of annual phosphorus removed from local waters.
3.4	Landscape Level 2	Landscape Level 2 Cost Share Program is aimed at assisting landowners with implementing larger BMP projects within the watershed. Preference for projects that have high visibility, educational value and/or local citizen support.	Install at least 1 project. Achieve .25 lbs of phosphorus/year removed from local waters.	1 20k ft ² native planting extending into 2019. Phosphorus reduction N/A.

PUBLIC EDUCATION AND OUTREACH

CORE ACTIVITY #

	Project Name	Description	Goals: Going into 2018	Goals: 2018 Result
3.3	Watershed Action Volunteers (WAV)	WAV is a group of volunteer residents that assist with idea development and implementation of outreach opportunities and projects. A new stormdrain stenciling program will allow volunteer groups such as scouts and youth groups to protect our water through stenciling service projects. A new "Adopt-a-Drain" program educates residents and businesses the importance of adopting a stormdrain. WAV also strives to encourage awareness and interaction with local water resources using phenology and basic environmental monitoring.	Volunteer participation to grow 10% WAV email list to reach 100 readers Host at least 3 stenciling service projects, adopt 12 stormdrains, install 1 picture post. Establish a volunteer program with 2 dedicated volunteers with specific role descriptions.	100 readers achieved 2 stenciling service projects complete. 26 drains adopted, 3 pictures posts installed. 1 dedicated volunteer 2 Master Water Stewards
3.3	Workshops	Hold raingarden workshops for residents covering watershed processes, raingarden function, and installation how-to. Introduce VLAWMO's cost-share program to participants. In addition to a raingarden workshop, add a native plant workshop based on a survey of past workshop attendees.	Achieve at least 25 raingarden/native plant workshop participants. At least 3 residents who attend a raingarden or native plant workshop will pursue a cost-share grant.	45 workshop participants. 1 resident from workshop pursued a grant.

Review of 2018 Work Plan



PUBLIC EDUCATION AND OUTREACH

CORE ACTIVITY

3.3

Project Name	Description	Goals: Going into 2018	Goals: 2018 Result
Community Events	Staff a VLAWMO booth at various community events. Develop information and engagement components for community events. A rainbarrel giveaway contest is used to attract event goers, and number of entries signify how many people stopped by the VLAWMO booth. Prizes such as tote bags, boating kits, and craft soda will be provided for free to guests who engage the booth.	Attend at least 5 community events annually. Receive 50 entries total in rainbarrel giveaways. Hold a press conference/public opening for Whitaker Treatment Wetlands	9 events attended. 70 rainbarrel entries received. Press conference for Whitaker complete.
Communications	Create and update material and publications for social media, website, seasonal Enews, and local publications. Make all sections of the website active. Create and maintain communications to promote public awareness for responsible use of our water resources.	Appear in at least 6 news articles in local papers. Appear in at least 3 City/Township newsletters with opportunities and education. Reach 200 visits on website.	13 City/township newsletters. 2 City Newsletters. 7,566 website visits.
K-12	Develop youth involvement opportunities and programs that improve/benefit VLAWMO's goals and activities: Macroinvertebrates field days, STEM lessons. Reach multiple age demographics through school involvement. Assist schools in establishing and maintaining stormwater best management practices (BMP's).	Reach 10% of the school age population in 2018 through education and BMP maintenance. At least 5 adults will contact VLAWMO about cost-share grants as a result of hearing about their student's school activities.	3% of school age population reached. 0 adults contacted VLAWMO.
Citizen Science	Picture posts will be a new initiative for VLAWMO to explore phenology (ice-out, algae blooms) and AIS monitoring, with support from volunteers. Citizens assist lake monitoring each year through the Citizen Lake Monitoring Program (CLMP).	Picture posts will be a new initiative for VLAWMO to explore phenology (ice-out, algae blooms) and AIS monitoring, with support from volunteers. Citizens assist lake monitoring each year through the Citizen Lake Monitoring Program (CLMP).	3 Picture Posts installed. 3 lakes collected by volunteers for monitoring season.

 **MONITORING PROGRAM**

SUB-WATERSHED

	Project Name	Description	Goals: Going into 2018	Goals: 2018 Result
Lambert Creek	E. coli Sourcing	Dry and wet weather monitoring of the Goose, Oakmede, County Road F, and Whitaker sites (wet weather= during rainfall event). Four-year summary is currently in the works, presentation to be completed in 2018.	Complete final report of four-year project, present report to stakeholders.	Final report under review, present to stakeholders in 2019.
Lambert Creek	Lambert Creek monitoring program	Monitor basic phosphorus, nitrogen, Chlorophyll A, chloride, and sediment levels at 6 sites along with pH, conductivity and DO at the 3 flumes. Maintain automated flow meter and precipitation gauge at Whitaker.	Document and evaluate the general health of the creek.	Monitoring complete, no change in creek health.
Multiple	Lake Level Program	Gilfillan, Birch, Gem & Goose Lake gauges are calibrated in the spring and read up to 11 times during the summer.	Monitor lake levels on 4 targeted lakes in the watershed to track short & long term trends.	Complete.
Multiple	Lake Surveys	VLAWMO will work with Ramsey Conservation District to perform bathymetry and vegetation surveys on Wilkinson and Charley Lakes and with Blue Water Science to perform fish surveys on East & West Goose Lakes and Wilkinson Lake. These surveys assist in determining future management of the lakes.	Complete all identified surveys.	All identified lake surveys complete.
Multiple	Stormwater Monitoring	Automated and manual sampling, including flow measurements on targeted streams into Birch Lake.	Document watershed nutrient loading into Birch Lake to assist selection of implementation strategies.	2nd season of stormwater monitoring completed at Birch Lake.
Multiple	Chloride Measurements	Sample lakes and Lambert Creek for chloride levels. Partner with Birch Lake Improvement District (BLID) for summer monitoring of Birch Lake	Check monthly measurement	Complete.
Multiple	Lake Monitoring Program	Monitor chemistry of 12 of VLAWMO's lakes through nutrient and sediment sampling, along with pH, conductivity, and dissolved oxygen (DO) measurements. Continue integration of automated sampling.	Keep water quality record of watershed's lakes. Utilize water quality data for future projects and CIPs.	Complete.

Review of 2018 Work Plan



ADMINISTRATION & REGULATION

Project Name	Description	Goals: Going into 2018	Goals: 2018 Results
Budget & Stormwater Utility	Storm sewer rates are based on the adopted budget and certified to the counties for collection.	Provide necessary financing for watershed.	Storm sewer rates certified by counties, providing for watershed funding.
Wetland Conservation Act (WCA)	Complete boundary and type & other determinations in consultation with the TEP. Respond to WCA questions.	Administer WCA Rules with VLAWMO as LGU.	Complete.



SUSTAINABLE LAKE MANAGEMENT PLAN (SLMP)

Project Name	Description	Goals: Going into 2018	Goals: 2018 Results
Deel Lake SLMP	A report covering the sub-watershed of Charley Lake on its health and trends, with lake management plans to sustain its health.	Collect background data, share with lake stakeholders to develop a prioritized list of management strategies.	Complete
Charley Lake SLMP	A report covering the sub-watershed of Charley Lake on its health and trends, with lake management plans to sustain its health.	Collect background data, share with lake stakeholders to develop a prioritized list of management strategies.	Complete

 CAPITAL IMPROVEMENT PROJECTS

SUB-WATERSHED

	Project Name	Description	Goals	Timeline
Goose Lake	Goose Lake Improvement	Work with contracted engineer using Watershed-based Funding to identify 3 BMP's with 60% design completion, choosing one project for 100% design and installation in 2019. Vegetation and ecosystems management. Reapply for 2020 CWF grant for alum treatment.	Alum Grant Channel restoration Stakeholder presentation ID and install BMP project	Grants and restoration ongoing. Stakeholder presentation Jan, 2019.
Lambert Creek	Whitaker Treatment Wetlands	A stormwater treatment project partnering with the U of MN with funding through LCCMR grant funding. Stormwater from Whitaker Pond will be routed to underground wetland treatment cells and then infiltrated into shallow groundwater. Treatment cells contain different sorption material - the study will determine which material is most effective at filtering pollutants. VLAWMO will monitor for nutrients and bacteria, while the U of MN will monitor for pathogens.	Complete 2nd season of monitoring. Partner with the U of M to monitor pathogens.	June 2020.
Goose Lake	Oak Knoll Pond Spent Lime Study	Partner with Barr Engineering for spent lime treatment and monitoring on Oak Knoll Pond (tributary to Goose Lake). VLAWMO staff will assist in monitoring efforts, supported by homeowner and City coordination.	Complete spent lime treatment and seasonal storm monitoring.	Spent lime May-June Monitoring June-Oct
Lambert Creek	Birch Lake: 4th & Otter Lake Road Project Development	VLAWMO will work with a consultant to assess the options for BMPs at the 4th and Otter Lake Rd site. Conceptual designs of best possible projects will be completed and VLAWMO will work with its partners to finalize design and secure funding for 2019 installation.	Installation of project. Complete partner agreements.	Installation Nov 2019, Grant completion 2020.

2019 Work Plan

GRANT PROGRAMS

CORE ACTIVITY #

3.4

3.4

3.3

Project Name	Description	Goals	Time line
Landscape Level 1	Establish relationships and provide grants to property owners within the watershed to install water quality enhancement projects.	Install at least 10 projects Achieve .25 lbs of phosphorus/year removed from local waters.	November, 2019
Landscape Level 2	Landscape Level 2 Cost Share Program is aimed at assisting landowners with implementing larger BMP projects within the watershed. Preference for projects that have high visibility, educational value and/or local citizen support.	Install at least 1 project. Achieve .25 lbs of phosphorus/year removed from local waters.	November, 2019
Community Blue	A communication and outreach grant program to provide money for projects big and small that otherwise might not qualify for other grant awards. Projects must provide education and outreach benefits that directly relate to water quality.	Complete 3 active grants initiated in 2018. Secure all results and grant measurables through collection of final reports.	Ongoing, based on grant timelines



Wildlife gathering on East Vadnais Lake



PUBLIC EDUCATION AND OUTREACH

CORE ACTIVITY #

	Project Name	Description	Goals	Time line
3.3	Watershed Action Volunteers (WAV)	The WAV consists of Master Water Stewards (Freshwater partnership), Citizen Advisory Commission (CAC), and VLAWMO-specific volunteers who have their own volunteer job description.	Plan, mentor, and complete job descriptions with two VLAWMO-specific volunteers.	Feb - Aug
			Guide and complete two Master Water Steward capstone projects.	Ongoing
			Hold three CAC meetings throughout the year, each achieving tangible insight for VLAWMO.	Feb-Nov
	Workshops	Workshops educate residents on watershed processes, raingarden and native plant function, and installation. They also introduce VLAWMO's cost-share program to participants and encourage them to apply.	Hold a raingarden workshop, native plant workshop, and general sustainable landscaping workshop. At least 3 residents who attend a raingarden or native plant workshop will pursue a cost-share grant.	Workshops: April-May Cost-share: ongoing
3.3	Community Events	Staff a VLAWMO booth at various community events. Develop information and engagement components for community events. A rainbarrel giveaway contest is used to attract event goers, and number of entries signify how many people stopped by the VLAWMO booth. Prizes such as tote bags, boating kits, and craft soda will be provided for free to guests who engage the booth.	Attend at least 6 community events annually. Accrue at least 1 new volunteer. Grow general email list by 150 people, volunteer email list by 15 people.	Feb-September
3.3	Communications	Create and update material and publications for social media, website, seasonal Enews, and local publications. Make all sections of the website active. Create and maintain communications to promote public awareness for responsible use of our water resources.	Appear in at least 6 news articles in local papers. Appear in at least 3 City/Township newsletters with events and education opportunities. Maintain weekly social media postings all year. Maintain monthly blog and news postings on the VLAWMO website. Create at least 4 neighborhood spotlight articles.	Ongoing

2019 Work Plan



MONITORING PROGRAM

SUB-WATERSHED

	Project Name	Description	Goals	Time line
Lambert Creek	<i>E. coli</i> Sourcing	Dry and wet weather monitoring of the Goose, Oakmede, County Road F, and Whitaker sites (wet weather= during rainfall event). Four-year summary is currently in the works, presentation to be completed in 2018.	Complete final report of four-year project, present report to stakeholders.	Dec, 2019.
Lambert Creek	Lambert Creek monitoring program	Monitor basic phosphorus, nitrogen, Chlorophyll A, chloride, and sediment levels at 6 sites along with pH, conductivity and DO at the 3 flumes. Maintain automated flow meter and precipitation gauge at Whitaker.	Document and evaluate the general health of the creek.	Ongoing.
Multiple	Lake Level Program	Gilfillan, Birch, Gem & Goose Lake gauges are calibrated in the spring and read up to 11 times during the summer.	Monitor lake levels on 4 targeted lakes in the watershed to track short & long term trends.	Ongoing,
	Stormwater Monitoring	Automated and manual sampling, including flow measurements on targeted streams into Birch Lake and Wilkinson Lake.	Document watershed nutrient loading into Birch and Wilkinson to assist selection of implementation strategies.	Ongoing.

