RESOLUTION NO. 23-028
Riley-Purgatory-Bluff Creek Watershed District
Board of Managers

Authorizing execution of a service agreement with Barr Engineering to act as District Engineer and provide engineering services

Manager _____ offered the following resolution and moved its adoption, which was seconded by Manager _____:

WHEREAS Minnesota Statute § 103B.227, Subd. 5. States that a request for proposals of services shall occur at least every two years; and

WHEREAS the RPBCWD Governance Manual states that this solicitation shall occur in odd numbered years; and

WHEREAS at its January 4, 2023, meeting the RPBCWD Board of Managers adopted resolution 23-008 authorizing the administrator to prepare and submit proposals; and

WHEREAS this solicitation was posted on the RPBCWD website as well as published in all the adopted official publications of the RPBCWD between March 2, 2023, and March 23, 2023; and

WHEREAS one proposal was provided in response from Barr Engineering; and

WHEREAS the Barr Engineering proposal, as well as past service to the RPBCWD demonstrates the necessary qualifications, skills, and resources to provide engineering services to RPBCWD;

NOW THEREFORE BE IT RESOLVED that the RPBCWD Board of Managers authorizes the administrator, with advice of counsel, to enter the attached services agreement with Barr Engineering, as finalized with such nonsubstantive changes as are necessary to implement the intent of the managers and the Services.

The question was on the adoption of the resolution and there were __ yeas and __ nays as follows:

	Yea	**Nay**	**Abstain**	**Absent**
CRAFTON				
DUEVEL				
KOCH				
PEDERSEN				

ZIEGLER

Upon vote, the president declared the resolution adopted on this 12th day of April, 2023.

* * * * * * * * * * *

I, Dorothy Pedersen, secretary of the Riley-Purgatory-Bluff Creek Watershed District, hereby certifies that I have compared the above resolution with the original thereof as the same appears of record and on file with RPBCWD and find the same to be a true and correct transcription thereof, and further that the resolution is in full force and effect on this date, and Resolution 23-028 has not been modified, amended or rescinded since its adoption.

IN TESTIMONY WHEREOF, I set my hand this _____ day of _____, 2023.

_____
Dorothy Pedersen, Secretary

Exhibit A
Agreement

Agreement Between
Riley-Purgatory-Bluff Creek Watershed District and
Barr Engineering Co.

Engineering Services

WHEREAS by vote on April 12, 2023, the Riley-Purgatory-Bluff Creek Watershed District Board of Managers selected Barr Engineering Co. to serve as the consulting engineer for the Riley-Purgatory-Bluff Creek Watershed District.

NOW, THEREFORE, this agreement is entered into by the Riley-Purgatory-Bluff Creek Watershed District, a public body with powers set forth at Minnesota Statutes chapters 103B and 103D (RPBCWD), and Barr Engineering Co., a private Minnesota corporation (Barr). In consideration of the terms and conditions set forth herein and the mutual exchange of consideration, the sufficiency of which hereby is acknowledged, RPBCWD and Barr agree as follows:

1. Scope of Work; Compensation

Barr will provide general engineering and professional services, as well as project-development and -implementation engineering services as specified in task orders as follows:

a. *General Engineering and Professional Services*. Barr will provide consulting engineering services to support RPBCWD ongoing operations and otherwise as requested or directed by the RPBCWD Board of Managers or the RPBCWD administrator (hereinafter referred to as the Engineering Services). Barr will provide the Engineering Services at the rates provided in the fee schedule attached hereto as Exhibit A. Exhibit A is incorporated into this agreement and its terms and schedules are binding on the parties as a term hereof, except to the extent there is an actual or perceived conflict between a terms of this agreement and Exhibit A, this agreement will prevail. Expenses including but not limited to materials and supplies, printing, and equipment rental will be billed at cost. Engineering Services will include, but not be limited to, preparing for and attending regular meetings and workshops of the RPBCWD Board of Managers as required, rendering advice and opinions thereon, and reviewing agenda materials in connection with such meetings; analyzing applications and supporting materials for RPBCWD permits and rendering reports containing findings and recommendations thereon; assisting with regulatory and 10-year plan revisions and updates, assisting with data collection and management of RPBCWD water quality database, preparing a written report for each regular meeting of the board of managers reviewing the status of projects and engineering work; assisting the RPBCWD administrator in the preparation and review of relevant portions of the RPBCWD annual budget; litigation support; performing other requested routine assignments relevant to Barr's role as RPBCWD consulting engineer. The Engineering Services will also include Barr's consultation with RPBCWD staff and board on watershed issues unrelated to specific projects and or other RPBCWD matters as

requested. RPBCWD will reimburse Barr the actual cost of documented direct costs incurred in the performance of Engineering Services. Time is of the essence in the performance of Engineering Services.

b. *Services by Task Order*. Barr also will provide engineering as authorized in task orders issued by RPBCWD from time to time during the term of this agreement (Task Order Services). A task order issued by the RPBCWD in accordance with this agreement will be incorporated into this agreement and binding on the parties as a term hereof. RPBCWD, at its discretion, in writing may at any time suspend work or amend a task order to delete any task or portion thereof. Authorized work by Barr on all or part of Task Order Services or as modified by RPBCWD will be compensated in accordance with this section (1) and section 6 of this agreement. A task order describing specific Task Order Services will specify the basis for payment, and will provide for subcontracted services and the costs thereof, when applicable. Compensation will be subject to any not-to-exceed cost limitations and any other terms specified in a task order. Time is of the essence in the performance of Task Order Services.

"The Services," as used herein, refers to Engineering Services and Task Order Services together.

Payment of an invoice issued by Barr in accordance with this agreement for undisputed work will be due within 45 days of receipt.

Barr will maintain all records pertaining to fees and costs incurred in connection with the Services for six years from the date of completion of the Services. Barr agrees that any authorized RPBCWD representative or the state auditor may have access to and has the right to examine, audit and copy any such records during normal business hours.

2. Conflict of Interest

During the term of the agreement, Barr may not represent another governmental jurisdiction or private entity located or operating fully or partially within the RPBCWD's jurisdiction on work that requires RPBCWD review or approval without prior record or written approval of the RPBCWD Board of Managers or administrator. Barr will employ reasonable best practices and good-faith efforts to identify and communicate to RPBCWD any such conflicts of interest to fulfill the terms of paragraph, and under any and all circumstances will comply with applicable provisions of Minnesota Rules chapter 1800.

3. Independent Contractor

Barr is an independent contractor under this agreement. Barr will select the means, method and manner of performing the Services. Nothing herein contained is intended or may be construed to constitute Barr as the agent, representative or employee of RPBCWD in any manner. Personnel performing the Services on behalf of Barr or a subcontractor will not be considered employees of RPBCWD and will not be entitled to any compensation, rights or benefits of any kind from RPBCWD.

4. Subcontract and Assignment

Except as may be authorized by RPBCWD in a task order or by other written order of the board of managers or administrator, Barr will not assign, subcontract or transfer any obligation or interest in this agreement or any of the Services without the written consent of RPBCWD and pursuant to any conditions included in that consent. RPBCWD consent to any subcontracting does not relieve Barr of its responsibility to perform the Services or any part thereof, nor in any respect its duty of care, insurance obligations, or duty to hold harmless, defend and indemnify under this agreement. An order authorizing subcontracted services will specify rates and costs for such services. All costs for subcontracted services must be tracked and itemized separately in invoices prepared for Barr and submitted to RPBCWD for payment. Subcontracted services will be billed at rates specified in the authorizing order.

5. Duty of Care; Indemnification

Barr will perform the Services with due care and in accordance with national standards of professional care. Barr will defend RPBCWD, its officers, board members, employees and agents from any and all actions, costs, damages and liabilities of any nature arising from; and hold each such party harmless, and indemnify it, to the extent due to: (a) Barr's negligent or otherwise wrongful act or omission, or breach of a specific contractual duty; or (b) a subcontractor's negligent or otherwise wrongful act or omission, or breach of a specific contractual duty owed by Barr to RPBCWD. For any claim subject to this paragraph by an employee of Barr or a subcontractor, the indemnification obligation is not limited by a limitation on the amount or type of damages, compensation or benefits payable by or for Barr or a subcontractor under workers' compensation acts, disability acts or other employee benefit acts.

6. Termination; Continuation of Obligations

This agreement is effective when fully executed by the parties and starting August 1, 2023, and will remain in force until December 31, 2025, unless earlier terminated as set forth herein.

RPBCWD may terminate this agreement at its convenience, by a written termination notice stating specifically what prior authorized or additional tasks or services it requires Barr to complete. Barr will receive full compensation for all authorized work performed, except that Barr will not be compensated for any part performance of a specified task or service if termination is due to Barr's breach of this agreement.

Insurance obligations; duty of care; obligations to defend, indemnify and hold harmless; and document-retention requirements will survive the completion of the Services and the term of this agreement.

7. No Waiver

The failure of either party to insist on the strict performance by the other party of any provision or obligation under this agreement, or to exercise any option, remedy or right herein, will not waive or relinquish such party's rights in the future to insist on strict performance of any provision, condition or obligation, all of which will remain in full force and affect. The waiver of either party on one or more occasion of any provision or obligation of this agreement will not be construed as a waiver of any subsequent breach of the same provision or obligation, and the

consent or approval by either party to or of any act by the other requiring consent or approval will not render unnecessary such party's consent or approval to any subsequent similar act by the other.

Notwithstanding any other term of this agreement, RPBCWD waives no immunity in tort. This agreement creates no right in and waives no immunity, defense or liability limit with respect to any third party.

8. Insurance

At all times during the term of this agreement, Barr will have and keep in force the following insurance coverages:

a. General: $1.5 million, each occurrence and aggregate, covering both Barr's work and completed operations on an occurrence basis and including contractual liability.

b. Professional liability: $1.5 million each claim and aggregate. Any deductible will be Barr's sole responsibility and may not exceed $50,000. Coverage may be on a claims-made basis, in which case Barr must maintain the policy for, or obtain extended reporting period coverage extending, at least three (3) years from completion of the Services.

c. Automobile liability: $1.5 million combined single limit each occurrence coverage for bodily injury and property damage covering all vehicles on an occurrence basis.

d. Workers' compensation: in accordance with legal requirements applicable to Barr.

Excess or umbrella insurance coverage may be used to obtain the limits required.

Barr will file with RPBCWD a certificate of insurance clearly evidencing the required coverages and naming RPBCWD as an additional insured for general liability, along with a copy of the additional insured endorsement establishing coverage for Barr's work and completed operations as primary coverage on a noncontributory basis. The certificate will name RPBCWD as a holder and will state that RPBCWD will receive written notice before cancellation, nonrenewal or a change in the limit of any described policy under the same terms as Barr.

9. Compliance With Laws

Barr will comply with the laws and requirements of all federal, state, local and other governmental units in connection with performing the Services and will procure all licenses, permits and other rights necessary to perform the Services.

In performing the Services, Barr will ensure that no person is excluded from full employment rights or participation in or the benefits of any program, service or activity on the ground of race, color, creed, religion, age, sex, disability, marital status, sexual orientation, public assistance status or national origin; and no person who is protected by applicable federal or state laws, rules or regulations against discrimination otherwise will be subjected to discrimination.

10. Data and Information; Materials

All data and information obtained or generated by Barr in performing the Services, including documents in hard and electronic form, software, and all other forms in which the data and information are contained, documented or memorialized, are the property of RPBCWD. Barr hereby assigns and transfers to RPBCWD all right, title and interest in: (a) its copyright, if any, in the materials; any registrations and copyright applications relating to the materials; and any copyright renewals and extensions; (b) all works based on, derived from or incorporating the materials; and (c) all income, royalties, damages, claims and payments now or hereafter due or payable with respect thereto, and all causes of action in law or equity for past, present or future infringement based on the copyrights. Barr agrees to execute all papers and to perform such other proper acts as RPBCWD may deem necessary to secure for RPBCWD or its assignee the rights herein assigned.

RPBCWD may immediately inspect, copy or take possession of any materials on written request to Barr. On termination of the agreement, Barr may maintain a copy of some or all of the materials except for any materials designated by RPBCWD as confidential or non-public under applicable law, a copy of which may be maintained by Barr only pursuant to written agreement with RPBCWD specifying terms.

The foregoing does not apply to software, the rights to which were or are acquired by Barr for purposes of performance of the Services from a third-party vendor or that was or is written by Barr outside the scope of a specific task order. While the above terms apply as between the parties as to ownership of work product derived from such software, RPBCWD obtains no license or other rights to utilize third-party software or software that was or is written by Barr outside the scope of a specific task order under this agreement. RPBCWD may be provided with rights to utilize third-party software in task orders agreed to by the parties.