2019 Work Plan

MONITORING PROGRAM

SUB-WATERSHED

	Project Name	Description	Goals	Time line
Multiple	Lake Monitoring Program	Monitor chemistry of 12 of VLAWMO's lakes through nutrient and sediment sampling, along with pH, conductivity, and dissolved oxygen (DO) measurements. Continue integration of automated sampling.	Keep water quality record of watershed's lakes. Utilize water quality data for future projects and CIPs.	March - September
Birch	Chloride Measurements	Sample lakes and Lambert Creek. Partner with Birch Lake Improvement District (BLID) for summer monitoring of Birch Lake.	Check monthly measurement.	Jan - September

ADMINISTRATION & REGULATION

CORE ACTIVITY #

	Project Name	Description	Goals	Time line
3.1	Budget & Stormwater Utility	Storm sewer rates are based on the adopted budget and certified to the counties for collection.	Provide necessary financing for watershed.	April - October
	Plan Amendment		Complete plan amendment and approval by VLAWMO Board.	April-June
3.5	Wetland Conservation Act (WCA)	Complete boundary and type & other determinations in consultation with the TEP. Respond to WCA questions.	Administer WCA Rules with VLAWMO as LGU.	Ongoing

2019 Work Plan



SUSTAINABLE LAKE MANAGEMENT PLAN (SLMP) - 2019 WORK PLAN

Project Name	Description	Goals	Time line
Pleasant Lake SLMP	A report covering the sub-watershed of Deep Lake on its health and trends, with lake management plans to sustain its health.	» Collect background data, share with lake stakeholders to develop a prioritized list of management strategies.	Jan, 2019



Pickerel Weed in Gem Lake

LOGISTICS:

Financial statement and budget

IN THIS SECTION

- » Finance and Budget
- » WCA Summary
- » Water Standards
- » Local Plan Adoption
- » Biennial Solicitations

Wetland Conservation Act (WCA)

VLAWMO administers the Wetland Conservation Act with review. There were 33 landowner contacts in which wetland related technical assistance was provided during 2018. There were 5 potential WCA violation sites investigated, all 5 were resolved.

WCA SUMMARY

Type of Application	Approved	Denied	Withdrawn
Boundary and Type	9	0	0
No-Loss	2	0	0
Exemption	3	0	0
Sequencing	0	0	0
Replacement Plan	0	0	0

Local Plan Adoption

Adoption of Local Plans: Gem Lake, Lino Lakes, North Oaks, White Bear Lake, White Bear Township, Vadnais Heights are all complete and have been adopted.

Member Community	Last Local Water Plan Update Year
Gem Lake	2018
Lino Lakes	2018
North Oaks	2009
Vadnais Heights	2018
White Bear Lake	2007
White Bear Township	2010

Partnerships

One of VLAWMO's greatest successes is working together with partners to use resources wisely and maximize effectiveness. Workshops, meetings, and webinars allow VLAWMO to be on the cutting edge of the water resources in the Northeast Metro.

- » Metro Watershed Partners provides monthly meetings to keep updated with other watersheds, receive feedback and strategy assistance, as well as hear from guest speakers to enhance education and outreach efforts.
- » Ramsey County GIS User Group focuses on sharing, developing, and promoting GIS data and technology. As a member agency, VLAWMO contributes and receives data, and has a voting hand in the content the Group funds and develops. Regular RCGISUG membership fees go to producing aerial images of Ramsey County and other GIS data.
- » Ramsey Conservation District holds informative forums on topics of general concern (AIS, State of the Waters, groundwater). They also provide technical assistance for lake studies and BMP design. Lastly, they provide financial partnership in grant funding of projects.
- » Many other organizations and groups (p. 35) help carry out VLAWMO's mission through events, outreach strategies, and project planning.

Biennial Solicitation for Proposals

Proposals for professional auditing services and legal services will be solicited for in 2020.

2018 Partners

- » Metro Watershed Partners
- » Ramsey County GIS User Group
- » Ramsey Conservation District
- » Vadnais Heights Economic Development Corp.
- » Birch Lake Improvement District
- » North Oaks Home Owners Association
- » Tamarack Nature Center
- » Minnesota Pollution Control Agency
- » MN Erosion Control Association
- » Conservation Minnesota
- » H₂O for Life
- » SCC Local Cable TV
- » White Bear Lake School District
- » White Bear Preserve Town homes
- » Cities in VLAWMO



Volunteer stormdrain clean-up events.

Special Thanks



Each year our fabulous partners provide leadership, guidance, resources, and support for our goals. 2018 saw the completion of some efforts, as well as the closing of some eras. VLAWMO would like to thank:

- » Mark Graham: Mark provided over 11 years of service to VLAWMO on the Technical Commission (pictured above).
- » Della Young: Della provided guidance and support in the conception of the Whitaker Treatment Wetlands, which is now completely constructed and operating.
- » Ramsey Soil and Water Conservation Division: RSWCD provided expertise in plant identification, project planning, and bathymetry data.
- » Jeff Melcoch: Jeff recorded multiple presentations for VLAWMO, complete with editing.
- » Rika Pennington and Connie Winterhalter: As residents and members of the Watershed Action Volunteers (WAV), Rika and Connie have been leaders in stormdrain clean-up and adopt-a-drain efforts in 2018.

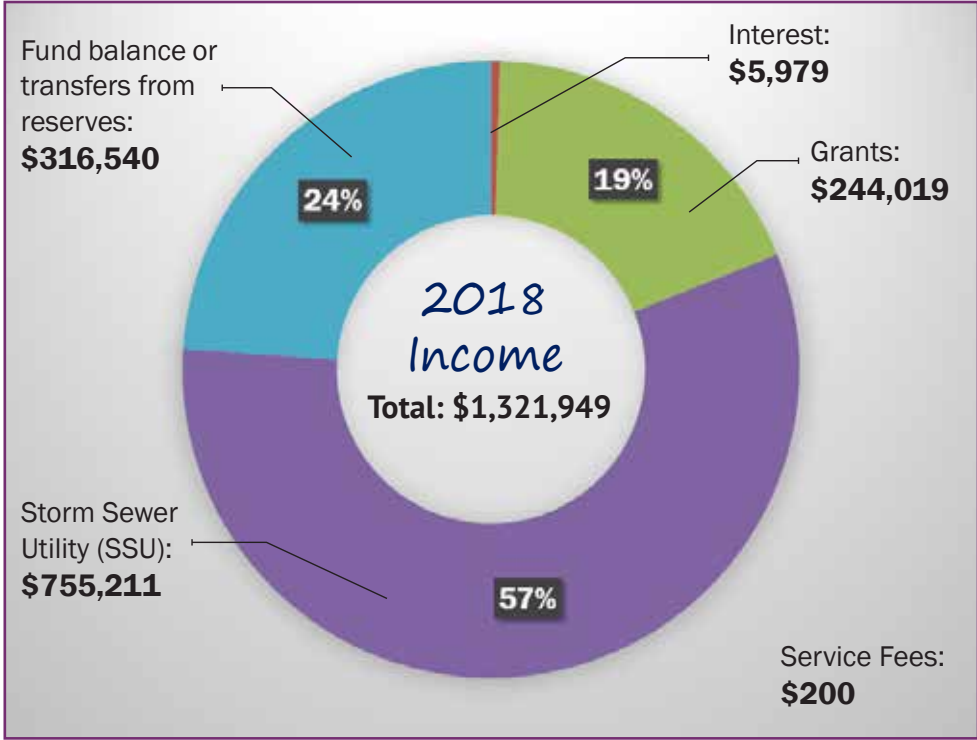


Andrea at RSWCD recording shoreline vegetation at Deep Lake.

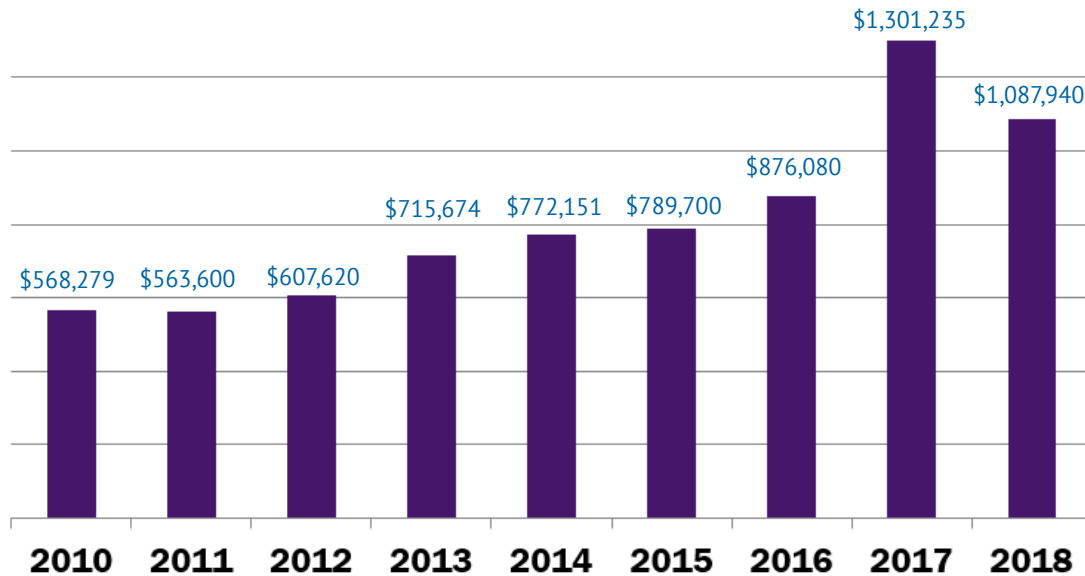
Finance and Budget

The 2018 budget was established by the Board of Directors in June with designated project and program funds carried over in December 2017. The Finance and Policy Committee with members from the Technical Commission and the Board reviewed and made recommendations on the 2018 budget to the Board in June 2017. The Board added additional funds to address two priorities: 1) The understanding and maintenance of Lambert Creek required historical reviews, surveying and modeling of the system as well as consultation with the VLAWMO attorney. 2) A focus on Goose Lake and its subwatershed. Funds to complete feasibility studies, targeted sampling, and grant applications were needed.