RPBCWD acknowledges that Barr's design methods, plans and specifications and other work products are instruments of professional service. Nevertheless, design methods, plans and specifications and other documents such as permitting files, engineering reports and other materials acquired or produced by Barr in the performance of the Services are the property of RPBCWD. The rights vested in RPBCWD pursuant to this section will not be construed to preclude Barr from utilizing standard report language or individual standard features on other projects for other clients. RPBCWD agrees to hold harmless, indemnify and defend Barr against all damages, claims, expenses and losses arising out of RPBCWD's reuse of work products and other documents or information provided by Barr under this agreement without Barr's written authorization.

11. Data Practices; Confidentiality

If Barr receives a request for data pursuant to the Data Practices Act, Minnesota Statutes chapter 13 (DPA), that may encompass data (as that term is defined in the DPA) Barr possesses or has created as a result of this agreement, it will inform RPBCWD immediately and transmit a copy of the request. If the request is addressed to RPBCWD, Barr will not provide any information or documents, but will direct the inquiry to RPBCWD. If the request is addressed to Barr, Barr will

be responsible to determine whether it is legally required to respond to the request and otherwise what its legal obligations are, but will notify and consult with RPBCWD and its legal counsel before replying. Nothing in the preceding sentence supersedes Barr's obligations under this agreement with respect to protection of RPBCWD data, property rights in data or confidentiality. Nothing in this section constitutes a determination that Barr is performing a governmental function within the meaning of Minnesota Statutes section 13.05, subdivision 11, or otherwise expands the applicability of the DPA beyond its scope under governing law.

Barr agrees that it will not disclose and will hold in confidence any and all proprietary materials owned or possessed by RPBCWD and so denominated by RPBCWD. Barr will not use any such materials for any purpose other than performance of the Services without RPBCWD written consent. This restriction does not apply to materials already possessed by Barr or that Barr received on a non-confidential basis from RPBCWD or another party. Consistent with the terms of this section 11 regarding use and protection of confidential and proprietary information, Barr retains a nonexclusive license to use the materials and may publish or use the materials in its professional activities. Any Barr duty of care under this agreement does not extend to any party other than RPBCWD or to any use of the materials by RPBCWD other than for the purpose(s) for which Barr is compensated under this agreement.

12. RPBCWD Property

All property furnished to or for the use of Barr or a subcontractor by RPBCWD and not fully used in the performance of the Services, including but not limited to equipment, supplies, materials and data, both hard copy and electronic, will remain the property of RPBCWD and returned to RPBCWD at the conclusion of the performance of the Services, or sooner if requested by RPBCWD. Barr further agrees that any proprietary materials are the exclusive property of RPBCWD and will assert no right, title or interest in the materials. Barr will not disseminate, transfer or dispose of any proprietary materials to any other person or entity unless specifically authorized in writing by RPBCWD.

Any property including but not limited to materials supplied to Barr by RPBCWD or deriving from RPBCWD is supplied to and accepted by Barr as without representation or warranty including but not limited to a warranty of fitness, merchantability, accuracy or completeness. However, Barr's duty of professional care under paragraph 4, above, does not extend to materials provided to Barr by RPBCWD or any portion of the Services that is inaccurate or incomplete as the result of Barr's reasonable reliance on those materials.

13. Notices

Any written communication required under this agreement to be provided in writing will be directed to the other party as follows:

To RPBCWD:

Administrator
Riley-Purgatory-Bluff Creek Watershed District
18681 Lake Drive East
Chanhassen, MN 55317

To Barr:

Scott Sobiech
Barr Engineering Co.
4300 Market Pointe Drive
Suite 200
Edina, MN 55435

Either of the above individuals may in writing designate another individual to receive communications under this agreement.

14. Choice of Law; Venue

This agreement will be construed under and governed by the laws of the State of Minnesota. Venue for any action will lie in Hennepin County.

15. Whole Agreement

The entire agreement between the two parties is contained herein and this agreement supersedes all oral agreements and negotiations relating to the subject matter hereof. Any modification of this agreement is valid only when reduced to writing as an amendment to the agreement and signed by the parties hereto. RPBCWD may amend this agreement only by action of the board of managers acting as a body.

IN WITNESS WHEREOF, intending to be legally bound, the parties hereto execute and deliver this agreement.

Barr Engineering Co.

_____ Date: _____

By Scott Sobiech
Its Vice President

Approved as to form and execution

_____
RPBCWD attorney

Riley-Purgatory-Bluff Creek Watershed District

_____ Date: _____

Terry Jeffery

Its Administrator

Exhibit A
Rate Schedule

description	rate* (U.S. dollars)
Support Personnel I	$70-90
Support Personnel II	$95-150
Support Personnel III	$155-200
Technician I	$70-90
Technician II	$95-120
Technician III	$125-150
Technician IV	$155-200
Engineer/Scientist/Specialist I	$80-115
Engineer/Scientist/Specialist II	$120-140
Engineer/Scientist/Specialist III	$145-170
Engineer/Scientist/Specialist III	$175-200
Consultant/Advisor	$205-300
Principal	$170-315

Rates for litigation support services will include a 30 percent surcharge beyond rates stated above.

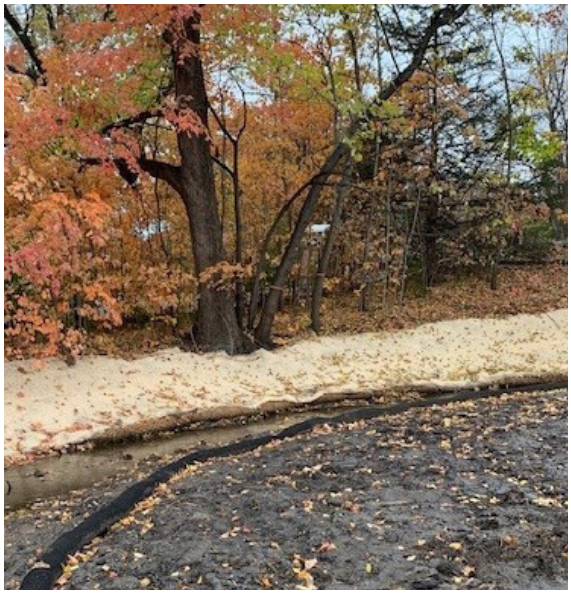
Reimbursable expenses including the actual and reasonable costs of transportation, meals, lodging, parking costs, postage, shipping charges and other expenses as approved in writing by the RPBCWD board or administrator will be billed at actual cost. Materials and supplies charges, printing charges and equipment rental charges will be billed in accordance with Barr's standard rate schedules attached here as Appendix A or as approved by the RPBCWD board or administrator. Mileage will be billed at the federal Internal Revenue Service-specified rate.

Appendix A
Standard Rate Schedules

Statement of qualifications for

Consulting district engineering services

Prepared for Riley-Purgatory-Bluff Creek Watershed District



Submitted by Barr Engineering Co.
March 23, 2023

BARR

Table of contents

Section 1: General firm information & qualifications

1.1 Letter of interest

March 23, 2023

RPBCWD Board of Managers
Riley-Purgatory-Bluff Creek Watershed District
18681 Lake Drive East
Chanhassen, Minnesota 55317

Re: statement of qualifications for consulting district engineering services

Dear Administrator Jeffery and Board of Managers:

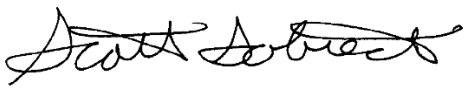
I am pleased to express Barr's interest in continuing to serve the Board of Managers and staff of the Riley Purgatory Bluff Creek Watershed District (District). The District has a strong tradition of efficiently and effectively managing its water resources. With over 45 years of providing engineering and technical services to the District, Barr staff have a unique familiarity and strong personal connection with the watershed and its resources. We highly value our partnership and close working relationship with you and are proud of our role in the District's accomplishments. Looking forward, we will continue to strive to provide the highest level of service and commitment to the board, staff, communities, citizens, and developers.

In response to your request for qualifications (RFQ), we present Barr's qualifications and expertise in providing general, day-to-day engineering and watershed management services, along with our qualifications and experience in each of the service area categories listed in the RFQ to support our desire to continue to serve as RPBCWD's district engineer.

Having worked side by side with district staff and managers, Barr has unique insight into the District's goals and policies. We understand the managers' desire to pursue an innovative ecological approach to implementing your 10-year plan, pursuing projects that are impactful, sustainable, cost effective, and built on strong partnerships with municipalities, other local governments, and the community. We also recognize the managers' desire to provide continued leadership in protecting the district's soil, water, and ecosystem resources while providing exceptional customer service to all stakeholders. The District will continue to benefit from Barr's strong working relationship with governmental agencies, particularly as the board of managers completes and implements the recommendations of the fourth-generation watershed management plan and helps ensure your role as a progressive leader in watershed management.

Thank you for the opportunity to present our engineering services capabilities. We look forward to continuing our successful working relationship with you. If you have any questions or would like a more in-depth presentation of Barr's skills and experience, please contact me at ssobiech@barr.com or 952.832.2755.

Sincerely,



Scott Sobiech, PE
Vice President, Principal in Charge

1.2 Why choose Barr for district engineer services?

The mission of the Riley-Purgatory-Bluff Creek Watershed District (RPBCWD) is to manage, protect, and restore water resources in the watershed—in collaboration with your partners and community stakeholders. As your trusted advisor for over 45 years, Barr will continue to support your collaborative approach to watershed management, using sound science to help you and your stakeholders identify and weigh available management options to make informed decisions. We're dedicated to working as your partner in protecting the valuable water resources and ecosystems throughout the district by:

Developing ecologically based engineering with an economical design. We believe in being innovative, but not at the price of cost effectiveness. With our long history of designing stream restorations and low-impact stormwater management infrastructure, we can help you look for affordable and long-term solutions that blend traditional engineering practices with an ecologically sound approach—balancing natural function, watershed characteristics, and hydrologic conditions with the ways people interact with the resources.

Informing decision makers with a solid understanding of the problems and management options. We understand how important it is for you to have the information needed to move forward with plan and program implementation and also coordinate with stakeholders. Our team includes staff with broad experience with educating and informing decision makers. The RPBCWD will also continue to benefit from Barr's strong working relationship with local communities in the district and governmental agencies.

Serving as district engineer for more than four decades, Barr has assisted the RPBCWD in implementing numerous ecological methods for stream, wetland, and lake restoration; habitat preservation; and floodplain management; such Pioneer Trail wetland restoration project (pictured above).

Staying at the leading edge of water resources management. Whether we're assessing alternatives for restoring ecological functions and values, evaluating climate change impacts, implementing new tools and technology, accommodating changes to water management rules and regulations, or designing stormwater management systems, we strive to remain at the forefront of regional water resources management issues and initiatives so that our solutions continue to be comprehensive, innovative, and efficient. Our staff are members of many regional conference-planning committees and present often to industry practitioners on topics ranging from climate-change resiliency and flood risk reduction to new water quality management methods. In addition, our involvement in state and regional technical initiatives such as regional groundwater models (Metropolitan Council), statewide stormwater volume performance goals (MPCA), and the Minnesota Stormwater Manual (MPCA) give us a regional perspective to help the RPBCWD keep abreast with cutting-edge methods and innovative approaches.

Continuing our commitment to excellent client service. Our depth and breadth of staff is unmatched locally, allowing us to provide you with complete water resources management services that complement your highly talented district staff. Our team members that have served the district for the past several years will continue to serve you.

Providing an exceptional client experience is one of Barr's core values. We will continue to do so by putting ourselves in your shoes, solving your problems as if they are our own, and sharing responsibility for the solutions. On the following pages, we respond to the RPBCWD's request for qualifications (RFQ), highlighting our team's experience and expertise.

Barr is proud to have partnered with the RPBCWD for over four decades. To support management plan implementation, we have helped the RPBCWD receive over $650,000 in grant funding.

1.3 General information

Barr Engineering Co. has been serving watershed management organizations and watershed districts since the early 1960s. We understand how important it is to develop usable watershed management plans, such as the RPBCWD 2018-2028 plan, to help guide project implementation and achieve district goals and objectives while providing exceptional customer service.

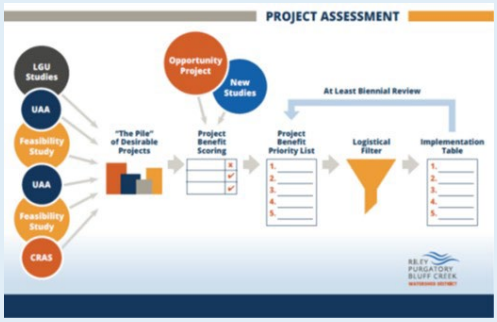
With nearly 1,000 engineers, scientists, and technical specialists, Barr provides engineering and environmental services to water management organizations; cities; counties; state and federal agencies; and commercial, institutional, and industrial clients. Incorporated in 1966 as an employee-owned firm, Barr is based in the Twin Cities, with offices in Duluth and Hibbing, Minnesota, and seven other locations across North America. More than 480 staff members work in our Minneapolis office, with more than 120 participating regularly in the areas of water resources study and design.