Approved budget for 2018: \$1,087,940
Actual income from 2018: \$1,321,949
Money spent in 2018: \$780,275

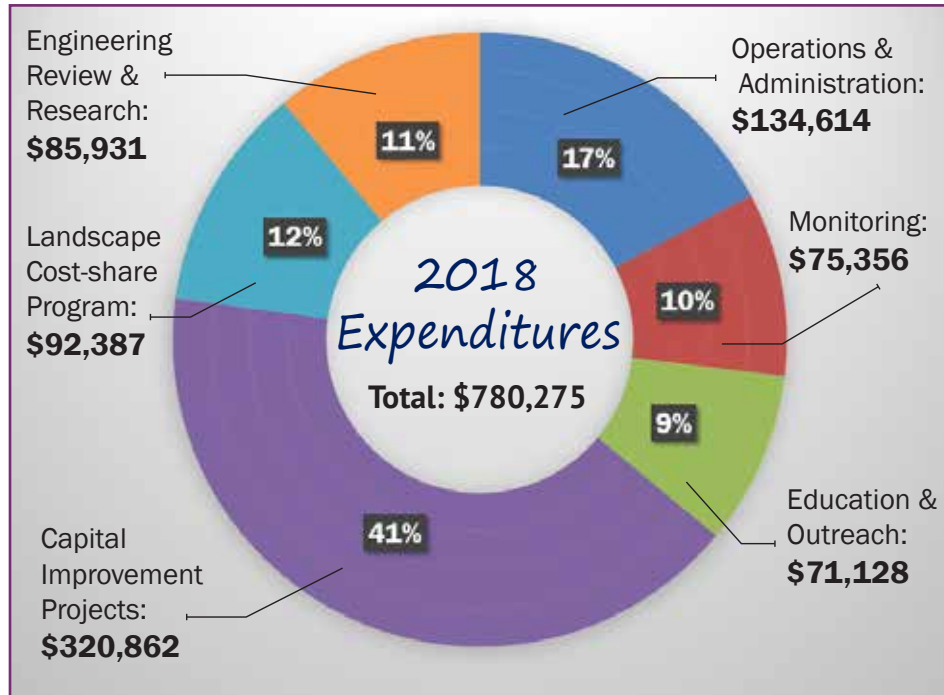


Annual Budget with Fund Balance



INCOME

The mainstay of support for VLAWMO work comes from its Storm Sewer Utility (SSU) fees. These fees are based on an estimate of impervious surface for each parcel of land that is in line with its land use classification. \$ 752,436.12 in SSU was certified to Ramsey and Anoka Counties for 11,502 parcels. The average single family homeowner paid \$ \$42.36 per year to support all of the projects and programs conducted by the watershed. That's about \$3.53 per month. The 15.5% increase in storm sewer utility fees allowed VLAWMO's budget to sustainably support the programs and projects of the Water Plan. Ongoing projects resulted in a significant amount of funding being carried over from 2017 to 2018 and again into 2019.



CAPITAL IMPROVEMENT PROJECTS

Installation of the Whitaker Treatment Wetlands was completed in 2018 and monitoring began (see page 20). The focus of the project is to research new ways to filter bacteria, excess nutrients, and pathogens out of stormwater runoff. A linked study on pathogens will be done by the University of Minnesota.

Design of the 4th and Otter hot spot remediation project for Birch Lake was nearing completion with the close of 2018. The partners include White Bear Lake, Ramsey County, the Birch Lake Improvement District and VLAWMO along with Barr Engineering. Together all are working hard to complete the preparations for a 2019 installation. The sand-iron filter should be influential in addressing neighborhood runoff that has been loading nutrients into Birch Lake.

Goose Lake work received a substantial boost from the Watershed Based Funding (WBF). These funds from the State's pilot grant will be harnessed to complete modeling and a feasibility study of the Goose Lake subwatershed, along with installation of a best management practice in 2019. VLAWMO will continue to pursue grant funding for an in-lake treatment of Goose Lake.

A full survey of Lambert Creek formed the basis of hydraulic and hydrologic modeling of the creek system and its branch ditches. VLAWMO partnered with Vadnais Heights to complete the study and prioritize maintenance needs.

EXPENSES

Total cash expenses for 2018 were less than budgeted at \$780,277. Funding for Sucker channel restoration and work on Lambert Creek and Goose Lake will be carried over into 2019. The Whitaker treatment cells project was installed in 2018 with the help of grant funding from the Legislative Citizens Commission for Minnesota Resources. Studies on Goose, Wilkinson and Deep Lakes were also completed setting the stage for the next phase of projects. Further financial detail is available in the annual audit attached as an Appendix to this Report.

GRANTS AND PARTNERSHIPS


Grant funds received in 2018 totaled \$244,536. The LCCMR supported the Whitaker Treatment wetlands installation (\$166,516). Clean Water Legacy funding supported the Birch Lake hot-spot remediation project targeting nutrient loading to one of the cleanest lakes in the watershed (\$48,500) and completing a robust feasibility study on the Goose Lake subwatershed (\$29,520). Much of the Legacy funds have been carried over as the projects continue into 2019. Wetland Conservation Act reimbursement funds totaled \$1380.



VLAWMO staff at the Whitaker Treatment Wetlands

WHO WE ARE:

The people who make VLAWMO

 **IN THIS SECTION**

- » Staff
- » Consultants
- » Partnerships
- » Board of Directors
- » Technical Commission (TEC)

The VLAWMO office is located at:

800 E County Road E
Vadnais Heights, MN
55127

Who we are:

VLAWMO Employs five full-time staff for everyday operations. Consultants are required for a variety of purposes including auditing, bookkeeping, engineering, and technical assistance. The VLAWMO Board of Directors consists of one elected official from each of the six cities within the watershed. Each board member is appointed for a three year term. The VLAWMO Technical Commission consists of one citizen representative from each of the six cities. The Technical Commission meets to review and consider watershed business as well as make recommendations to the Board for wider scope decisions.

BOARD OF DIRECTORS (BOD)**Primary Directors****Dan Jones, Chair**

1956 Lakeaires Blvd
White Bear Lake, MN 55110
651.283.6097

Jim Lindner, Treasurer

4200 Otter Lake Rd
Gem Lake, MN 55110
651.492.5083

Marty Long

10 Larch Lane
North Oaks, MN 55127
651.407.8507

Ed Prudhon

470 Otter Lake Rd
White Bear Twp, MN 55110
651.426.2311

Terry Nyblom

715 Hiawatha Ave
Vadnais Heights, MN 55127

Rob Rafferty

1573 Merganser Ct
Lino Lakes, MN 55038
651.982.2492

Alternate Directors

Bill Walsh
White Bear Lake

Rick Bosak
Gem Lake

Gregg Nelson
North Oaks

Bob Kermes
White Bear Township

Craig Johnson
Vadnais Heights

Dave Roeser
Lino Lakes

TECHNICAL COMMISSION (TEC)**Commissioners can be reached by contacting VLAWMO**

Primary
Mark Graham, Chair
Vadnais Heights

Gloria Tessier
Gem Lake

Jim Grisim
White Bear Lake

Bob Larson, Treasurer
North Oaks

Paul Duxbury
White Bear Township

Marty Asleson
Lino Lakes

Alternate
Kevin Watson
Vadnais Heights

Gretchen Artig-Swomley
Gem Lake

Connie Taillon
White Bear Lake

Diane Gorder
North Oaks

Tom Riedesel
White Bear Township

No alternate available
Lino Lakes

STAFF

Stephanie McNamara
Administrator
 stephanie.o.mcnamara@vlawmo.org
 651.204.6073

Dawn Tanner, PhD
Program Development Coordinator
 dawn.tanner@vlawmo.org
 651.204.6074

Brian Corcoran
Water Resources Manager
 brian.corcoran@vlawmo.org
 651.204.6075

Nick Voss
Education and Outreach Coordinator
 nick.voss@vlawmo.org
 651.204.6070

Tyler Thompson
GIS Watershed Technician
 tyler.thompson@vlawmo.org
 651.204.6071

CONSULTANTS

Abdo, Eick & Meyers LLP.
 5201 Eden Ave. Ste. 250
 Eden Prairie, MN 55436
 952.835.9090

Burns & McDonnell
 8201 Norman Center Dr
 Bloomington, MN 55437
 952.656.6003

Ehlers & Associates
 3060 Centre Point Dr
 Roseville, MN 55113
 651.697.8500

HDR Engineering, Inc.
 701 Xenia Ave. S. Ste. 600
 Minneapolis, MN 55416
 763.591.5400

Houston Engineering Inc.
 6901 E Fish Lake Rd
 Maple Grove, MN 55369
 763.493.4522

Humphrey Bookkeeping
 14214 Geneva Way North
 Hugo, MN 55038
 651.426.4900

Kennedy & Graven, Chartered
 200 South Sixth St. Ste. 470
 Minneapolis, MN 55402
 612.337.9215

Ramsey Conservation District
 1425 Paul Kirkwood Dr
 Arden Hills, MN 55112
 651.266.7270

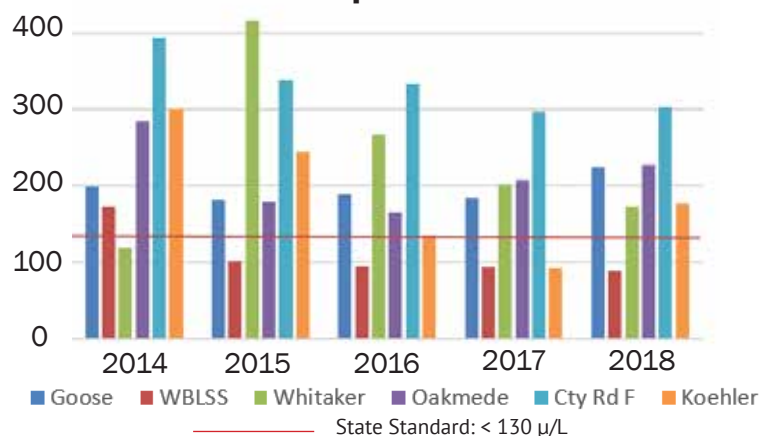
St Paul Regional Water Service
 1900 Rice St
 St Paul, MN 55113
 651.266.6350

Wenck Associates
 1800 Pioneer Creek Center
 P.O. Box 249
 Maple Plain, MN 55359
 763.479.4200



Lambert Creek

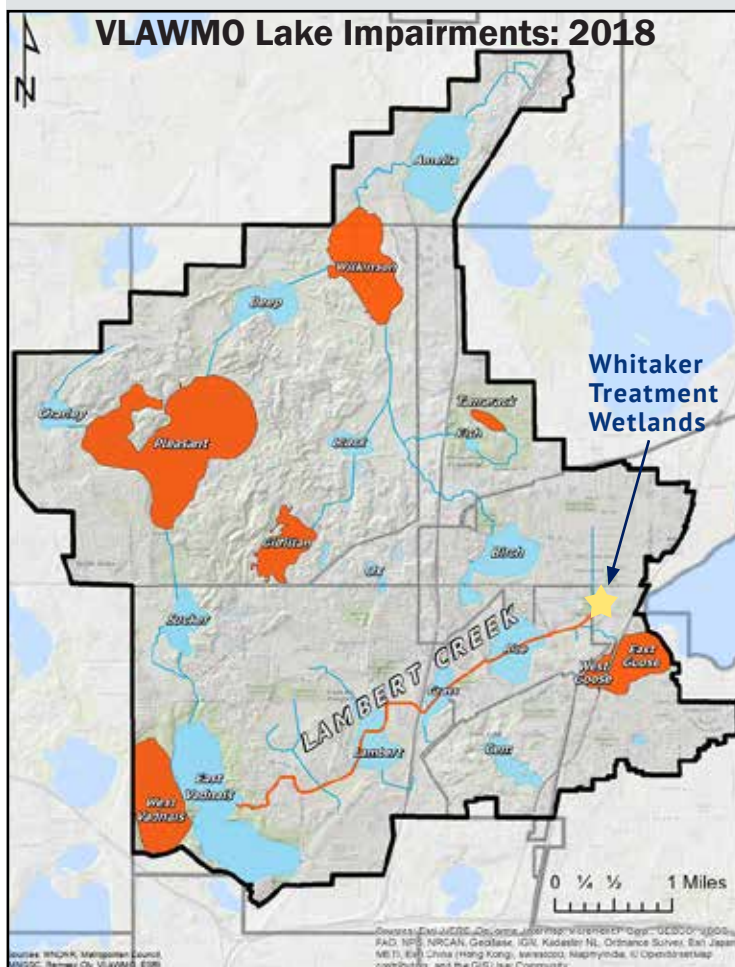
Historical Total Phosphorus of Lambert Creek



Lambert Creek is impaired for being high in nutrients and bacteria. Six sample sites are taken along the creek to assess contaminants in different parts of the watershed. E. coli levels have been detected as primarily avian and canine.

In 2018, VLAWMO partnered with Houston Engineering to create a complete hydraulic model of the Lambert Creek drainage system. This model serves to identify areas for repair or maintenance, and is a reference for future planning and problem solving. VLAWMO is the ditch authority for Lambert Creek under the state of MN, charged with maintaining a reasonably functioning ditch with the help of its partnering Cities.

Visit VLAWMO.org to learn what's being done to resolve these issues and see how you can be a part of the solution!



Whitaker Treatment Wetlands

The Whitaker Treatment Wetlands is a research project investigating new ways to treat stormwater runoff. Completed in 2018, data will be collected until 2020 to analyze how various materials treat contaminants such as phosphorus, nitrogen, and E. coli bacteria.

Samples are gathered before (pre) and after (post) storm events and at various points within the 3 treatment cells. Each cell consists of layers of gravel, sand, and a unique mix of specialized sorptive media (concrete, peat, clay, tire crumb). Sampling is staggered over a period of days as water moves through the system. At right, E. coli levels are lower after water travels through the cells. The lowest level is seen in cell 3. These results may indicate that the composition in cell 3 is the most beneficial for removing E. coli bacteria. Research will continue until 2020 to replicate and investigate these results, making recommendations for future water treatment projects.

Whitaker Treatment Wetlands E. coli Samples Surrounding a Storm Event: 9/4/2018



Image: Burns & McDonnell



Brian Corcoran
Water Resources Manager
brian.corcoran@vlawmo.org
(651) 204-6075

Vadnais Lake Area Water Management Organization

2018 Water Monitoring Report Summary



VLAWMO's monitoring program consists of:

- 12 Lakes
- Lambert Creek
- Water quality sampling every other week from May to September
Phosphorus, nitrates, chlorophyll-A, chloride, turbidity, bacteria, pH, and storm sampling



See the complete report at www.VLAWMO.org/resources/reports

2018 Lake Notes

A summary of significant watershed issues.

See the 2018 water monitoring report at vlawmo.org/reports for more information.



Gem Lake: Gem Lake's chemistry has improved, coinciding with a 2014 Highway 61 swale reconstruction. The improved swale may be capturing nutrients and sediment that drained into the lake from a large parking lot. After 10 years on the State Impaired List and continued monitoring, the Minnesota Pollution Control Agency (MPCA) officially de-listed Gem Lake in 2018. This success story demonstrates that lake improvements are possible!



Gilfillan Lake: One of VLAWMO's lakes on the State Impaired List, Gilfillan data show a nutrient increase over 5 years. An augmentation system was installed in 2012 to raise the water level, and also provided dilution that improved the water quality. Gilfillan and its subwatershed is now maintaining its water level on its own, as no augmentation has occurred since the installation.

Goose Lake (East & West): Goose Lake has had high nutrient levels since VLAWMO began monitoring in 1997 (East) and 2006 (West). A 2015 bullhead removal (pictured right) made minor impacts to lake health, serving to reduce internal loading, which is one of several factors contributing to the lake's impairment. A 2017 fish survey indicated that the bullhead population is under control. Wood Lake/Oak Knoll Pond is a neighborhood pond that feeds into Goose Lake, is the focus of a spent lime treatment study in 2019. Follow the study and connect to public engagement meetings at vlawmo.org.



Wilkinson Lake: Wilkinson's phosphorus levels are above State standards but its Chlorophyll A level is below. Studies have detected high nutrient levels draining into Wilkinson from both North and South inlets. Because Wilkinson functions more like a wetland than a lake, it continually cycles nutrients through the water column. Its water quality may be especially sensitive to inputs from the surrounding watershed (sediment, agricultural runoff, grass clippings, etc). This question is currently being studied and addressed in the 2017 Wilkinson feasibility study. Visit vlawmo.org/waterbodies/lake-wilkinson for the full report. Reducing upland nutrient and sediment loads in the future are likely to promote the health of Wilkinson and downstream Deep Lake.

Tamarack Lake: A floating island wetland was installed at Tamarack in 2015 to reduce lake nutrient levels. Lake data indicates that the island was undersized, which helps inform future experimental treatments. Tamarack is currently on the State Impaired List.

VLAWMO Lake Grades:

Lake	2017	2018	TSI Status
Amelia	B+	B+	Eutrophic
Birch	B+	A-	Mesotrophic
Black	A-	B+	Mesotrophic
Charlie	C+	C	Eutrophic
Deep	C	C-	Eutrophic
Gem	B	B	Mesotrophic
Gilfillan	C	C	Eutrophic
E. Goose	D	D-	Eutrophic - Hypereutrophic
W. Goose	D	D-	Eutrophic - Hypereutrophic
Tamarack	D-	D-	Eutrophic - Hypereutrophic
West Vadnais	D-	D-	Eutrophic - Hypereutrophic
Wilkinson	C	C	Eutrophic

Definitions:

TSI: Trophic Status Indicator. The trophic status of a lake pertains to its nutrient levels, which helps assess lake health. TSI is calculated from monitoring data and converted into a lake grade for familiarity.

Oligotrophic: Low nutrient levels and abundant oxygen.

Mesotrophic: A moderate amount of dissolved nutrients, less than eutrophic waterbodies.

Eutrophic: Rich in nutrients, supporting a dense plant population and/or large algae blooms.

Hypereutrophic: Exceptionally high nutrient levels that risk low dissolved oxygen and prolific algae blooms, posing threat to fish and other aquatic life.

Eutrophication is the process of nutrient loading into a waterbody from the surrounding watershed (i.e. upland area).

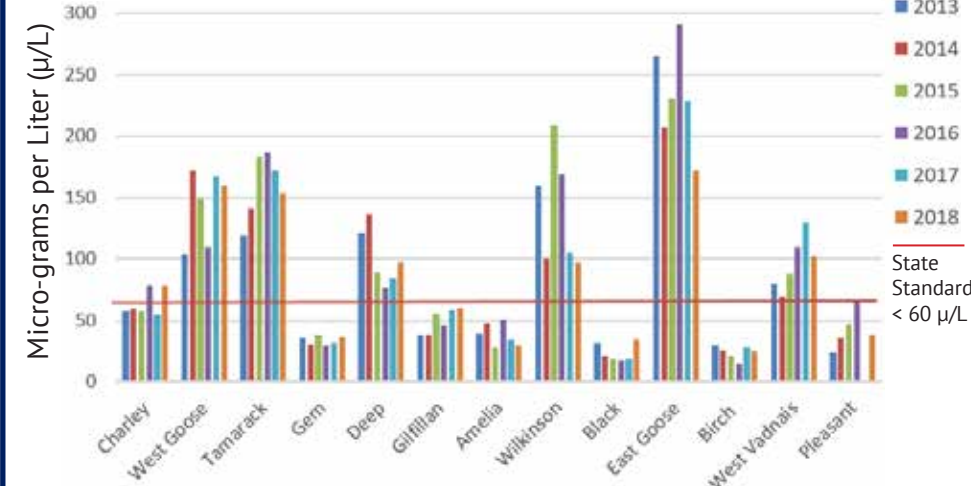
Eutrophication is a natural process that can be accelerated by human activity and is difficult to reverse.

Lake Summaries

Individual lake reports are available in the 2018 water monitoring report at vlawmo.org/reports

for more information. Visit vlawmo.org/waterbodies for more info, studies, reports, and lake fact sheets.

Average Total Phosphorus (TP) in VLAWMO Lakes 2013-2018



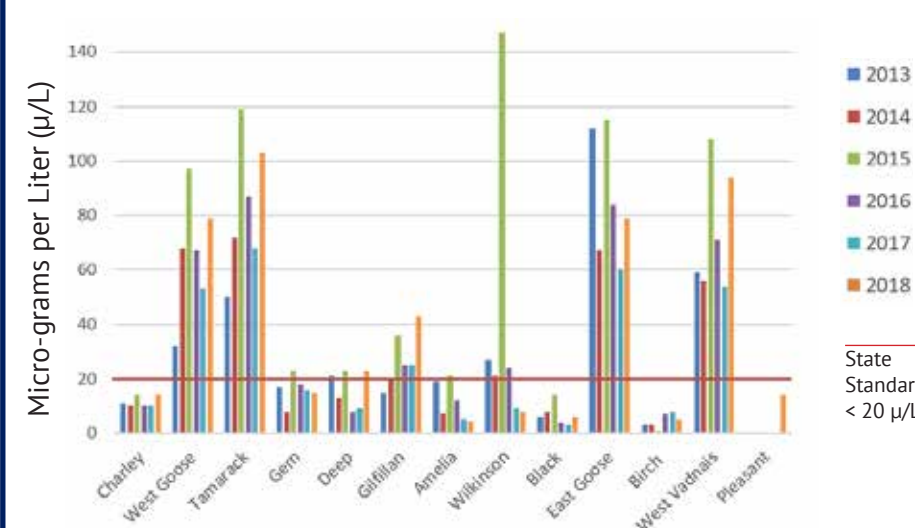
Phosphorus: What is it?

A naturally occurring nutrient. In water, phosphorus is a main driver of algae growth. 1 lb. of phosphorus can produce up to 500 lbs. of algae in a lake. Increased algae levels create a variety of lake issues, including low oxygen, poor light penetration, and reduced fish and wildlife habitat.

What the data says:

6 of our lakes exceed the State phosphorus standard.

Average Chlorophyll-A (Cl-A) in VLAWMO Lakes 2013-2018



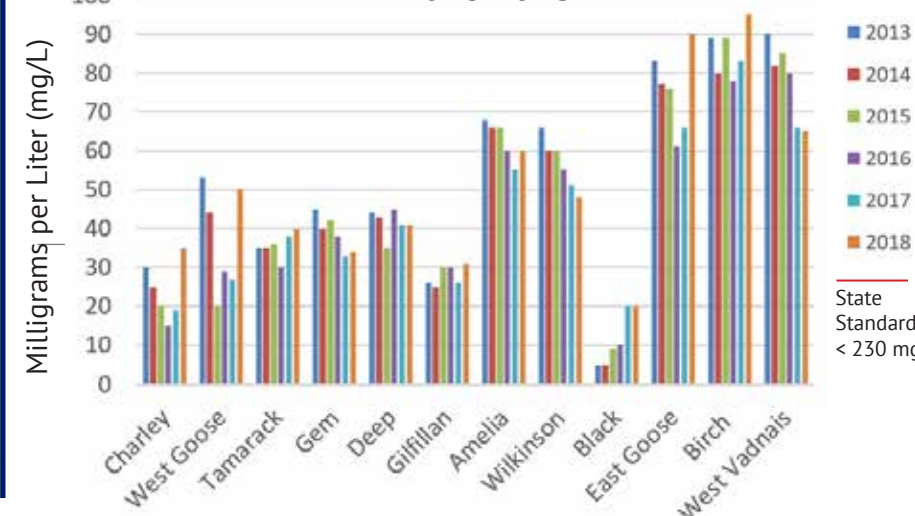
Chlorophyll-A: What is it?