District engineer experience

As the RPBCWD's district engineer and principal in charge for ten years, **Scott Sobiech** will continue to lead our team of professionals and serve as the primary point of contact. He'll make sure that the necessary resources are directed to district work, will be available for general assistance, and will attend board meetings as necessary. Scott has 25 years of experience as a project manager and technical expert. In addition, Barr's staff provides over four decades of RPBCWD institutional knowledge.

The section references listed in parenthesis after the category name are intended to provide a cross reference to the nine the Service Area Qualifications listed on page 1 of the RFQ which are further detailed in Section 2.

1. innovative and integrative watershed/natural-resources planning and engineering within the metropolitan area *(sections 2.1, 2.4, and 2.9)*

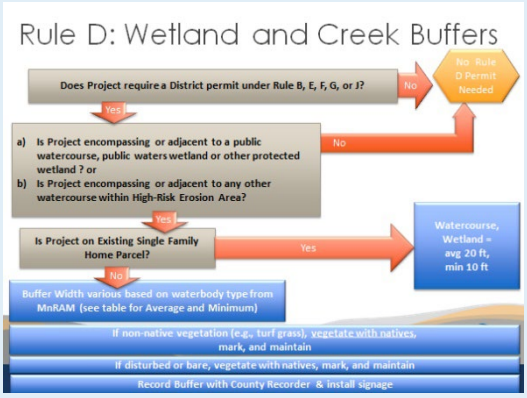


Barr's water resources management and planning expertise—combined with our experience coordinating local and comprehensive plans, our understanding of your watershed, Minnesota rules 8410, and Minnesota statutes 103B.231—puts us in the best position to assist you. Few other firms have Barr's level of understanding and perspective, or our knowledge of state requirements and your urban watershed's unique issues. Effective watershed management requires a holistic approach, with resources to be protected and managed ranging from soil health to shallow- and deep-lake ecosystems, to prominent swimming lakes, to streams flowing through suburban centers, to wetlands and rare cranberry bogs. Barr has been helping metropolitan-area watershed districts manage such resources for more than 50 years. Barr's role in assisting the MPCA with enhancing the Minnesota Stormwater Manual and MIDS calculator demonstrates that we are at the forefront when it comes to state, regional, and local watershed management.

2. design and construction management and inspection *(section 2.4)*

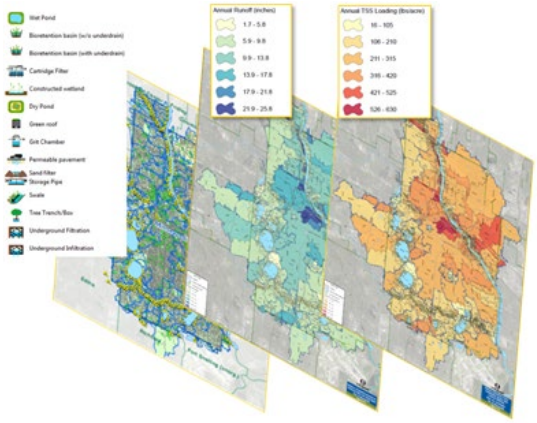
Barr is widely known for our creativity and cutting-edge approach to stormwater management. Recent examples include Barr's design and construction oversight of the the award-winning Towerside District stormwater management system in Minneapolis. Barr's ability to provide an integrative, full range of services enables projects to move smoothly from concept through implementation, as demonstrated in the district's Pioneer Trail wetland restoration project and the Ford site/Highland Bridge district stormwater system in St. Paul, where we helped Capitol Region Watershed District (WD), the City of Saint Paul, and the developer take a communal approach to managing stormwater. Barr conducted the feasibility study, designed, and provided construction management for this project and hundreds of others in the metropolitan area.

3. municipal/governmental permitting and land-use regulation as it applies to watershed programs and projects *(section 2.5)*



Administering district rules and implementing permitting/regulatory programs protect and improve downstream water resources. Barr has decades of experience to offer the district, including reviewing water resources permits for watershed organizations, counties, and municipalities for compliance with their rules, regulations, and policies, and with state requirements. We also help our clients establish or update their guidance documents and rules as well as obtain federal, state and local permits for construction projects. We regularly review and update these programs, such as the 2020 RPBCWD rule update and guidance document, to verify that they provide the needed level of regulatory guidance to be reasonable, effective, manageable, and enforceable.

4. hydrologic, hydraulic, and pollutant modeling *(section 2.3)*



Barr's experience with a variety of hydrologic, hydraulic, and water-quality models is unmatched locally—with dozens of staff members having in-depth modeling experience. We are experienced with a variety of hydrologic, hydraulic, and water-quality models, from basic to complex three-dimensional modeling, and enjoy the challenge of selecting and using the models to best meet the specific needs and budget of a project (including building our own, if needed).

Barr updated the RPBCWD's hydrologic and hydraulic (H&H) model to evaluate higher Atlas 14 rainfall depths, associated floodplain uncertainty along the creeks, and potential flood elevations as a result of future climate change. Barr recently completed the joint RPBCWD and city of Eden Priaire with a climate resiliency grant from the MPCA floodplain vulnerability evaluation to identify flood-risk areas within the watershed. Following the vulnerability evaluation, a framework for prioritizing flood-risk mitigation projects was collaboratively developed, considering several factors.

Barr's water-quality team has completed or is working on more than 30 total maximum daily load assessments (TMDLs), watershed restoration and protection strategy (WRAPS), and impaired waters studies for state agencies, watershed districts, and local governments. For example, Barr completed pollutant loading assessment for all the lakes in RPBCWD and assessed many of the creek reaches for erosion and pollutant loads. Barr developed an innovative GIS-based water-quality model system that, if applied to the RPBCWD, could provide the city-requested pollutant-load tracking methodology and accounting system across the entire district and allow the RPBCWD to be recognized as the go-to agency for pollutant management.

5. federal, state, and regional programs related to watershed and natural-resources management *(section 2.5)*

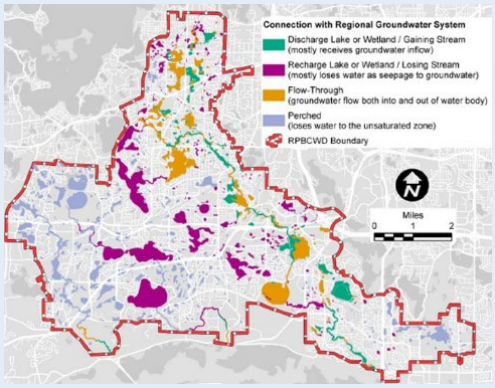
Keeping abreast of ever-changing water management rules and regulations is a focus of our water resources staff. In doing so, we remain at the forefront of state, regional, and local watershed management and we are sought after by regulators and policy makers. Evidence of this includes developing regional groundwater models for the Metropolitan Council, working collaboratively with the MPCA and a large group of stakeholders to develop a statewide stormwater volume performance goals through the MIDS project and updates to the Stormwater Manauls to credit manufactured treatment devices. In addition to a detailed understanding of watershed requirements, Barr routinely leads environmental reviews, National Environmental Protection Act (NEPA) supporting studies, and permitting efforts (federal, state and local) for capital improvement projects.

6. limnology and hydrology *(see section 2.2)*

The RPBCWD's lake management approach aligns perfectly with Barr's decades-proven approach that helps watershed districts understand complex relationships between rainfall, runoff, pollutants, and biology—so that managers can make fully informed decisions. We routinely develop watershed restoration and protection strategies (WRAPS), total maximum daily load (TMDL) analyses, UAAs, strategic lake-management plans, and lake-vegetation management plans for urban lakes— both shallow and deep. Our previous studies of lakes in the RPBCWD (Ann, Lucy, Susan, Riley, Rice Marsh, Staring, Round, Mitchel, Lotus, Silver, Duck, and Red Rock) give us a strong foundation of experience we can leverage on future lake management projects throughout the district. Our team's lake management experience and expertise has been enhanced by the recent addition of Joe Bischoff, a certified lake manager. We are ready to continue helping the RPBCWD implement the lake improvement projects outlined in your 10-year plan.

7. groundwater and hydrogeology

Barr's hydrogeologists use groundwater modeling for a variety of different projects, including wellhead protection, water supply studies, groundwater contamination investigations, surface-water/groundwater interface analysis, and geotechnical evaluations. We have been using and developing groundwater flow models since the early 1970s. We performed a groundwater/surface-water interaction and slope-stability study for the RPBCWD to evaluate 1) the connection of regional groundwater and surface water across the district, 2) the vulnerability of surface waters to changes in the groundwater system, 3) areas that are most conducive for large-scale infiltration, and 4) the current slope stability across the district and areas where the risk of slope failure is greatest in the presence of increased infiltration. We look forward to helping the RPBCWD implement the groundwater management recommendation from this study, as incorporated into RPBCWD's 10-year plan.



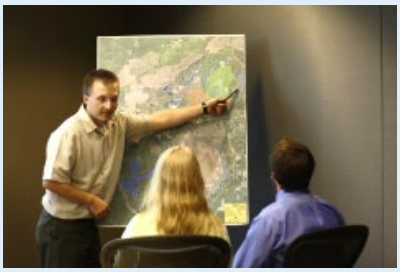
8. wetland science *(see section 2.2)*

Barr has been involved in the administration of the Wetland Conservation Act (WCA) since its inception in 1991, giving us an in-depth knowledge of the law that benefits our clients. We've provided WCA administration and technical assistance to numerous cities and counties, including the RPBCWD. Barr supports local government units by representing them on the technical evaluation panel (TEP) for administration of the WCA, which includes reviewing and providing recommendations to the District for WCA wetland boundaries and types, no-loss, exemptions, sequencing, replacement plans, and wetland banking plan decisions, as well as conducting wetland investigations of potential wetland violations.

By assisting the District with its plan, we understand your goals to preserve and enhance the quantity, as well as the functions and values, of District wetlands. One local restoration project Barr completed for RPBCWD is the Purgatory Creek Park wetland, a roughly 85-acre wetland restoration project in Eden Prairie. Another more recent project is the 7-acre Pioneer Trail wetland restation. Barr's wetland restoration and mitigation services include all aspects to successfully implent you capital projects.

9. working and communicating with the public, regulatory agencies, and stakeholders *(see section 2.8)*

Effective communication is critical to engaging stakeholders and citizens and encouraging them to become leaders in protecting their own water resources. Barr's audience-targeted education and outreach experience includes development of interpretive signage, brochures, maps, seminars, and workshops. We recently worked with the RPBCWD and Nine Mile Creek WD to implement a public planning process to educate and engage communities on the importance of climate change, current and anticipated impacts, and the need for resilience planning.



Our recent work on Minnetonka's Natural Resources Management Plan and Eden Priairie's Climate Resiliency Plan are just two examples that highlight Barr's excellent relationship with the communities within RPBCWD and helps us bring the District a detailed understanding of collaboration opportunities between the communities and the District to protect water resources. We've also worked successfully with local regulators and directly for state agencies for many years. We've led outreach and stakeholder involvement efforts with these groups and are frequently called on to present our designs, including the pros and cons of multiple alternatives, at public meetings and to elected officials and the media.

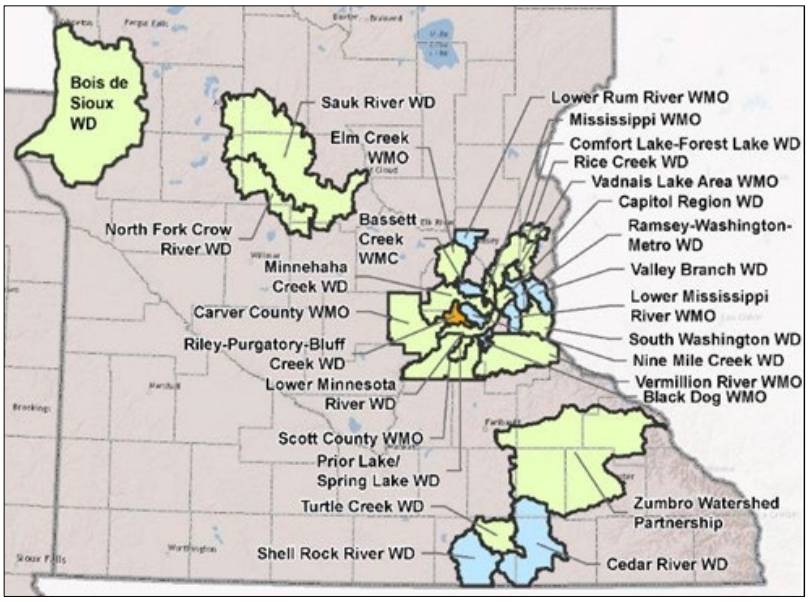
Other services

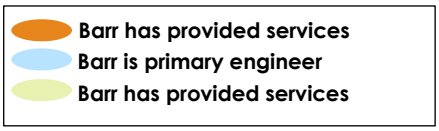
In addition to the services discussed above, we can offer the district assistance in other areas. Additional information on our experience in these areas can be found in section 2.