A pigment that helps plants produce food. It is the green color found in algae and other plants. The concentration of chlorophyll present in the water is directly related to the amount of algae living in the water.

What the data says:

6 lakes of our exceed the State Chlorophyll-A standard. They are the same lakes that are high in TP, demonstrating the relationship between Cl-A and TP. For a lake to be listed as "impaired", it must show a trend in being above standards in 2 of the 3 readings: Cl-A, TP, and/or Secchi disk (turbidity).

Average Chloride (Cl) in VLAWMO Lakes 2013-2018



Chloride: What is it?

A common ingredient in de-icers such as sodium chloride (rock salt). Chloride is a permanent pollutant to water quality, requiring only 1 tsp. to pollute 5 gallons of water. Toxic to aquatic life, chloride also interrupts natural temperature and nutrient cycles in lakes.

What the data says:

We have no water bodies impaired for chloride. As water flushes through lakes, overall chloride level can drop over time. However, Birch, Black, and Gilfillan are showing gradual upward trends.

OPERATIONS & OUTREACH

VLAWMO's primary source of income is Storm Sewer Utility (SSU) fees. The average single family homeowner in VLAWMO pays \$28.92/year (\$2.41/month) to support projects and programs that improve the watershed.

Additional funding for projects comes from grants from the Minnesota Board of Water and Soil Resources (BWSR) and the Legislative-Citizen Commission on Minnesota Recourses (LCCMR).

OUTREACH

Outreach initiatives for 2018 covered all ages and almost every community in the watershed. Examples include:

- Picture posts installed on Sucker and Pleasant Lakes.
- Over a dozen newspaper articles
- Stakeholder meetings for Goose Lake improvement efforts.
- Continued growth in volunteer activity, including stormdrain clean-ups and adopt-a-drain.



- Native plant and raingarden workshops
- Raingarden maintenance efforts with schools (pictured below).



Looking Ahead

SPENT LIME STUDY

VLAWMO is working with Barr Engineering to conduct a spent lime study in Oak Knoll Pond/Wood Lake. As a feeder pond into Goose Lake, this study will analyze the effect of spent lime on excess nutrient levels. Results will inform future treatment options for Goose Lake, which is listed as impaired by the State of Minnesota.



Water stewardship includes everyday lawn care, fixing auto leaks, proper use of de-icers, water conservation, and more. Learn how to help on our website under the 'Residents' tab. Check out the Watershed Action Volunteers (WAV) or adopt a nearby stormdrain to be a leader.

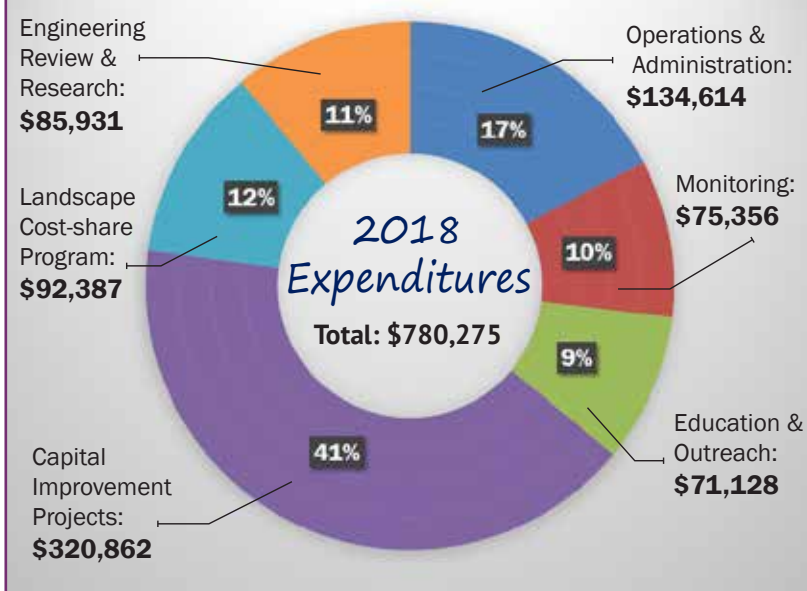
www.vlawmo.org



2018 Quick Stats:



FINANCE



COST-SHARE PROGRAM

VLAWMO completed 18 cost-share grants in 2018. These grants supported the creation of raingardens, native plantings, permeable pavement, shoreline restoration, and rainbarrels. The projects all together total 56,507 ft², and infiltrate an estimated 123,172 gallons of water per year. 4 of the projects were native plantings, 2 were permeable driveways, 2 were raingardens, 1 was a shoreline restoration, and 9 were rainbarrels.

REGULATIONS

*As a local governing unit, VLAWMO administers the Wetland Conservation Act (WCA). WCA oversees new development as it pertains to wetland conservation. Any wetlands lost to development, by law, are to be replaced either on-site or elsewhere in the state through the purchase of wetland banking credits.

4TH & OTTER HOTSPOT

VLAWMO is working with Ramsey County, the City of White Bear Lake, and Barr Engineering to install a sand-iron filter at 4th and Otter near Birch Lake. This filter will collect of stormwater runoff from 85.3 acres each year. This location has shown to a hotspot for excess nutrients entering Birch Lake.

What can you do?



ANNUAL REPORT SUMMARY

Established in 1983, VLAWMO is a unit of government co-created by Gem Lake, Lino Lakes, North Oaks, Vadnais Heights, White Bear Lake, and White Bear Township. Together, we use science and partnerships to protect and improve the water resources in the watershed.

From the administrator

2018 big things new year lots of busy stuff we rock.



Stephanie McNamara
651-204-6073

stephanie.o.mcnamara@vlawmo.org



2018

Board of Directors:

Dan Jones
White Bear Lake
Chair

Rob Rafferty
Lino Lakes
Treasurer

Marty Long
North Oaks

Ed Prudhon
WB Township

Jim Lindner
Gem Lake

Terry Nyblom
Vadnais Heights

WHAT DID WE DO IN 2018?

Whitaker Treatment Wetlands

After a multiple years of planning and construction, The Whitaker Wetlands project is now up and running.



Three engineered wetland cells are testing which soils are most effective at treating polluted stormwater runoff. Contaminants in focus include excess nutrients and E.coli bacteria (avian and canine). Water samples are taken throughout the growing season. Visit vlawmo.org/projects for more information and a video on how it works.

Raingarden & Native Plant Workshops

Our Spring workshops taught residents how to install raingardens and native plants on their properties. For the second year in a row, the native plant workshop has grown in popularity. Both raingardens and native plantings are covered in VLAWMO's cost-share program. Check out vlawmo.org/grants for grant information and examples of how residents are taking a cooperative strategy to deal with tricky drainage issues.



Lambert Creek

VLAWMO conducted ditch cleaning efforts to keep Lambert Creek (Ditch 14) functioning effectively. A comprehensive study of Lambert Creek's drainage was completed, providing baseline elevations, floodplain information, and guidance for future ditch improvements. Observation of the year's heaviest rainfalls indicate that the creek is operating according to ditch operating laws.

Following a 3.75" rain event, Creek levels rose to 2.1' at Kohler Road in Vadnais Heights. In three days time, water levels receded 1'.



Smart Salting & Turf Maintenance



Working independently and with neighboring watershed districts, VLAWMO provided two workshops for public and private maintenance staff. These workshops instructed on sustainable de-icing and turf practices that reduce impact on the watershed while continuing to provide quality services to the community.

Lake Plans



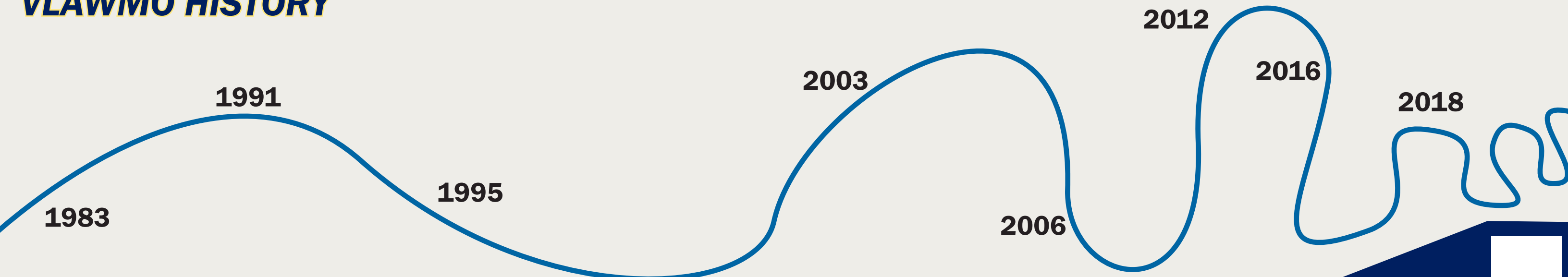
Sustainable Lake Management Plans (SLMP's) were completed for Deep and Charley Lakes. These plans consist of vegetation studies, lake depth studies, analysis of water quality issues, and drainage patterns from the area surrounding the lakes. The plans serve as guides for grant applications and future improvement projects.

The Sucker Channel restoration at Vadnais/Sucker Park is complete. This project was a partnership between Ramsey County Parks, the Saint Paul Water Service, and VLAWMO. The new channel features a stabilized shoreline that protects Sucker Lake and public drinking water with a buffer of native plants.

Sucker Channel



VLAWMO HISTORY



Technical Commission:

Jim Grisim
White Bear Lake
Chair

Mark Graham
Vadnais Heights
Chair

Bob Larson
North Oaks
Treasurer

Marty Asleson
Lino Lakes

Gloria Tessier
Gem Lake

Paul Duxbury
White Bear Township



800 County Road E E, Vadnais Heights, MN 55127
www.vlawmo.org; Office@vlawmo.org

To: Board of Directors

From: Tyler Thompson

Date: February 15, 2019

Re: V. E. Birch Lake – 4th & Otter authorization for bidding

Draft plans for the 4th & Otter retrofit Project, as well as cost estimates are being presented at the Board meeting. Contingent on draft plans approval from partners (City of White Bear Lake, Ramsey County), plans and costs will move to the finalization phase, as well as completion of project bid documents. Upon receiving final plans and bid documents, staff is seeking Board approval to submit the Project for bid for construction.

Recommendation: the Board authorize staff to submit the 4th & Otter project for bid upon receiving final Project bid documents.



800 County Road E E, Vadnais Heights, MN 55127
www.vlawmo.org; Office@vlawmo.org

To: Board of Directors

From: Dawn Tanner

Date: February 20, 2019

Re: V. F. Contract with RCSWCD

We would like to pursue survey work with RCSWCD as discussed at our previous Board meeting. We have a bid and propose to conduct the survey work at Goose, Birch, and bathymetry only at West Vadnais. The full bid is included in the packet. In summary:

Lake	Survey Type	Cost
Goose	Macrophyte	\$3,014
Birch	Bathymetry	\$2,006
Birch	Macrophyte	\$3,014
West Vadnais	Bathymetry + Macrophyte	\$3,734
West Vadnais	Shoreline Vegetation	\$6,480

Total for all surveys: \$18,248

Total for surveys not including West Vadnais Shoreline Vegetation: \$11,768

Recommendation: We request support from the Board to go forward with \$11,768 for lake surveys in 2019.

2019 VLAWMO Lake Survey Proposals

East and West Goose Lakes, West Vadnais Lake, Birch Lake

January 14, 2019

Prepared for:

Vadnais Lake Area Water Management Organization

Prepared by:

Andrea Prichard, Environmental Resource Specialist
Ramsey County Parks & Recreation, SWCD

Scope of Services

Macrophyte Surveys

Macrophyte surveys will consist of data sampling at evenly spaced geo-referenced points throughout the lake to characterize the diversity and abundance of aquatic vegetation using a point intercept survey method. RC-SWCD staff members will also use Lowrance unit and transducer to generate data to produce a biovolume map showing concentration of aquatic vegetation growing in the lake.

Bathymetry Surveys

Bathymetric surveys are completed by connecting a Lowrance unit + transducer to the boat and following pre-determined transect lines across the lake to capture lake bottom depth data. This data is then processed, corrected using physically measured field data points where necessary, and then used to create new contour lines with ArcGIS software. It may be completed in conjunction with Macrophyte surveys when there is a clear enough sonar signal in the lake.

Shoreline Vegetation Surveys

This survey will consist of a quadrat-transect sampling method to characterize the shoreline vegetation of West Vadnais Lake. About 6 transect lines will be mapped perpendicular to shore in highly vegetated areas to represent the diversity of vegetation communities present. Vegetation will be surveyed within 1m x 1m quadrats, spaced at four equal intervals along each transect line. Species abundance in quadrats will be represented in the report as relative coverage, relative density, and relative frequency of occurrence. In addition to the quadrat study, some representative sections of road-side shoreline vegetation will be selected and summarized to characterize the most common plant types and any invasive/noxious species identified in those sections. These roadside vegetation sections will be indicated in a map and described in the report.

EAST AND WEST GOOSE LAKE

Macrophyte Survey*

Goose Lake Macrophyte Survey Estimate*, Spring 2019

Task	Cost/hr	Hours	Cost
Boat Use	unit	-	\$50
BioBase Upload	unit	-	\$300
Lake Survey Prepwork	\$72	5	\$360
Field Work, 1 day (2 people)	\$72	16	\$1,152
Data entry, Curly-leaf Delimitation	\$72	5	\$360
GIS Post-processing and Mapping	\$72	6	\$432
Report Completion	\$72	5	\$360
TOTAL		37	\$3,014

***Note:** This estimate is modified from the November quote submitted to account for the addition of the curly-leaf pondweed delimitation, as well as to reflect the new hourly rate for staff time.

Deliverables

The report will include:

- Description of Methods
- Tables of aquatic vegetation detected showing location, species abundance, and % occurrence in both East & Goose Lakes (1 report).
- Delimitation of Curly-leaf Pondweed in East Goose Lake
- BioVolume Map and numbered Survey Point map to match with aquatic species tables
- Shapefiles including Biovolume, Curly-leaf area, and Point Intercept Location layers



BIRCH LAKE

Bathymetry Survey

Birch Lake Bathymetry Survey Estimate, Spring 2019

Task	Cost/hr	Hours	Cost
Boat Use	unit	-	\$50
BioBase Upload	unit	-	\$300
Lake Survey Prepwork	\$72	4	\$288
Field Work, 1 day (2 people)	\$72	10	\$720
Data entry	\$72	2	\$144
GIS Post-processing and Mapping	\$72	4	\$288
Report/Contour Creation	\$72	3	\$216
TOTAL		23	\$2,006



Deliverables

The bathymetry report will include:

- Description of Methods and Findings
- Bathymetry Map
- Shapefile of 2019 Contour lines

Macrophyte Survey*

Birch Lake Macrophyte Survey Estimate, September 2019

Task	Cost/hr	Hours	Cost
Boat Use	unit	-	\$50
BioBase Upload	unit	-	\$300
Lake Survey Prepwork	\$72	5	\$360
Field Work, 1 day (2 people)	\$72	16	\$1,152
Data entry, EWMF Delimitation	\$72	5	\$360
GIS Post-processing and Mapping	\$72	6	\$432
Report Completion	\$72	5	\$360
TOTAL		37	\$3,014

* Estimate may be modified by adding 7 hours for bathymetry if done during macrophyte survey rather than as a separate survey

Deliverables

The macrophyte report will include:

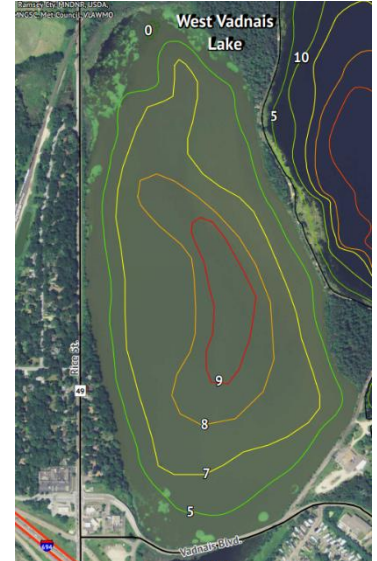
- Description of Methods
- Tables of aquatic vegetation detected showing location, species abundance, and % occurrence
- Delimitation of Eurasian Watermilfoil
- BioVolume Map and numbered Survey Point map to match with aquatic species tables
- Shapefiles including Biovolume, Eurasian Watermilfoil area, and Point Intercept Location layers

WEST VADNAIS LAKE

Bathymetry and Macrophyte Survey

West Vadnais Lake Macrophyte & Bathymetry Survey Estimate, Summer 2019

Task	Cost/hr	Hours	Cost
Boat Use	unit	-	\$50
BioBase Upload	unit	-	\$300
Lake Survey Prepwork	\$72	8	\$576
Field Work, 1.5 days (2 people)	\$72	18	\$1,296
Data entry (Species & Depths)	\$72	6	\$432
GIS Post-processing and Mapping	\$72	7	\$504
Report Completion, Contour Generation	\$72	8	\$576
TOTAL		47	\$3,734



Deliverables

The report will include:

- Description of Methods
- Tables of aquatic vegetation detected showing location, species abundance, and % occurrence
- Bathymetry Map, BioVolume Map and numbered Survey Point map to match with aquatic species tables
- Shapefiles including Biovolume, 2019 Contour Lines, and Point Intercept Location layers

Shoreline Vegetation Survey

West Vadnais Lake Shoreline Vegetation Survey Estimate, late Summer 2019

Task	Cost/hr	Hours	Cost
Shoreline Survey Research/Prep	\$72	12	\$864
Field Work (2 people, 2.5 days)	\$72	40	\$2,880
Data Entry, Follow-up ID	\$72	18	\$1,296
Data Organization, Statistics	\$72	8	\$576
Report Completion	\$72	12	\$864
TOTAL		90	\$6,480

Deliverables

The report will include:

- Description of Methods
- Tables of shoreline vegetation detected showing coverage, density and frequency for individual species, in addition to relative coverage, relative density and relative frequency
- General summary of vegetation in selected representative sections of roadside shoreline
- Shore vegetation survey map with numbered transect lines to match with species tables
- Shapefile of surveyed locations

To: Board of Directors
From: Stephanie McNamara, Administrator
Date: February 15, 2019
Re: V.5. Designation of Legal Counsel and Legal Publication and 2019 meeting dates

1. Legal counsel

VLAWMO seeks proposals for professional services such as legal counsel and auditor. This was done and consultants were selected for a 2 year period. At this point, the Board is confirming the appointments for 2019.

Kennedy & Graven – Troy Gilchrist, current counsel

Recommendation: confirmation of the services of the firm of Kennedy & Graven, principal attorney, Troy Gilchrist for 2019 on an as-needed basis.

2. Legal Publication

Recommendation: that VLAWMO continue to use Press Publication for public notices to our jurisdiction and VLAWMO will advertise in League of MN Cities publication as appropriate.

3. 2018 Meeting dates

Setting of regular meeting dates (4th Wednesday starting Feb.). Please confirm the following or indicate any desired changes:

February 20

August 28

April 24

October 23

June 26

December 11

February-19		Actual 2/1/19	Actual to Date	2019 Budget	2018 carry over/Grants	Remaining in Budget	2019 Available	Act vs. Budget
BUDGET #	INCOME							
5.11	Storm Water Ut	\$15,088	\$15,088	\$836,150	\$0	\$821,062	\$836,150	2%
5.12	Service Fees	\$0	\$0	\$200	\$0	\$200	\$200	0%
5.13	Interest	\$955	\$2,013	\$1,300	\$0	(\$713)	\$1,300	155%
5.14	Misc. income - V	\$0	\$1,311	\$5,000	\$0	\$3,689	\$5,000	26%
5.15	Other Income G	\$0	\$272	\$20,000	\$0	\$19,728	\$0	
5.16	Transfer from re	\$0	\$0	\$0	\$0	\$0	\$0	
	TOTAL	\$16,043	\$18,684	\$862,650	\$0	\$843,966	\$842,650	2%
EXPENSES								
3.1	Operations & Administration							
3.110	Office - rent, cop	\$1,849	\$3,691	\$23,700	\$0	\$20,009	\$23,700	16%
3.120	Information Sys	\$520	\$2,324	\$22,000	\$2,500	\$22,176	\$24,500	9%
3.130	Insurance	\$187	\$187	\$5,200	\$400	\$5,413	\$5,600	3%
3.141	Consulting - Aud	\$0	\$0	\$6,400	\$0	\$6,400	\$6,400	0%
3.142	Consulting - Bod	\$0	\$0	\$2,000	\$0	\$2,000	\$2,000	0%
3.143	Consulting - Leg	\$0	\$0	\$4,000	\$3,000	\$7,000	\$7,000	0%
3.150	Storm Sewer Ut	\$0	\$960	\$13,500	\$2,000	\$14,540	\$15,500	6%
3.160	Training (staff/t	\$185	\$195	\$4,500	\$1,000	\$5,305	\$5,500	4%
3.170	Misc. & mileage	\$774	\$855	\$5,500	\$1,000	\$5,645	\$6,500	13%
3.191	Administration -	\$24,291	\$48,582	\$340,260	\$30,000	\$321,678	\$370,260	13%
3.192	Employer Liabil	\$6,167	\$12,246	\$88,810	\$2,500	\$79,064	\$91,310	13%
3.2	Monitoring and Studies							
3.210	Lake and Creek	\$0	\$0	\$24,000	\$0	\$24,000	\$24,000	0%
3.220	Equipment	\$8,220	\$8,478	\$2,000	\$9,200	\$2,722	\$11,200	76%
3.3	Education and Outreach							
3.310	Public Educatio	\$389	\$2,426	\$7,200	\$1,500	\$6,274	\$8,700	28%
3.320	Marketing	\$855	\$1,205	\$7,500	\$2,000	\$8,295	\$9,500	13%
3.330	Community Blue	\$0	\$1,225	\$10,000	\$4,300	\$13,075	\$14,300	9%
	<i>Total Core functions: Ops, Moni</i>	<i>\$43,437</i>	<i>\$82,374</i>	<i>\$566,570</i>	<i>\$59,400</i>	<i>\$543,596</i>	<i>\$625,970</i>	<i>13%</i>
Capital Improvement Projects and Programs								
3.4	Subwatershed Activity							
3.410	Gem Lake	\$0	\$0	\$1,200	\$0	\$1,200	\$1,200	
3.420	Lambert Creek	\$22,313	\$22,313	\$45,000	\$50,000	\$72,687	\$95,000	23%
3.425	Goose Lake	\$1,686	\$3,412	\$67,000	\$113,696	\$177,284	\$180,696	2%
3.430	Birch Lake	\$1,623	\$5,342	\$10,000	\$18,923	\$23,581	\$28,923	18%
3.440	Gilf Black Tam V	\$0	\$0	\$54,000	\$0	\$54,000	\$54,000	0%
3.450	Pleasant Charle	\$5,700	\$5,746	\$15,000	\$5,000	\$14,254	\$20,000	29%
3.460	Sucker Vadnais	\$0	\$0	\$2,000	\$64,900	\$66,900	\$66,900	0%
3.48	Programs							
3.481	Landscape 1	\$0	\$0	\$24,000	\$0	\$24,000	\$24,000	0%
3.482	Landscape 2	\$0	\$0	\$20,000	\$1,500	\$21,500	\$21,500	0%
3.483	Project Researc	\$0	\$0	\$14,000	\$30,000	\$44,000	\$44,000	0%
3.470	Facilities Mainte	\$0	\$0	\$5,000	\$27,172	\$32,172	\$32,172	0%
3.5	Regulatory							
3.510	Engineer Plan re	\$0	\$0	\$2,000	\$0	\$2,000	\$2,000	0%
	<i>Total CIP & Prog</i>	<i>\$31,322</i>	<i>\$36,813</i>	<i>\$259,200</i>	<i>\$311,191</i>	<i>\$533,578</i>	<i>\$570,391</i>	<i>6%</i>
	Total of Core Op	\$74,759	\$119,187	\$825,770	\$370,591	\$1,077,174	\$1,196,361	10%