- ecosystem planning, ecology, and restoration
- aquatic invasive species
- stream restoration
- landscape architectire
- sustainability alternatives assessment (life-cycle analysis and Envision™ rating system)
- water-quality modeling and sampling
- pond maintenance and sediment management
- BMP maintenance/management support
- grant-funding assistance
- environmental assessments, cleanup, and reviews
- structural, mechanical, electrical, and geotechnical analysis and design
- land surveying
- geographic information systems (GIS)

1.4 Related work, projects, and clients

Barr serves as the primary engineer for eight other watershed management organizations and watershed districts across Minnesota, or as part of a select consultant pool (see illustration, below). The table that follows summarizes the services we have provided to the RPBCWD, as well as those for other watershed organizations with whom we have long-term working relationships.





Barr's services to watershed organizations

watershed organization	watershed planning and management	stormwater/ground-water management	development plan review	stream and ravine stabilization	water-quality studies and implementatio	CIP assistance and flood control	stream and lake monitoring	innovative stormwater management	aquatic plant management	wetland services
Riley-Purgatory-Bluff Creek	●	●	●	●	●	●	●	●	●	●
Bassett Creek	●	●	●	●	●	●	●	●	●	●
Black Dog	●	●			●	●	●	●	●	●
Capitol Region	●	●	●	●	●	●	●	●	●	●
Cedar River	●	●	●		●	●	●	●	●	●
Elm Creek	●	●	●		●	●				●
Lower Mississippi	●	●		●	●		●		●	●
Lower Rum River	●	●		●	●	●				●
Mississippi	●	●		●	●	●		●		●
Nine Mile Creek	●	●	●	●	●	●	●	●	●	●
Ramsey-Washington Metro	●	●	●	●	●	●	●	●	●	●
Prior Lake-Spring Lake	●	●			●	●	●			●
Shell Rock River	●	●	●	●	●	●	●	●	●	●
Valley Branch	●	●	●	●	●	●	●	●	●	●

1.5 Project team leaders

Scott Sobiech, our **principal in charge,** will be supported by a team of Barr leaders—each hand-selected for their ability to guide Barr staff serve the needs of the RPBCWD in 2023 and beyond. Qualifications for each key team member are highlighted on the pages that follow. Complete resumes are available upon request. In addition to these key staff, we can call on more than 120 water resources scientists and engineers to provide you with comprehensive services. And if a project needs it, Barr can draw on the expertise of nearly 900 scientists, engineers, and technical specialists across 24 disciplines. Each project team will be tailored to specific project needs and budgetary constraints.

Staff availability and flexibility to field multiple teams

Barr uses a project team approach to match our expertise with the unique requirements of each project and client. Having a deep bench enables us to structure teams flexibly, staffing projects from a broad group of qualified specialists to meet all of your project needs and schedule requirements.

To serve the district in 2023 thorugh 2025, we've identified 25 key engineers, scientists, and technical specialists who can serve as project and/or task leads for work likely to occur over the next two years (see tables above); biographies are provided below. As needed, we can supplement from our deep and multidisciplinary bench to create multiple, parallel teams to support the planning and design needs of the RPBCWD. Barr's ten offices and remote staff allow us to bring you emerging technologies and state-of-the-art resource management approaches from across the U.S. Each project team will be tailored to specific project needs and budgetary constraints.

Key staff qualifications

Scott Sobiech, PE, Principal VP, Sr. Water Resources Engineer
MS, Civil Engineering

Scott, Barr's proposed district engineer for the RPBCWD, has 25 years of experience in civil and environmental engineering as a project manager and technical expert for watershed districts, watershed management organizations, and federal, state, and municipal clients. His expertise encompasses both urban and rural areas and includes watershed and water resource planning and engineering, watershed and lake water quality modeling and analyses (including TMDLs), H&H modeling, BMP design and performance assessments, alum treatments, engineering feasibility studies, evaluation and construction of flood control projects, construction management, and permitting and regional, state, and federal regulation compliance. Scott has performed, managed, or provided technical guidance on dozens of lake diagnostic/feasibility studies, designed and overseen construction of numerous lake and watershed management recommendations, and is a skilled communicator with diverse stakeholder groups.

As district engineer for the RPBCWD, Scott is responsible for leading Barr's overall team to support the district's goals and managing Barr's work for the district, including engineering scheduling, administration, and cost control. In addition, Scott stepped in to serve RPBCWD as the temporary interim administrator in early 2022. He also works with numerous other watershed organizations including the Nine Mile Creek WD, Vermillion River Watershed JPO, Valley Branch WD, Ramsey-Washington Metro WD, Capitol Region WD, Cedar River WD, Bassett Creek WMC, and Black Dog WMO.

selected relevant experience:

- Ecological health action plan; RPBCWD; Principle in charge
- Planning for next 10 years (2018-2027) (10-year plan); RPBCWD; principal in charge
- Lower Riley Creek stabilization project; RPBCWD; principal in charge
- Upper Riley Creek ecological enhancement plan; RPBCWD; principal in charge
- Scenic Heights school forest restoration; RPBCWD; principal in charge
- Pioneer wetland restoration; RPBCWD; principle in charge
- Duck Lake subwatershed assessment; RPBCWD; principal in charge
- Lake Susan Park Pond water-quality treatment and reuse feasibility, design, and construction; RPBCWD; principal
- Chanhassen High School stormwater reuse system; RPBCWD; principal in charge
- regulatory permit review; RPBCWD; principal in charge
- Purgatory, Riley, and Bluff creeks H&H/vulnerability modeling; RPBCWD; principal in charge
- Rice Marsh Lake and Lake Riley UAA update; RPBCWD; principal in charge
- creek restoration action strategy development; RPBCWD; principal in charge

Joe Bischoff *Sr. Aquatic Ecologist*
MS, Ecosystems Ecology

Joe has more than 25 years of experience in lake, reservoir, and watershed management, completing a multitude of lake and watershed diagnostic studies and restoration actions. Joe's practice focuses on watershed and lake nutrient management, aquatic vegetation management, wetlands assessment, and fisheries assessment. Joe's work on lake TMDLs in Minnesota includes some of the first studies to include sediment P release and ecological structures such as fisheries and aquatic vegetation conditions. Joe and his pre-Barr client recently won a Lake Management Success Award from the North American Lake Management Society (NALMS) for his diagnostic and implementation work on Bald Eagle Lake in the Twin Cities metropolitan area, Minnesota. The project included detailed sediment nutrient-cycling assessment and sediment P inactivation. Joe is an instructor at the annual NALMS conference for the "Use of Alum for Sediment P Inactivation" workshop and routinely participates in national forums regarding nutrient cycling in lake, pond, and reservoir sediments.

selected relevant experience:

- wetland ecosystem service framework; RPBCWD; project manager
- alum treatment for Lake Riley, Lotus Lake, and Rice Marsh Lake; RPBCWD; project manager (pre-Barr)
- aquatic vegetation management plans and five-year review for Red Rock Lake, Mitchell Lake, and Lotus Lake; RPBCWD; project manager (pre-Barr)

Jen Koehler, PE Sr. Water Resources Engineer

MS, Civil and Environ. Engineering and MS, Water Resources Mgmt.

Jen has 17 years of experience as a water resources engineer. She assists a vareity of clients with projects involving H&H modeling for flood mitigation projects, watershed and in-lake water-quality modeling, water management planning for watershed and municipal clients, and development and design flood mitigation and water quality improvement BMPs. Jen also develops TMDLs and conducts water balance modeling.

selected relevant experience:

- Lotus Lake Water Quality Improvement Project Feasibility Study; RPBCWD; project manager
- Kerber Pond Ravine Stabilization Project Feasibility Study; RPBCWD; project manager
- Chanhassen High School stormwater reuse system; RPBCWD; project manager

Brandon Barnes, PE VP, Sr. Water Resources Engineer

BS, Civil Engineering

Brandon has 16 years of experience in water resources engineering, planning, and project management. His background includes experience with development of hydraulic and hydraulic models for urban and rural watersheds, stormwater system planning and design, flood-risk mitigation studies, and water quality analyses. Brandon's work also involves implementation of regulatory programs for municipal and water management organizations, stormwater system resiliency studies to simulate the impacts of climate change, floodplain analyses, coincidental frequency analyses, and 1D and 2D XPSWMM and PCSWMM modeling for floodplain and watershed improvements for cities and watershed management organizations.

selected relevant experience:

- PCSWMM modeling and vulnerability evaluation; RPBCWD; project manager
- Silver Lake water-quality BMP feasibility study; RPBCWD; project manager
- Eden Prairie stormwater model update and flood-risk area identification and prioritization for Eden Prairie portion of Riley and Purgatory Creeks; RPBCWD; project manager
- Modifications to Lake Phalen and Keller Creek outlet control structures to allow real-time adjustment of lake outlets; RWMWD; project manager

Greg Wilson, PE Sr. Water Resources Engineer

MS, Civil Engineering

Greg has more than 32 years of experience in water resources management. His expertise includes hydrology and hydraulics, water quality modeling, and watershed and lake management planning. His work includes water-quality and water-quantity monitoring and modeling for diagnostic feasibility and/or TMDL/WRAPS/ 1W1P/Nine Element Plan studies for more than 100 lakes, including more than 60 shallow lakes/wetlands. Greg has completed watershed and in-lake water-quality modeling, recommended management actions, and facilitated technical advisory group meetings for development of lake management plans. He has led design, sediment analysis, chemical dose determination, and/or alternative treatment options for internal phosphorus control for more than 25 lakes and ponds. Greg just completed a project that received Section 319 funding from MPCA to address carp and sediment phosphorus release that has resulted in the delisting of Sweeney Lake on behalf of Bassett Creek Watershed Management Commission (BCWMC). He also assists with NPDES and wetland permitting, SWPPP development, and public education and stakeholder outreach.

selected relevant experience:

- Purgatory Creek watershed assessment; RPBCWD; project manager
- Riley-Purgatory-Bluff Creek WRAPS and TMDL study; MPCA; project manager
- Bluff Creek biological stressor identification study; RPBCWD; project manager

Jessica Olson, PE *Sr. Water Resources Engineer*

BS, Biosystems and Agricultural Engineering

Jessica has more than 23 years of experience as a water resources engineer with expertise in project management; assessment, design, and construction observation of stream stabilization and restoration projects; wetland restoration; erosion control; and stormwater management. Jessica has led the design and construction of multiple water resources projects throughout Minnesota,

including assessment and restoration design of urban streams in the Twin Cities metro area.

selected relevant experience:

- Middle Riley Creek stabilization; RPBCWD; project engineer
- Upper Riley Creek stabilization; RPBCWD; project engineer
- Lower Rice Creek stabilization; Rice Creek WD; project manager and design engineer
- Willow River dam conversion to rock arch rapids; Minnesota Department of Natural Resources; project manager
- lakeshore stabilization; Encompass Real Estate; project manager and design engineer

Jay Hawley, PE — Sr. Water Resources Engineer

MS, Civil and Environ. Engineering

Jay has more than ten years of experience as a water resources engineer focusing primarily on H&H and water quality modeling. He is proficient in a variety of modeling programs such as PCSWMM, XP-SWMM, HEC-RAS, HydroCAD, and P8, among others. His work includes model development and calibration, results analysis, water quality BMP and stormwater structure design, cost estimating, permitting, construction observation, and stakeholder coordination. He has worked on many projects for Minnesota regulatory agencies and more than a dozen Twin Cities municipalities and watershed organizations.

selected relevant experience:

- Lake Lucy and Lake Ann UAA update; RPBCWD; project engineer
- Purgatory, Riley, and Bluff Creeks H&H modeling updates (TO2); RPBCWD; project engineer
- Rice Marsh Lake and Lake Riley UAA update; RPBCWD (TO10); project engineer and writer

Fred Rozumalski, PLA — Ecologist & Sr. Landscape Architect

MLA, Landscape Architecture

Fred has 25 years of experience in ecology and sustainable landscape design, specializing in native habitat regeneration and green infrastructure design. His projects are designed to work with nature to create economically viable, low-maintenance landscapes that support a diversity of plants and animals, while also meeting the needs of people. In addition to lecturing on ecosystem protection, Fred conducts natural resources inventories, writes natural resources management plans, provides landscape master plans for colleges and corporations, and designs innovative stormwater management features.

selected relevant experience:

- Ecosystem Health Action Plan; RPBCWD; project manager, ecologist
- Lotus Lake BMP planning, RPBCWD; landscape ecologist
- Natural Resources Master Plan; City of Minnetonka; project manager, ecologist
- Natural Resources Prioritization and Management Strategies for Bloomington Parks; Bloomington; project manager

Maddie Hankard — Geologist

BS, Environmental Science

Maddie has over four years of experience with environmental database creation and data collection, management, and presentation. She manages analytical data in environmental water-quality information system (EQuIS), creates data tables, and reviews and reports environmental data. She has also conducted groundwater, soil, gas, and surface water sampling.

selected relevant experience:

- EQuIS database management; RPBCWD; data manager
- EQuIS Enterprise online dashboard creation and management; RPBCWD; website liaison
- EQuIS database management; Nine Mile Creek WD; data manager
- watershed outlet monitoring program (WOMP) sampling; Nine Mile Creek WD and Bassett Creek Watershed

Chris Bonick Sr. Water Resources Scientist

MS, Civil and Environ. Engineering

Chris has 25 years of experience water-quality and water-quantity monitoring and assessment related to land use and drainage effects on nutrient concentrations, the dynamics of dissolved oxygen patterns, eutrophication, sedimentation, stream flow measurement, and biological assessment methods. His experience spans the entire process of evaluating water resources, from collecting to analyzing data, including installation and operations of water-quality and flow monitoring equipment; in-stream water-quality measurements and biological surveys; pollutant load modeling; and water-quality and -quantity modeling.

selected relevant experience:

- Riley Creek WOMP station operation and maintenance; Metropolitan Council, RPBCWD; project manager
- Purgatory Creek WOMP station construction, operation, and maintenance; Metropolitan Council, RPBCWD; project manager
- Purgatory, Riley, and Bluff creeks fish surveys; RPBCWD; project scientist

Karen Wold Sr. Environ. Scientist

BA, Environ. Studies

Karen is a Minnesota certified wetland professional with two decades of experience in wetland delineation, monitoring, permitting, replacement/compensatory mitigation plans, restoration, and functional assessments. She provides wetland expertise to numerous Minnesota cities, counties, and watershed districts, including serving as a technical representative for administration of the Minnesota Wetland Conservation Act (WCA) and local government wetland rules for several watershed management organizations and municipalities. By identifying, classifying, monitoring, and assessing wetlands, Karen helps clients meet their goals for wetland preservation, protection, restoration, and management

selected relevant experience:

- Pioneer Trail wetland restoration project; RPBCWD; project manager
- Silver Lake water quality improvement project; RPBCWD; wetland delineation, tree survey, permitting
- MnRAM database updates for Evaluating Wetland Functions; RPBCWD; project manager

Cheryl Feigum, PhD, PSS, PSC, CMWP *VP, Sr. Environ. Scientist*

PhD, Soil Science

Cheryl has 20 years of experience as a wetland and soil scientist specializing in wetland delineation and functional assessment, wetland hydrology studies, natural resources inventory and management, and environmental review and permitting including watershed-scale natural resource assessments using GIS. She has worked for a wide range of clients including municipalities, state agencies, industrial companies, residential and commercial developers, engineering and architectural firms, and private landowners. Cheryl has also coordinated and conducted natural resource studies botanical surveys, wildlife habitat studies, threatened and endangered species review, and associated permitting with state and federal agencies.

selected relevant experience:

- Rice Marsh Lake subwatershed RML12 assessment; RPBCWD; project scientist
- wetland delineations and assessments for a flood protection system; City of Oslo, MN; wetland specialist
- wetland delineation, functional assessment, and permitting, natural resources surveys for transmission lines; City of Nashwauk, MN; project manager/wetland lead

Shanna Braun VP, Sr. Environ. Scientist

MS, Water Resources Science

Shanna has 18 years of environmental consulting experience, with specific focus on environmental review requirements under NEPA and state-equivalent processes and baseline data collection to support such processes. She leads environmental impact assessments and facilitates the environmental approval process for projects related to natural resources, mining, energy transmission, flood management, municipal services, alternative energy, and transportation. Shanna has served as project manager for environmental review and permitting projects for a number of federal, state, and local agencies, including watershed districts. Shanna has also served as the non-federal designated representative for Section 7 consultation for effects to threatened and endangered species on dozens of projects. She has led dozens of agency

review and public engagement meetings, including for controversial topics, with attendance ranging from just a few to more than 100 participants.

selected relevant experience:

- Upper Riley Creek ecological enhancement plan and design; RPBCWD; project manager
- stream restoration prioritization tool; RPBCWD; stream assessor
- Morningside Flood Risk Reduction project; City of Edina; project manager

Meg Rattei — Sr. Biologist

BA, Biology

Meg has worked for 48 years on projects that involve water-quality monitoring, studies, and management plans. She conducts UAAs and diagnostic feasibility studies, manages treatment implementation projects to improve water quality and control water-based invasive weeds, and prepares water-quality and macrophyte management plans. Meg also completes lake and stream studies and water resources management plans.

selected relevant experience:

- Phytoplankton analyses of RPBCWD lake samples, analyst
- ecological use classification of Riley, Purgatory, and Bluff creeks; RPBCWD; project manager
- UAAs for Round, Riley, Hyland, Silver, Mitchell, Red Rock, Lotus, Duck, and Staring lakes; RPBCWD; project manager
- Purgatory Creek UAA; RPBCWD; project manager

Evan Christianson, PG — VP, Sr. Hydrogeologist

MS, Geology and Environ. Science

Evan has over 15 years of hydrogeologic experience, including implementing hydraulic models to solve complex water-quality and water-supply issues. Evan specializes in groundwater flow modeling, GIS, aquifer characterization, and custom quantitative modeling applications. He also has experience in geologic mapping, data processing and visualization, and monitoring-well installation and sampling. Evan's project work has included groundwater flow modeling and a three-dimensional groundwater flow model of all aquifers and aquitards within the 11-county Twin Cities metropolitan area. He has also assisted with wellhead protection area delineations, aquifer vulnerability assessments, and water-source sustainability studies for multiple Minnesota cities.

selected relevant experience:

- groundwater/surface-water interaction assessments and surface-water vulnerability evaluation; multiple watershed districts including the RPBCWD; project manager
- Little Rock Creek watershed groundwater/surface-water modeling; MPCA; groundwater modeler
- Metro Model 3 development; Metropolitan Council; groundwater modeler

Mike Strong — Sr. GIS Specialist

BA, Environ. Studies

Mike has over 15 years of experience as a GIS specialist, providing support for a wide variety of projects. He has worked extensively for watershed districts, renewable energy developers, electric utilities, and mining clients.One of Mike's focus areas is H&H modeling support for watershed-management and flood-control purposes using different software packages, including Esri's ArcHydro tools. He has also participated in numerous TMDL studies across the state.

selected relevant experience:

- 100-year floodplain vulnerability evaluation; RPBCWD; GIS lead
- Bluff Creek TMDL study; RPBCWD; GIS specialist (detailed terrain analysis to identify sediment pollution)
- Climate adaptation and resiliency plan; South Washington WD; GIS specialist slope failure risk analysis; MnDOT, Local Road Research Board; GIS lead

Heather Lau — Water Resources Engineer

MS, Civil Engineering

Heather has over eight years of experience in H&H modeling, floodplain modeling, water quality management, and stormwater permitting. She has developed, updated, and reviewed PCSWMM, XPSWMM, HEC-HMS, and HEC-RAS models, which have been used to characterize watershed hydrology, determine flooding extents in both urban and rural settings, establish storm sewer network deficiencies, and evaluate flood-risk reduction opportunities. Heather also has extensive experience addressing stormwater treatment and water quality. Employing Minimal Impact Design Standards (MIDS) and using P8 urban catchment modeling software, she has estimated pollutant loading from stormwater runoff and designed BMPs for stormwater treatment (ex. bioretention, reuse, manufactured treatment devices, etc.).

selected relevant experience:

- Rice Marsh Lake water quality improvement feasibility study and design; RPBCWD; project engineer
- Pioneer Trail Wetland Restoration project; RPBCWD; project engineer
- Silver Lake water quality improvement feasibility study; RPBCWD; project engineer, modeler

Greg Nelson — Sr. Project Designer

AS, Civil Technology and Land Surveying

Greg has more than 25 years of experience assisting with water resources projects, including surveying, civil/water resources engineering design, and construction. He collects field data with survey equipment; develops design plans utilizing Autodesk Civil 3D software, prepares cost estimates for feasability study and value assessments, and EOPC at each design phase and assists with preparation of technical specifications included as part of the construction contract documents. ; he provides bidding and contract administration, construction oversight, and project management. Over several years, Greg's projects have involved watershed-district facility maintenance and repairs, stream stabilization and restoration, low-impact development, stormwater-quality improvement systems, including filters, and hydrodynamic seperators, and erosion control.

selected relevant experience:

- Rice Marsh Lake lake water-quality BMP design; RPBCWD; designer
- Lake Susan Park Pond water-quality treatment and reuse design and construction; RPBCWD; designer
- Lake Susan spent-lime treatment system design and construction; RPBCWD; project designer

Maureen McFarlane — GIS Applications Specialist

MS, Geographic Information Science

Maureen has more than eight 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 services for a variety of projects. Maureen works with project teams to design and program geoprocessing tools and to design web-based solutions for data access and visualizations. She is also involved in developing and enhancing field data collection tools, managing web geographic information system (GIS) data hosting procedures, and guiding the integration of data connections across platforms

selected relevant experience:

- web map application development and data administration; RPBCWD; GIS specialist
- district address search tool development; RPBCWD; GIS specialist
- web map application development and data administration; South Washington WD; GIS specialist

Jim Staberg — Sr. Survey Technician

Jim has nearly 40 years of experience providing field services for a variety of clients. He works extensively with conventional and GPS surveying methods, hydrographic sounding systems, laser survey technology, AutoCAD, and Civil 3D modeling. Jim is Barr's lead technician for state-of-the-art remote surveying and bathymetric mapping techniques and equipment. He also conducts high-resolution surveys using three-dimensional techniques; bridge scour investigations; record, topographic, control, and construction surveys; construction staking and observation; and cost estimating. He coordinates Barr's survey staff.

selected relevant experience:

- stormwater detention pond surveys and volume calculations; RPBCWD, Valley Branch WD, Bassett Creek WMC, Scott WMO; lead surveyor
- stormwater detention pond surveys and volume calculations; City of Eagan; lead surveyor

Brie Meyer Sr. Applications Developer—Information Systems

BS, Business Computer Information Systems

Brie has over two decades of experience encompassing a wide variety of programming languages, database platforms, and development tools, including Visual Studio 2010 (2008/2005), VB.NET, ASP.NET, C#, Microsoft Active Server Pages, VBA, SQL Server, and Macromedia ColdFusion. She specializes in programming that integrates websites and databases, as well as other IT tools used in manufacturing and industry, such as production tracking.

selected relevant experience:

- regulatory program web-based database and automated inspection summary; RPBCWD; programmer
- web-based data entry forms for CapX2020 project; Xcel Energy; programmer
- web-based water-treatment-plan reporting system; City of New Brighton; programmer, administrator

Marcy Bean, PLA Sr. Landscape Architect

Bachelor of Architecture

Marcy has nearly 20 years of experience in landscape architecture and project management, with an emphasis on innovative stormwater management, native landscaping and maintenance, and green infrastructure design in urban environments. Her work has involved urban ecosystem restoration, stormwater reuse, BMP design and maintenance, and stakeholder facilitation. Prior to joining Barr, Marcy managed capital projects and supported community-based efforts to manage stormwater at the Mississippi Watershed Management Organization (MWMO).

selected relevant experience:

- Rice Marsh Lake lake water-quality BMP design; RPBCWD; landscape designer
- Hasenbank Stormwater Park feasibility study and construction design; South Washington WD; project manager and landscape designer
- Morningside Flood Risk Reduction project; City of Edina; landscape lead

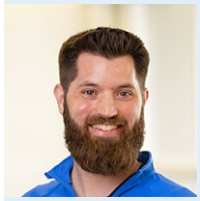
Brendan Dougherty, PLA Sr. Landscape Architect

Master of Landscape Architecture

Brendan is a professional landscape architect with over 12 years of experience in ecological planning, native plant community restoration, sustainable landscape design, and alternative stormwater management. He designs and develops construction documents for green infrastructure, pollinator plantings, and creek stabilization projects. Brendan's knowledge of native plant community regeneration makes him proficient at reading the land and making recommendations for successful landscape establishment resulting in beautiful landscapes that are inexpensive to maintain. He also creates GIS maps, visualizations for master plans, and interpretive signage and develops cost estimates.