Fund Balance		1/1/2018	2/1/2019
4M Account		\$233,916	\$208,991
4M Plus Savings		\$304,691	\$305,269
Total		\$538,607	\$514,260

Restricted funds	2/1/2019
Mitigation Savings	\$29,637
Term Series (3/28/19)	\$151,058

Vadnais Lake Area Water Management Orga
Profit & Loss
 January 12 through February 8, 2019

11:03 AM
 02/01/2019
 Cash Basis
 Jan 12 - Feb 8, 19

Ordinary Income/Expense	
Income	
Mitigation Interest	-23.49
5.1 · Income	
5.11 · Storm Water Utility	15,087.95
5.13 · Interest	978.61
Total 5.1 · Income	<u>16,066.56</u>
Total Income	<u>16,043.07</u>
Gross Profit	<u>16,043.07</u>
Expense	
3.1 · Administrative/Operations	
3.110 · Office	
Copies	26.89
Phone/Internet/Machine Overhead	275.00
Postage	7.11
Rent	1,540.00
Total 3.110 · Office	<u>1,849.00</u>
3.120 · Information Systems	
Hardware	52.61
IT Support	467.00
Software	0.00
Total 3.120 · Information Systems	<u>519.61</u>
3.130 · Insurance	187.00
3.160 · Training (staff/board)	185.52
3.170 · Misc. & mileage	774.16
3.191 · Employee Payroll	24,291.20
Total 3.191 · Employee Payroll	24,291.20
3.192 · Employer Liabilities	
Admin payroll processing	44.92
Administration FICA	1,797.72
Administration PERA	1,821.84
Insurance Benefit	2,267.84
3.192 · Employer Liabilities - Other	234.50
Total 3.192 · Employer Liabilities	<u>6,166.82</u>
Total 3.1 · Administrative/Operations	<u>33,973.31</u>
3.2 · Monitoring and Studies	
3.220 · Equipment	<u>8,220.00</u>
Total 3.2 · Monitoring and Studies	8,220.00
3.3 · Education and Outreach	
3.310 · Public Education	388.83
3.320 · Marketing	855.17
Total 3.3 · Education and Outreach	<u>1,244.00</u>
3.4 · Capital Imp. Projects/Programs	

3.420 · Lambert Creek Restoration	
Whitaker Wetlands	22,313.47
Total 3.420 · Lambert Creek Restoration	<u>22,313.47</u>
3.425 · Goose Lake	
WB Funding - Goose subshed	1,628.00
3.425 · Goose Lake - Other	57.61
Total 3.425 · Goose Lake	<u>1,685.61</u>
3.430 · Birch Lake	
4th & Otter project	1,623.00
Total 3.430 · Birch Lake	<u>1,623.00</u>
3.450 · Pleasant Charley Deep	5,700.00
Total 3.4 · Capital Imp. Projects/Programs	<u>31,322.08</u>
Total Expense	<u>74,759.39</u>
Net Ordinary Income	<u>-58,716.32</u>
Net Income	<u><u>-58,716.32</u></u>

Vadnais Lake Area Water Management Organization

11:04 AM

Check Detail

02/01/2019

January 12 through February 8, 2019

Type	Num	Date	Name	Item	Account	Paid Amount	Original Amount
Check	ef	02/08/2019	Reliance Standard		Checking - 1987		-179.74
				Insurance Benefit		-179.74	179.74
TOTAL						-179.74	179.74
Check	ef	01/22/2019			Mitigation & Monitoring - 8355		-25.00
				Mitigation Interest		-25.00	25.00
TOTAL						-25.00	25.00
Check	4655	02/08/2019	Tyler J Thompson		Checking - 1987		-119.27
				3.170 · Misc. & mileage		-66.66	66.66
				Hardware		-52.61	52.61
TOTAL						-119.27	119.27
Check	4657	02/08/2019	Stephanie Oliver McNamara		Checking - 1987		-289.60
				3.192 · Employer Liabilities		-135.50	135.50
				3.192 · Employer Liabilities		-99.00	99.00
				3.170 · Misc. & mileage		-55.10	55.10
TOTAL						-289.60	289.60
Check	4658	02/08/2019	Brian Corcoran		Checking - 1987		-60.32
				3.170 · Misc. & mileage		-60.32	60.32
TOTAL						-60.32	60.32
Check	4659	02/08/2019	Dawn Tanner		Checking - 1987		-128.71
				3.170 · Misc. & mileage		-67.28	67.28
				3.310 · Public Education		-61.43	61.43
TOTAL						-128.71	128.71
Check	4660	02/08/2019	Nicholas Voss		Checking - 1987		-78.43
				3.170 · Misc. & mileage		-24.80	24.80
				3.310 · Public Education		-53.63	53.63
TOTAL						-78.43	78.43
Check	4661	02/08/2019	City Of Roseville		Checking - 1987		-467.00
				IT Support		-467.00	467.00
TOTAL						-467.00	467.00

	Check 4662 02/08/2019 Barr Engineering Co	Checking - 1987	-3,251.00
		WB Funding - Goose subshed	-1,628.00 1,628.00
		4th & Otter project	-1,623.00 1,623.00
TOTAL			<u>-3,251.00 3,251.00</u>
	Check 4663 02/08/2019 Bullis Insurance Agency LLC	Checking - 1987	-187.00
		3.130 · Insurance	-187.00 187.00
TOTAL			<u>-187.00 187.00</u>
	Check 4664 02/08/2019 Fondriest Environmental Inc	Checking - 1987	-8,220.00
		3.220 · Equipment	-8,220.00 8,220.00
TOTAL			<u>-8,220.00 8,220.00</u>
	Check 4665 02/08/2019 MAWD	Checking - 1987	-500.00
		3.170 · Misc. & mileage	-500.00 500.00
TOTAL			<u>-500.00 500.00</u>
	Check 4666 02/08/2019 Belair Builders, Inc.	Checking - 1987	-22,313.47
		Whitaker Wetlands	-22,313.47 22,313.47
TOTAL			<u>-22,313.47 22,313.47</u>
	Check 4667 02/08/2019 Ramsey County	Checking - 1987	-5,700.00
		3.450 · Pleasant Charley Deep	-5,700.00 5,700.00
TOTAL			<u>-5,700.00 5,700.00</u>
	Check 4668 02/08/2019 City of Vadnais Heights	Checking - 1987	-1,849.00
		Rent	-1,540.00 1,540.00
		Phone/Internet/Machine Overhead	-200.00 200.00
		Phone/Internet/Machine Overhead	-75.00 75.00
		Postage	-7.11 7.11
		Copies	-26.89 26.89
TOTAL			<u>-1,849.00 1,849.00</u>
	Check 4669 02/08/2019 City of White Bear Lake	Checking - 1987	-30,043.78
		payroll	-24,291.20 24,291.20
		Administration FICA	-1,797.72 1,797.72
		Administration PERA	-1,821.84 1,821.84
		Insurance Benefit	-2,088.10 2,088.10
		Admin payroll processing	-44.92 44.92
TOTAL			<u>-30,043.78 30,043.78</u>

Check 4670 02/08/2019 FastSigns

Checking - 1987

-118.80

3.320 · Marketing

-118.80

118.80

-118.80

118.80

TOTAL

Vadnais Lake Area Water Management Organization
Custom Transaction Detail Report
January 2019

11:07 AM
02/01/2019
Accrual Basis

	Type	Date	Num	Name	Memo	Amount	Balance
Jan 19							
	Credit Card Charge	01/02/2019		Google*SVCAPPS_VLAWM		20.83	20.83
	Credit Card Charge	01/15/2019		Target	treats goose stakeholder mtg	27.57	48.40
	Credit Card Charge	01/15/2019		Caribou	goose stakeholder mtg	30.04	78.44
	Transfer	01/22/2019			fund transfer	-892.89	-814.45
	Credit Card Charge	01/25/2019		4Imprint	tent	576.37	-238.08
	Credit Card Charge	01/29/2019		MN Pesticide	Pesticide workshop185.52	185.52	-52.56
	Credit Card Charge	01/29/2019		VHEDC	2019 partner for good cohort	100.00	47.44
	Credit Card Charge	01/29/2019		Amazon.com	aluminum sheet pans	36.44	83.88
	Credit Card Charge	01/29/2019		Amazon.com	canopy weights	23.56	107.44
	Credit Card Charge	01/29/2019		L.L. Bean	jacket for dawn	102.90	210.34
	Credit Card Charge	01/29/2019		hardware hank	ais supplies	53.63	263.97
	Credit Card Charge	01/29/2019		hardware hank	ais supplies	117.24	381.21
Jan 19						381.21	381.21

TEC Report to the Board
February 2019

Programs & Projects	Effort Level	Completion Date	Comments
	LOW		
	MED		
	HIGH		
Projects			
Oak Knoll Pond	LOW	2019	The Watershed Based Funding grant for spent lime research and treatment on Oak Knoll Pond was selected for funding in 2019. Barr is waiting on BWSR for grant agreement execution.
Goose Lk subshed project	LOW	2017-2020	Final inputs for the modeling have been secured from MNDOT. The report from Barr should be available in March.
Lambert Creek - Ditch 14, branches	MED	2019	Staff developing creek/ditch policy and working with contractors on Lambert Lake maintenance costs
Birch Lake	MED	2017-19	Final surveying data has been completed and passed to Barr to continue and complete engineering the structure and site plans
Vadnais Sucker Park	LOW	2018-20	Grant request has been submitted to Great River Greening for help with AIS removal and habitat restoration in select areas of Vadnais Sucker park.
Whitaker Wetlands	LOW	2019	system has been winterized and shut down for the winter, working on agreement with U of M for pathogen sampling
Programs			
Outreach	HIGH	2/15	Creating 2018 annual report, annual report summary, water monitoring summary, new cost-share brochure, planning Spring Workshops and presentations. Upcoming events: Bearly Open Feb 2, Connect the Drops Feb 10.
Education	LOW	2/28	Contacting Mounds View schools to re-connect on Chippewa raingarden. Updating lake fact sheets to reflect new 2018 water monitoring report.
Website	LOW	1/20	New photos displayed on homepage slideshow, Goose Lake stakeholder meeting recorded and posted.
WAV	HIGH	ongoing	Training, recruiting volunteers and planning volunteer activities. Volunteer training session Feb 13th, CAC meeting March 6th.
Cost Share	LOW	ongoing	Several site visits have been conducted for interest in LL1 funds, and several applications are expected for LL1, LL2, and RBs early on in the year.
GIS	MED	ongoing	GIS site update info delivered to HEI. Survey equipment in use.
Monitoring	MED	ongoing	most monitoring has been completed, monitoring report finished.
WCA	MED	ongoing	Staff developing wetland replacement policy, working on year end report

TEC Report to the Board
February 2019

Admin & Operation			
SLMPs		2018	Deep Lk aquatic and shoreline veg surveys completed by RSWCD, just awaiting reports. Deep Lake 2018 SLMP in progress, slated for winter completion.
Budget		June 2019	The approved 2019 working budget is reflected in the Financial report. Total: \$1,157,809
Administration		Sept. 2018	The audit of 2019 is underway with the CLA staff onsite 2-21. The Board will have a presentation at its April meeting
SSU		ongoing	2019 certification is being prepared for spring tax statement
Water Plan		ongoing	The last two Local Water Plans from North Oaks and White Bear Lake are remaining for approval

FINANCIAL SUMMARY as of 2/1/2019			CD's	4M Term Series	
				Maturity	Rate
4M Account (1.10)	4M Plus (1.23)	Total	Term series	3/28/2019	2.30%
\$208,991	\$305,269	\$514,260	\$150,000	\$151,059	

Budget Summary	Actual Expense YTD	2019 Budget amended	Remaining in Budget	% YTD
Operations	\$82,374	\$625,970	\$543,596	13%
CIP	\$36,813	\$570,391	\$533,578	6%
Total	\$119,187	\$1,196,361	\$1,077,174	10%

Recommendations from February 8, 2019 TEC Meeting

VII. Projects – B. Lambert Creek – 1. Lambert Lake Project Scoping

Tanner announced the application for MPCA 319 grant funds for a meander project that would include bio-char treatment. The grant application is due February 26th and could be used in concert with LCCMR grant funding. Staff will be working with Prof. Joe Magner for project design of the meander and bio-char treatment. Tanner also arranged a drone flight and survey of Lambert Lake in hopes of identifying groundwater upwelling to determine the path of the meander. Cost estimates were also delivered and presented, as well as 3 options to move ahead for Lambert Lake maintenance and improvement. Staff recommended option 3, and asked for recommendation to move ahead with the corresponding 319 grant application for funding.