Selected relevant experience:

- Developed construction documents for the restoration of Pioneer Trail Wetland, Lower; RPBCWD; landscape designer
- Stormwater master plan for Highland Bridge District; Capitol Region WD; landscape designer
- Natural resources management prioritization plan for parks; City of Bloomington; advisor for native landscapes



Bryan Pitterle, PE Sr. Civil Engineer

BS, Civil Engineering

Bryan has over ten years of experience in civil and environmental engineering. He has served as a project manager and project engineer for municipal, mining, industrial, power, and other natural resource management clients in both the United States and Canada. Bryan's experience includes feasibility studies, site design and planning, multi-disciplinary design, site remediation, site reclamation, cost estimating, cost-benefit analyses, drafting, specifications, and construction management.

Selected relevant experience:

- Chanhassen High School stormwater reuse system; RPBCWD; civil engineer lead
- Outlet structure replacements and new flow diversion structure for lakes; Bassett Creek Water Management Commission, construction drawings & specifications, construction observation
- Fargo-Moorhead Area Diversion preliminary design, Fargo, ND; civil engineer for 11 inlets

Katherine Tomaska Water Resources Engineer

BS, Bioproducts and Biosystems Engineering

Katherine joined Barr with a bachelor's degree in bioproducts and biosystems engineering from the University of Minnesota. She contributes to projects involving civil engineering and hydrologic and hydraulic analysis. Specifically, Katherine's responsibilities include assisting with stormwater planning, stormwater runoff modeling, open-channel and pipe flow design, infrastructure design, and hydrologic and water quality measurements.

Selected relevant experience:

- Lotus Lake Water Quality Improvement Project Feasibility Study; RPBCWD; modeler
- Regulatory permit review; RPBCWD and City of Lakeville; project engineer

1.6 Barr's fee schedule

Barr's fee schedule, presented below, summarizes the range of billing rates for each of our staffing categories. In many cases, the billing rates listed represent a wide range, based on varying levels of experience and expertise of staff within these categories. To provide the district with high-value services at a reasonable cost,

project teams will be hand-selected based on experience and billing rates. Because Barr understands the RPBCWD's need for budget efficiency, we are committed to the following fee schedule for two years, similar to past terms of engagement.

description	rate* (U.S. dollars)
Support Personnel I	$70-90
Support Personnel II	$95-150
Support Personnel III	$155-200
Technician I	$70-90
Technician II	$95-120
Technician III	$125-150
Technician IV	$155-200
Engineer/Scientist/Specialist I	$80-115
Engineer/Scientist/Specialist II	$120-140
Engineer/Scientist/Specialist III	$145-170
Engineer/Scientist/Specialist IV	$175-200
Consultant/Advisor	$205-300
Principal	$170-315

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.

Section 2: Service area qualifications

The District's request for proposal indicates the desire to designate a pool of engineering firms to provide engineering and project-design services for specific types of projects. We pride ourselves on our ability to offer high-quality, innovative services for a broad range of areas of expertise related to watershed management. We wish to be considered in each of the areas of expertise identified, including:

2.1. Watershed, subwatershed, and water resources management planning
2.2. Lake, wetland, and stream restoration
2.3. Hydrologic, hydraulic, and water quality modeling and analysis
2.4. Urban BMP design and construction management
2.5. Water resource permitting
2.6. Land surveying
2.7. Geographic information systems
2.8. Graphic design
2.9. Technology/website enhancement

The sections below summarize our expertise and provide some project examples to demonstrate our experience and knowledge in each of the areas. We consider ourselves to be specialists in many, if not most. We work hard to foster excellence in this broad range of areas to help keep you on the leading edge of watershed management. Additional information regarding our qualifications for these or other service areas is available upon request.

2.1 Watershed, subwatershed, and water resource management and planning

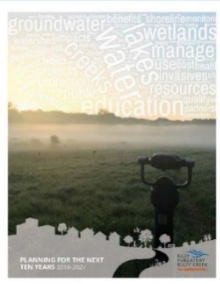
Water resources management is an increasingly complex endeavor, requiring robust datasets, complex models and tools, and a holistic, ecological perspective to water resources management to inform science-based decisions quickly and effectively. For 50 years, Barr has provided engineering expertise to watershed management organizations and federal, state, and municipal clients. 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-, third-, and fourth-generation plans (e.g., the RPBCWD, Nine Mile Creek WD, Ramsey-Washington Metro WD, Valley Branch WD, Capitol Region WD, Cedar River 1W1P Partnership, and many more) as well as helped more than 50 cities develop local water-management plans (e.g., Bloomington, Minnetonka, Edina, Apple Valley, Farmington, and Lakeville, among others). Whether it's facilitating a public meeting about policies or plans, making presentations to boards, or conducting BMP "how-to" workshops, we employ proven communication techniques as a component of design projects or as an independent service. We use a community-based approach 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, which also leads to greater acceptance and buy-in.

As part of assisting the RPBCWD in developing your 10-year plan for 2018 to 2028, Barr helped the District create a quantitative prioritization process to identify projects across varying water resources types throughout the watershed.

Relevant project examples

Watershed management and planning

Client: RPBCWD



As the engineer for RPBCWD for over four decades, Barr has helped develop numerous versions of the district's watershed management plan. Recently, Barr worked with the district to develop its fourth-generation, 10-year watershed management plan. We are currently helping implement the plan and associated projects. As part of the plan, Barr developed an easily accessible, graphic-heavy executive summary to engage and educate the public about the management plan and project implementation.

Because project prioritization was of high importance, Barr and the district worked with stakeholders to develop a prioritization tool. The tool uses several criteria to quantitatively compare and prioritize issues and projects in terms of district goals and project benefits. The methodology was adjusted and enhanced during the planning process in response to feedback from the citizen advisory committee, technical advisory committee, and board of managers.

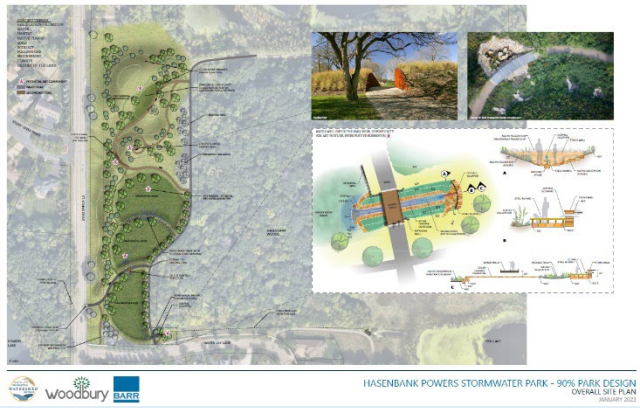
City of Minnetonka natural resources management plan

Client: City of Minnetonka

The City of Minnetonka partnered with Barr to set direction and priorities for natural resources protection and enhancement. When identifying natural resources improvement opportunities, we looked at issues effecting both private and public land, including habitat fragmentation, dwindling native plant diversity, lack of pollinator species, invasive species, urban heat island effect, climate change, human perception of natural resources, and more. The final natural resources management plan presents suggestions for ecosystem regeneration and practical strategies for mitigating specific negative impacts such as habitat degradation, deer over-browse, and a common 'everything green is good' public perception. Barr also provided volunteer, education, and engagement suggestions for ways in which the city can partner with the community to bolster support around the management of natural resources.

Powers Lake bioretention cells and park integration

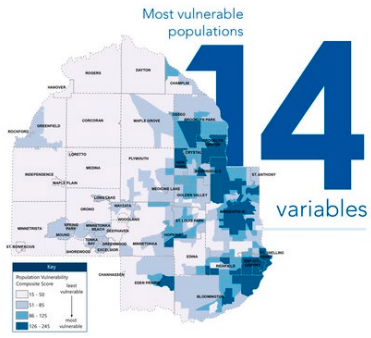
Client: South Washington WD/City of Woodbury



Powers Lake receives overflow water from Fish Lake (really a wetland) laden with phosphorus from stormwater runoff through a large suburban watershed. South Washington WD and the City of Woodbury have teamed to reducing phosphorus input to Powers lake by filtering stormwater through a series of bioretention cells in Hasenbank Park. Because local topography prohibits gravity flow, our design requires pumping water from Fish Lake into the basins—an unusual approach. These basins are expected to be functioning in 2024 and will serve as places for people to enjoy scenic views, trails, interpretive art, and pollinator plantings.

Climate change vulnerability assessment

Client: Hennepin County



Hennepin County worked with Barr to develop a county-wide climate change vulnerability assessment. The assessment identifies current and projected climate change impacts to Hennepin County, specifically its water system, natural system, built environment, transportation system, economic system, public health, cultural assets, and public services. The analysis involved overlaying multiple spatial datasets, from socio-economic data to county operations and infrastructure, to identify residents who are the most vulnerable to climate change. The resulting document and GIS-analysis maps present the risks posed by existing and projected climate trends and identifies the locations, people, and operations most vulnerable based on exposure, sensitivity, and adaptive capacity (i.e., the capacity to prepare for, cope with,

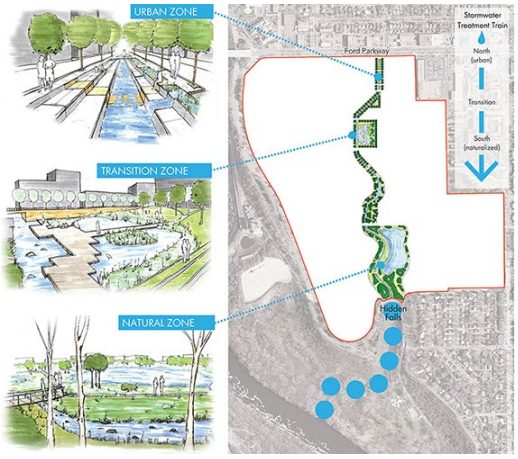
and recover from climate change impacts. The assessment will serve as a technical resource as the county's teams advance a county-wide climate action plan, where strategies will be set forth to reduce vulnerability within Minnesota's most populated county in the Minneapolis-Saint Paul metropolitan area.

Flood risk reduction alternatives evaluation and design Client: City of Edina

To help the City of Edina address flooding in the Morningside neighborhood, Barr identified and evaluated a wide range of concept-level flood risk reduction alternatives, including underground storage, predictive pumping, additional/larger storm sewers, flood walls and/or berms, larger stormwater ponds, and others. Barr worked with the City of Edina and two adjacent cities—St. Louis Park and Minneapolis—to create one XP-SWMM model of the area. This combined model allowed us to evaluate alternatives that span city boundaries and benefit all three cities. We used the model to define neighborhood-wide relationships between annual exceedance probability and potential damage (in dollars), which allowed us to estimate the expected annual damages and benefits of each alternative compared to their costs. We then incorporated additional factors—community values, construction space available, and funding options—and described refined alternatives in a technical memo.

The final project design increases storm sewer pipe capacity, improves flood conveyance through streets and a constructed swale, and expands the flood storage capacity of two ponds. The project is under construction and planned for completion in 2023.

Ford assembly plant stormwater sustainability analysis Client: Capitol Region WD/City of Saint Paul



The Capitol Region WD, working with the City of Saint Paul, hired Barr to help develop master plan concepts for managing stormwater on a former Ford Motor Company assembly plant site. To help stakeholders understand and compare the relative value of several 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. Barr then worked for the master developer (Ryan Companies) to design and implement the plan for the development (now called Highland Bridge—see page 25 for details), while further collaborating closely with CRWD and city staff. Barr continues to work closely with CRWD staff as we continue to support ongoing operations and maintenance.

2.2 Lake, wetland, and stream restoration management

Barr provides comprehensive water resources consulting services to preserve and improve the quality of lakes, streams, and wetlands. We've completed hundreds of projects related to stormwater management, lake improvement, flood control, and wetland delineation and mitigation. Our history with RPBCWD provides the district institutional knowledge of past restoration efforts and unique insight into the diversity of lakes, streams, and wetlands of varying size, type, and characteristics. The District adopted a holistic approach to resource management to account for the interconnectivity and interdependency of your various water resources. This holistic approach to water management is key to understanding the systems and the true impacts (both advantages and disadvantages) of potential restoration projects.

Lake and stream restoration

Many of RPBCWD's lakes are shallow, which tends to intensify the impact of the lakes' biological conditions and make management more challenging. We work 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, stream bank stabilizations, invasive species management, stormwater-conveyance retrofit projects, residential rain-garden programs, and regional water-quality improvement facilities.

Barr is 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 identify problem sources and cost-effective alternatives so that decision makers can make informed, justifiable choices with a full understanding of the expected outcomes.

Barr is working closely with RPBCWD staff to develop a wetland assessment program using ecosystem services to evaluate wetland functions. This approach builds on the outdated MnRAM assessment framework to incorporate new science surrounding wetland functional assessments.

Wetland services

Barr has been involved in administration of the Wetland Conservation ActCA since the law's inception in 1991. We have developed 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. We have provided WCA and technical assistance to numerous cities and counties, including RPBCWD, Bassett Creek WMO, Capitol Region WD, Lower Rum River WMO, Nine Mile Creek WD, Ramsey-Washington Metro WD, and Valley Branch WD. Our certified wetland delineators bring experience in the following areas:

- Identification, delineation, characterization, and mapping
- Functions and values assessments
- Interpretation of local, state, and federal regulations
- Wetland hydrology studies and evaluation of hydrologic impacts
- Design of programs to avoid, minimize, and mitigate impacts
- Preparation of municipal wetland management ordinances
- Wetland mitigation design, construction administration, maintenance, and monitoring

Relevant project examples

Streambank restoration projects

Client: RPBCWD

Upper Riley Creek ecological enhancement plan: In 2020, In collaboration with district staff and the City of Chanhassen, Barr lead the development of the ecological enhancement plan for Riley Creek between Highway 5 and Lake Susan, a nearly 9,000-foot stream reach. Project goals were to create an ecologically diverse stream reach, significantly reduce streambank erosion, create diverse habitat layers, improve ecological functions, and enhance the public's access and understanding of why stable stream systems are important. This project in currently in the final design and permitting phase with anticipated construction in the 2023/2024. Restoring the Upper Riley Creek ecosystem is reducing pollutant loads reaching Lake Susan by an estimated 470,000 pounds of Total Suspended Solids (TSS) per year and 250 pounds of total phosporus (TP).

Lower Riley Creek restoration: Barr developed an ecological enhancement plan and conducted detailed design and construction administration for the Lower Riley Creek restoration project. The goal of the project is to enhance ecological resources by restoring 4,600 feet of creek and 375 feet of a tributary ravine. By establishing a stable stream corridor, it is estimated that the project reduces the annual TSS load by 2,173,930 pounds per year

and TP load by 1,250 pounds per year, thus helping address turbidity impairments within this reach of Riley Creek and the Lower Minnesota River.

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 improvement. Barr developed concept designs for each reach and provided a recommendation for proceeding with one reach into final design. Project restoration was completed in the fall of 2020, and ongoing vegetation-establishment activities continue.

Creek Restoration Action Strategy: Barr worked with district staff 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 into approximately 90 reaches and sub-reaches. 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.

Pioneer Trail wetland restoration project

Client: RPBCWD

The Pioneer Trail wetland is located within the Bluff Creek watershed on the northwest quadrant of the intersection of Pioneer Trail and CSAH 101 in Chanhassen. Using a flood damage reduction grant from the Minnesota Department of Natural Resources, three privately-owned parcels were purchased by the RPBCWD and City to remove the flood prone structures from the wetland floodplain. Using the Clean Water Fund (CWF) grant, the RPBCWD hired Barr restore the wetland within the parcels. Restoration included the re-construction of the existing outlet, grading within the wetland to increase floodplain storage, and ecological restoration of land surrounding and within the wetland with native and diverse wetland and upland vegetation.

Improvements to Normandale Lake's water quality and ecology

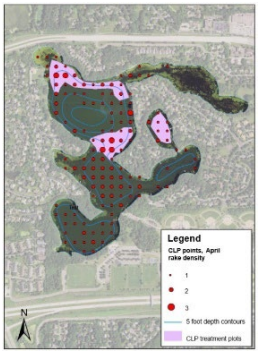
Client: Nine Mile Creek WD

To help Nine Mile Creek target and implement nutrient reduction and ecological management strategies for Normandale Lake, Barr used a hydrodynamic, ecological, and water quality model developed in Denmark (GOTM-FABM) to simulate nutrient cycling and aquatic plant growth. The model helped to identify and quantify the significant role that aquatic plants play in phosphorus uptake. We determined that internal phosphorus loading and carp overpopulation were significant contributors to the lake's poor water quality.

Barr then worked with the District on a holistic lake management strategy that began with drawing down the water to freeze lake-bottom sediments and disrupt the life cycle of curly-leaf pondweed. The drawdown reduced the curly-leaf pondweed but also temporarily impacted the entire plant community. That meant fewer plants to take up phosphorus from lake inflows and internal loading. To compensate for this effect and to prevent potential algal blooms while the plant community recovered, we conducted an alum treatment immediately following the springtieme drawdown. Barr then oversaw follow-up herbicide treatments for the remaining curly-leaf pondweed and assisted with carp management activities.

Aquatic plant management plans

Client: RPBCWD



Barr actively works with the RPBCWD to manage their lakes, including aquatic vegetation and invasive species control. We partner with the District to evaluate aquatic plant communities, develop strategies to manage invasive species such as curly-leaf pondweed and Eurasian water milfoil, and provide long-term plans for maintaining a healthy aquatic vegetation community that also supports recreational uses. Barr also works with the District's stakeholders to coordinate herbicide applications and harvesting to ensure effective approaches that meet the needs of the stakeholders. Through this partnership, the District has successfully controlled curly-leaf pondweed and Eurasian water milfoil in many of the District's lakes while supporting many of the desired recreational uses of the lake.

Lower Rice Creek restoration Client: Rice Creek WD

Barr managed the design and construction of 12 bank stabilization sites along a reach of Lower Rice Creek in Fridley. We worked with the RCWD to develop designs that address bank erosion and reduce excessive sedimentation in the stream system. When estimated costs for the preliminary designs exceeded the RCWD's budget, Barr helped reduce overall project costs by prioritizing areas with the highest potential for erosion reduction. Upon review and approval by the RCWD board, our team assembled final design and bid documents and guided the RCWD through an online bidding process, including advertising the project for bid, responding to bidder questions, and reviewing submitted bid documents. In tandem with the design process, Barr also assisted the RCWD with permit applications, obtaining federal and state permits for the project to proceed. The project reached final completion by mid-2021.

Spring Lake alum treatment achieves state water-quality criteria Client: Prior Lake-Spring Lake WD

To date, this is the largest in-lake alum treatment project in Minnesota.

Barr prepared a report for the Prior Lake-Spring Lake WD 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 three phases of the in-lake alum treatment. Barr developed the permit application and contract documents for each phase of the alum treatment and assisted with bid administration and treatment oversight, including water quality analysis and sediment core collection and assessment between each phase. Since completion of the final phase of alum application, the Spring Lake treatment represents the largest volume of alum applied to any lake in Minnesota.

2.3 Hydrologic, hydraulic, and water-quality modeling and analysis

H&H analysis and design

Barr was founded on the strength of our H&H capabilities, and we have performed H&H analyses and developed stormwater management plans for watershed districts and cities. 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 cities; WMOs; and other local, state, and federal entities.

We are experienced with a variety of H&H computer models and enjoy the challenge of selecting and using the models that best meet the specific needs of a project. Specifically, we are experts using XP-SWMM and PCSWMM—H&H models with robust capabilities, including detailed watershed runoff simulation of highly urbanized areas and modeling flow through complex storm sewer and ponding basin networks, backflow, and tailwater conditions. We used XP-SWMM to model dozens of cities and the entire watershed served by the Ramsey-Washington Metro WD, as well as portions of RPBCWD, Capitol Region WD, Shell Rock River WD, Vermillion River watershed, Mississippi WMO, Cedar River WD, and Valley Branch WD.

Water quality modeling and analysis

With increased regulation of stormwater and TMDLs to address impaired water bodies, WMOs and cities are working to implement BMPs and need to know whether their efforts are having the desired results. Using software such as

P8, Barr has modeled the BMP effectiveness for more than 30 years. We also developed a proprietary software program, SHSAM, to predict pollutant removal from underground stormwater treatment structures and sump manholes.

Barr's water quality team has completed more than 40 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, reduction scenario development and evaluation, TMDL implementation plans, and 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, and nitrate.

Relevant project examples

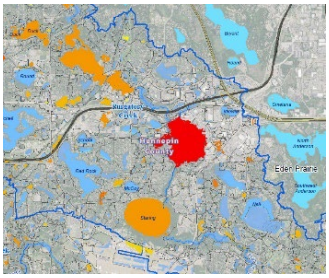
Surface water/groundwater flood mitigation planning

Client: Valley Branch WD

Barr is working for the Valley Branch WD, who is teaming with the U.S. Army Corps of Engineers through a Planning Assistance to the States program, on a Landlocked Basin Flood Mitigation Comprehensive Planning Study. Barr developed a local groundwater model of the VBWD study area using the Metropolitan Council's larger regional groundwater model of the entire Twin Cities metropolitan area (Metro Model 3, MODFLOW). The groundwater model uses detailed climate and geologic data to understand movement of water from the surface to the groundwater and how groundwater moves below the surface and interacts at each of the study's landlocked basin. Barr and the USACE used surface water models (XP-SWMM/PC-SWMM) to estimate runoff from the land surface during precipitation events and movement of surface water through a watershed, including runoff rates and volumes, drainage patterns, and resulting water levels on water bodies throughout a watershed.The modeling results are used to 1) Understand flood risk, 2) Estimate impacts to surrounding structures, 3) Estimate the impact of groundwater on the basin water levels and 4) Identify high-water management alternatives and evaluate possible flood-level lowering options.

Flood risk reduction prioritization

Client: RPBCWD, Cities of Eden Prairie and Bloomington



Barr worked with the RPBCWD, Eden Prairie, and Bloomington to update RPBCWD's model of Riley and Purgatory Creeks. Project goals were to increase the model's resolution, use updated model results to identify areas at risk of flooding, and develop a method for prioritizing flood mitigation projects. The updated, more detailed model showed many more structures at risk of flooding than the previous model.

Barr worked with the stakeholders to identify criteria for ranking flood-prone areas in order of mitigation priority. We identified six criteria: 1) number of impacted structures, 2) frequency of flooding, 3) social-vulnerability index, 4) project efficiency, 5) multiple benefits, and 6) critical infrastructure. The ranked list of flood-prone areas will be used by stakeholders to inform decisions related to prioritizing further study and evaluating flood-risk mitigation options. The order of the list may change over time as projects are implemented or different project partners are identified.

Lotus, Silver, Duck, Round, Mitchell, and Red Rock UAA update; Lake Idlewild and Staring Lake UAA

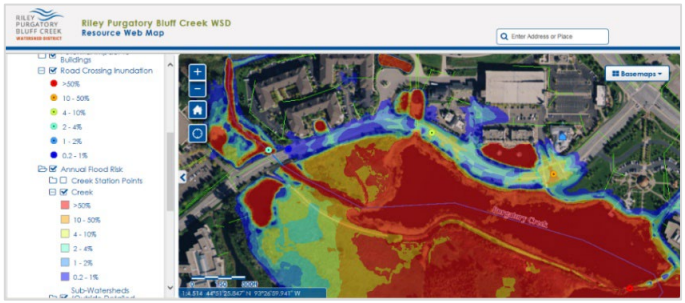
Client: RPBCWD

Barr's holistic approach to water quality improvements was used in the development of the Lotus, Silver, Duck, Round, Mitchell, and Red Rock UAA update; Lake Idlewild and Staring Lake UAA; and Lower Purgatory Creek stabilization study completed for the district. These studies assessed the water quality in these lakes based on more recent physical, chemical, and biological data, and proposed watershed and in-lake BMPs to improve and protect lake water quality. Barr developed customized management strategies for the seven lakes, including practices to target removal of dissolved phosphorus from watershed runoff and in-lake management to address internal phosphorus loading.

PC-SWMM modeling and vulnerability evaluation

Client: RPBCWD

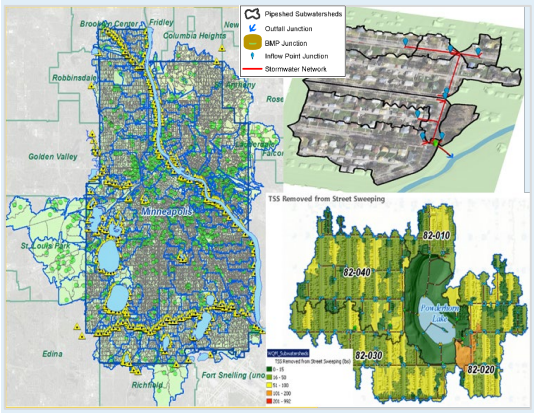
Barr updated the RPBCWD's H&H model to evaluate the higher rainfall depths published in Atlas 14 (*NOAA Atlas 14, Volume 8,* 2013) as well as floodplain uncertainty associated with Atlas 14 rainfall depth, and to estimate potential flood elevations as a result of future climate change (mid-21st century). 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 RPBCWD'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.