It was moved by Ferrell and seconded by Larson to recommend option 3 for Lambert Lake maintenance and improvement, as well as to move forward with submitting an application for 319 grant funding for the Project. Vote: all aye. Motion passed.

VIII. WCA. – B. Weston Woods Escrow Release

In 2002 as part of a residential development called Weston Woods in White Bear Township, escrow funds were held for the project for wetland mitigation as part of the project in the amount of \$8,600. The developer, Mark of Excellence Homes, has submitted a request for release of those funds.

Discussion: Different options were discussed in terms of escrow release, further assessment before releasing the funds, and working with the Township in providing maintenance information. It was decided that before VLAWMO would return the remaining escrow funds, a portion of the \$8,600 will be used to complete a final report on the wetland mitigation area. VLAWMO will also make itself available to White Bear Township staff for future assistance with maintenance information.

It was moved by Riedesel and seconded by Ferrell to use a portion of the escrow funds to fund a final report assessing the mitigation areas of the Weston Woods development. Vote: all aye. Motion passed.



800 County Road E E, Vadnais Heights, MN 55127
www.vlawmo.org; Office@vlawmo.org

To: Board of Directors

From: Dawn Tanner

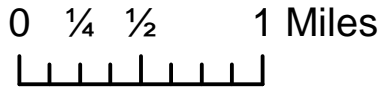
Date: February 20, 2019

Re: VII. C. Project updates

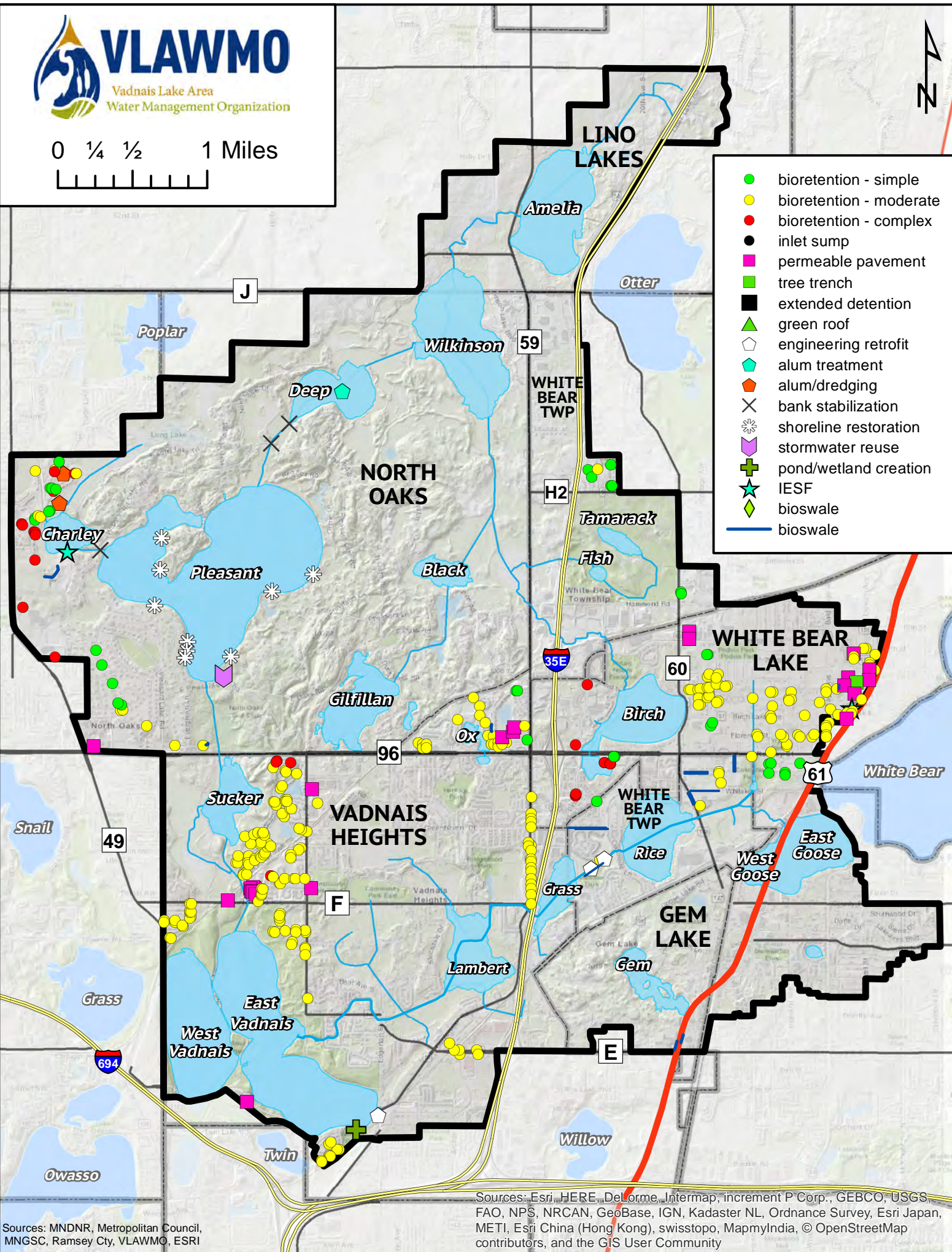
- a1) Goose Lake stakeholder meeting was well attended. Nick presented about activities individual landowners can do to improve stormwater runoff into the lake, Greg Wilson presented plans for new BMPs including spent lime treatment in Oak Knoll and the 3 projects in design stage, and Dawn presented about native revegetation goals, steps, and reasons why we want native plants in our shallow lakes. We had ~40 people including representation from our Board, TEC, MN DNR, MPCA, City of White Bear Lake, RCSWCD, and residents.

a2) Speed limit/no wake update

b) Oak Knoll pond study and WBF
- Great River Greening request: Great River Greening is gathering projects to include in their annual proposal to LCCMR and Outdoor Heritage. We have submitted a short proposal for consideration in their annual proposal. That would include restoration of 20-40 acres in Vadnais-Sucker Park. VLAWMO is working with SPRWS on restoration plans to support native vegetation areas, drinking water, and indicator species documented with remote cameras.
- North Oaks Stakeholder Meeting, March 12, 6:00-7:00 pm at the North Oaks Community Room: Following completion of our Deep, Charley, and Pleasant SLMPs, VLAWMO is working with NOHOA, the City of North Oaks, and the Natural Resources Commission to facilitate the meeting. North Oaks News published an article about the meeting that came out in Feb. The City and NOHOA listservs have notified the community. We will cover:
 - Results of the surveys that were mailed to residents in late 2018,
 - SLMPs,
 - SPRWS will talk about lake level stabilization efforts,
 - We'll discuss forming a joint lake improvement district or association,
 - and we'll facilitate a small-group session to select BMPs to prioritize for future implementation.
- See Tyler's new retrofit BMP watershed map and planning/prioritization tool.



- bioretention - simple
- bioretention - moderate
- bioretention - complex
- inlet sump
- permeable pavement
- tree trench
- extended detention
- ▲ green roof
- ◻ engineering retrofit
- ◻ alum treatment
- ◻ alum/dredging
- ✕ bank stabilization
- ☼ shoreline restoration
- ◀ stormwater reuse
- ⊕ pond/wetland creation
- ★ IESF
- ◇ bioswale
- bioswale



Sources: MNDNR, Metropolitan Council, MNGSC, Ramsey Cty, VLAWMO, ESRI

Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

To: Board of Directors
From: Stephanie McNamara, Administrator
Date: February 14, 2019
Re: Wetland assessment within VLAWMO

VLAWMO is rich in wetlands. In 1997 a rapid assessment inventory was done of our wetlands and management classifications were assigned. The classification standards were incorporated in to subsequent Water Management Plans. We continue to use those management classifications that give us buffer and water level bounce standards when we administer the Wetland Conservation Act and advise the municipal permitting agencies.

In Water Plan Goal 1-3 VLAWMO commits to “Minimize loss of major wetland function and value with the watershed boundary.” We would like to start working on two of the strategies under that goal. One that says we will establish a wetland monitoring program, determining the health of each wetland or complex of wetlands. The effort would focus on different wetland complexes in each year, rotating through the watershed over the course of the Water Plan. The wetland assessment should identify where restoration efforts would be effective and beneficial. Just to highlight wetland functions:

- ✓ Wetlands reduce impacts of flooding,
- ✓ They can provide base flow during drought periods,
- ✓ They provide for groundwater infiltration
- ✓ Wetlands can absorb pollutants and can improve water quality
- ✓ Wetland vegetation locks up carbon, reducing the carbon footprint of an area, increases O₂ and transpires water vapor back into the atmosphere as part of water cycle.
- ✓ Wetlands provide habitat for plants and animals, increasing biodiversity,
- ✓ They provide recreational and aesthetic benefits sometimes increasing property values,
- ✓ Shoreline wetlands can reduce erosion.

Roughly 15 wetland complexes were identified in VLAWMO in the Water Management Plan. The Minnesota Routine Assessment Methodology (MNRaM) is in use around the state. Staff would like to use that tool along with Rapid Floristic Quality Assessment (RFQA) on targeted wetlands and a frog and toad call survey across the watershed. Two areas of VLAWMO are listed as retaining their native vegetation. One area is in the Vadnais Sucker Park, west and south of Sucker Lake the other is in the northern part of North Oaks. As MNRaM calibrates to a reference (highest functioning for the area) wetland, it would be helpful to take a good look at our ‘best’ wetlands first.

Some of this could be done in-house with staff, some, at least for this first time, it would be useful to do with a consultant who has done it before. Dawn has done the frog and toad surveys (DNR) before and could do this survey Area spring and summer this year across the watershed. The results can help us understand how healthy some of our wetlands are. The information would be collected in a VLAWMO

database through the GIS system. There is funding in the Project research budget that could cover running MNRaM and the RFQA on the target wetland complex. Staff would recommend starting with the Vadnais Sucker park wetlands because of the anticipated quality, ease of access and potential as reference wetlands for the remainder of the watershed.

RECOMMENDATION: VLAWMO should acquire at least 2 bids to complete a MNRaM assessment and a RFQA on targeted wetlands within the Vadnais Sucker Park. Staff is authorized to proceed with the lowest reasonable bid to secure the required information.