GIS-based data and water-quality model

Client: City of Minneapolis



As part of a pipeshed and water-quality project, Barr worked with the City of Minneapolis to update city pipesheds (drainage areas to individual outfalls to receiving waters), calculate citywide average annual loading of pollutants, and assess effectiveness of BMPs related to improving water quality. We created a city-wide, GIS-based model of Minneapolis was developed to assess the estimated effectiveness of stormwater-quality treatment across the city. The model provides an estimate of how well the BMPs in the city are doing in removing total phosphorus and total suspended solids in stormwater before it reaches receiving waters. The catch-basin-to-catch-basin cluster-level model utilizes the city's stormwater geometric network to describe flow patterns to approximately 500 outfalls and includes more than 1,300 BMPs, 28,000 watersheds, and 70,000 junctions.

The completed model allows for the evaluation of "what if" scenarios regarding BMP placement, street sweeping frequency, and other potential changes to the city's stormwater system. Since the model utilizes GIS network and feature classes, pollutant loading and removal can be summarized anywhere within the drainage system upstream of outfalls. This model will allow the city to target high pollutant-generating areas and incorporate water quality BMPs into planned capital projects.

Lake management and alum treatments in Eagan

Client: City of Eagan

For the past two years, Barr has provided alum dosing and implementation services to the City of Eagan to support its lake management efforts. Many of the lakes in Eagan are shallow, requiring multiple methods to determine the appropriate alum dose and strategy. Alum was compared to watershed and other in-lake practices to determine the most cost-effective approach to manage water quality in the lakes. Joe's services include sediment sampling, alum dosing and implementation, plans and specifications, contractor oversight, water quality monitoring, and follow-up monitoring for longevity. This work led to three lakes being removed from the State of Minnesota's impaired waters list, with two more ready to be delisted.

2.4 Urban stormwater BMP design and construction management

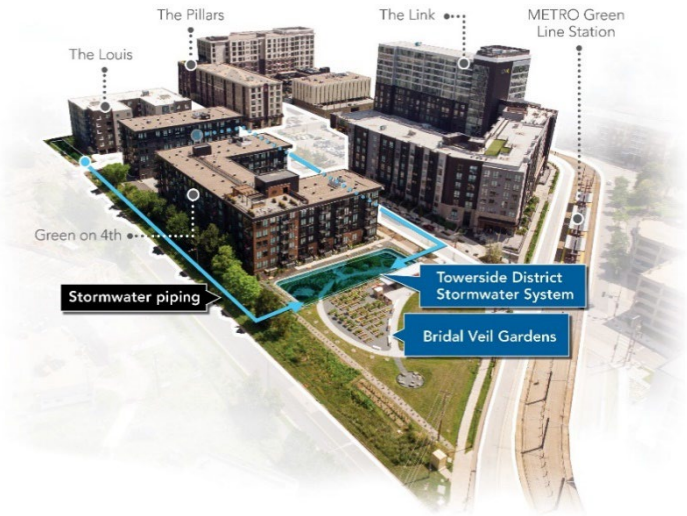
The leading edge of stormwater design

Local and state regulatory agencies have increased their regulation of stormwater, resulting in increased focus on stormwater BMPs that reduce the rate and volume of runoff and associated pollutant loading. Barr has become a national leader in ecological stormwater management techniques.

In fact, when it comes to urban stormwater BMPs, we literally wrote the book—writing and designing the Metropolitan Council's 380-page *Minnesota Urban Small Sites BMP Manual*, which served as a model for the *Minnesota Stormwater Manual* published by the MPCA. 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. Many of the standard permit provisions and BMP requirements adapted by Minnesota watershed districts, cities, and counties were written by Barr staff. We also assisted the MPCA on major portions of the MPCA's minimal impact design standards (MIDS), including the development of the statewide volume control standard, the MIDS water quality calculator, and several green infrastructure guidance documents.

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 the RPBCWD include preparing contract documents, administering the bidding and selection process, construction oversight and administration, and post-construction services such as 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 WD, Valley Branch WD, Nine Mile Creek WD, Capitol Region WD, Minnehaha Creek WD, Bassett Creek Water Management Commission, and Lower Minnesota River WD.



Privately owned but accessible the public, Towerside, a Minneapolis park, is also a district stormwater system designed by Barr for the Mississippi Watershed Management Organization and four local developers. First of its kind in the Twin Cities, the shared system collects, treats, and stores runoff from adjacent developments for eventual reuse (see project example below for details).

Relevant project examples

Rice Marsh lake water quality improvement Client: RPBCWD

Rice Marsh Lake, located in Chanhassen, Minnesota, has historically not met the MPCA's shallow lake water quality goal of an average in-lake total phosphorus concentration of 60 µg/L. The project was completed with the goal of reducing sediment and phosphorus loading to the downstream lake.The project involved construction of an underground stormwater treatment filtration system (STFS) to treat low flows through an existing storm sewer upstream of Rice Marsh Lake. Monitoring equipment was installed for the RPBCWD to evaluate the effectiveness of the underground filtration system at removing pollutants. The project also included the construction of a bioretention basin to treat local drainage from Dakota Lane and convey overflows to areas of amended soil with restored soil absorption capacity.

District stormwater-management system Client: Mississippi Watershed Management Organization

Towerside is a rapidly developing area adjacent to the University of Minnesota and on a light-rail transit line that connects Minneapolis and St. Paul. Barr worked with the MWMO and four private developers to design and construct a system to manage stormwater runoff from a two-block area in this designated innovation district.

Our design includes stormwater conveyance systems from the private developments to the district stormwater system, large biofiltration basins (rain gardens) to filter out pollutants, an underground concrete tank to store the treated stormwater, and a pumping system to enable the treated water to be reused for irrigation by the private developers and a future industrial user.

The Towerside district stormwater system went online in late 2016 and is treating water for the first development. When fully operational, it will treat an estimated annual average of 4.5 million gallons of stormwater for reuse. We are currently assisting the MWMO and local developers in planning the expansion of Towerside and managing stormwater runoff from an additional 20 acres. The project recently won a Grand Award from the American Council of Engineering Companies of Minnesota (ACEC/MN).

Ford Site (Highland Bridge) district stormwater management system Client: Ryan Companies US, Inc.

The Ford Motor Company's assembly plant in Saint Paul, Minnesota closed in 2011—offering an opportunity for the city to redevelop the 135-acre riverfront property into a sustainability-focused, mixed-use community that could improve surface water quality. After assisting the Capitol Region WD and the City of St. Paul evaluate management alternatives, Ryan Companies—the new property owner and developer—hired Barr to complete the final design and assist with construction administration.

Completed in 2021, the stormwater management system includes five large rain gardens with native plants and iron-enhanced filtration trenches and five underground storage and filtration systems. The gardens and underground filtration treat and route stormwater into a nearly half-mile-long recreational pond before it enters the re-imagined Hidden Falls Creek. The infrastructure reduces intense creek flows by 98% in a two-year storm event, helping to mitigate erosion downstream in Hidden Falls Regional Park. It is estimated to capture and clean 64 million gallons of stormwater annually, preventing an estimated 28 tons of total suspended solids and 147 pounds of phosphorus from entering the Mississippi River each year. We are now assisting the city with day-to-day operations and maintenance of the USD $13.5M district stormwater system.

Kohlman Lake water-quality improvement Client: Ramsey-Washington Metro WD

Kohlman Lake was on the MPCA's impaired-waters list for excess nutrients but is no longer impaired. For the past nine years, Barr has helped the Ramsey-Washington Metro WD implement ongoing water-quality improvement efforts, resulting in a substantial decrease in total phosphorus and chlorophyll concentrations and an increase in water transparency. Two permeable, reactive limestone barriers were installed to treat runoff before it flows into Kohlman Lake. A sand filter with iron filings was added to treat runoff from nearby roads, and a development site further reduced phosphorus loading. Herbicide treatment resulted in a nearly complete elimination of curly-leaf pondweed and reduced phosphorus loading to the lake. Alum treatment was implemented to reduce internal phosphorus load from sediment. Innovative stormwater-infiltration and -treatment BMPs at a nearby, upstream mall help reduce stormwater and pollutants from reaching the lake.

Nature Center water quality improvement and design Client: City of St. Louis Park/Bassett Creek WMC

Barr performed a feasibility study and created the resulting design of a stormwater management feature at the Westwood Hills Nature Center. The feature was designed to achieve two goals: educate visitors about the hydrologic cycle and improve water quality in downstream Westwood Lake. The system reduces pollutants entering Westwood Lake by reducing the volume of water flowing off site. It collects runoff from the center's roof, patios, and sidewalks and is stored underground. The runoff is then pumped to the surface via hand pumps or a solar pump and discharged into a trough. The water flows from the trough into basins and channels, crossing sidewalks in trench drains until it reenters the underground storage. The water recirculates through the system until it infiltrates, evaporates, or is taken up by vegetation. A portion of the collected stormwater feeds into a transplanted bog on the nature center's north side. The bog can be viewed up close and features numerous plant species as well as animals, including ducks, turtles, tadpoles, and many insects.

Rosland Park stormwater filtration BMP Client: Nine Mile Creek WD

For the Nine Mile Creek WD, Barr designed a new stormwater filtration system at Rosland Park in the City of Edina. The system has been built into a hill slope at the edge of the Rosland Park parking lot—between nutrient-impaired Lake Cornelia and Swimming Pool Pond. Formerly, water from Swimming Pool Pond drained directly into Lake Cornelia. The new filtration system now diverts low flows that are pumped continuously through an anthracite pretreatment filter followed by three parallel filtration chambers to remove both total and soluble phosphorus before discharging to Lake Cornelia. This configuration and design differ from typical passive stormwater treatment systems that receive runoff on a per-event basis, allowing for higher volumes of water to be treated.The new stormwater filtration system, designed to test and use filter media with both high pollutant removal efficiencies and high filtration rates, is intended to bring insights on filter media to other stormwater professionals while addressing high phosphorus levels in Lake Cornelia and Lake Edina.

Annual CIP and LID maintenance and repairs Client: Ramsey-Washington Metro WD

With Barr's assistance, the RWMWD has implemented more than 30 CIPs over the last 40 years, including flood damage reduction, stormwater conveyance upgrades, water quality improvement, regional stormwater management, and habitat enhancement. Each year, Barr helps assess the condition of key project elements, identifies maintenance and repair issues, and designs repairs for a construction contractor to implement. These repairs often include dredging of accumulated sediment in stormwater ponds, pipe separation, concrete control structure repairs, and bank stabilization and repair. Annually, the RWMWD relies on Barr to prepare design and bid packages, including collecting repairs, securing a contractor, and facilitating the construction administration process. These CIP projects range in contract size from $300,000 to well over $500,000. The large investments the RWMWD has made over the years have paid off; improvements continue to perform as designed, and the district continues to advance toward its goals.

Barr has coordinated the multi-year inspection and maintenance of more than 24 green infrastructure project sites and other RWMWD projects. The projects included in this maintenance program consist primarily of Barr-designed low-impact development features. The BMPs inspected and maintained include rain gardens and other infiltration and filtration basins, stormwater tree trenches, underground stormwater infiltration and detention features, permeable pavement systems, vegetated swales, and native restorations. Our work includes inventorying the BMP sites biyearly, developing contracting documents, and overseeing inspection and maintenance operations including feature functionality and vegetation management. Site infiltration and filtration is monitored and remediation plans are created if interventions are required. Throughout the growing season, vegetation is assessed and directions are provided to the contractors.

2.5 Water resources permitting

Local and state regulatory agencies have increased their regulation of stormwater, resulting in more intense focus on stormwater BMPs that reduce the rate and volume of runoff and associated pollutant loading. Barr's knowledge of and experience with alternative and innovative stormwater practices allow us to suggest creative solutions to stormwater problems on challenging sites. Permitting programs for land alteration activities are one of the ways watershed districts—and the cities, townships, and counties within their boundaries—can help verify that their water and natural resources are protected and those aspects of long-term goals and initiatives are implemented. Each year, Barr reviews hundreds of water resource permits for watershed organizations, counties, and municipalities for compliance with their ordinances and policies and with state requirements.

We also help our governmental clients develop permitting programs for construction projects and land development or redevelopment and regularly review and update these programs so that they provide the needed level of regulatory guidance to be effective, manageable, and enforceable.

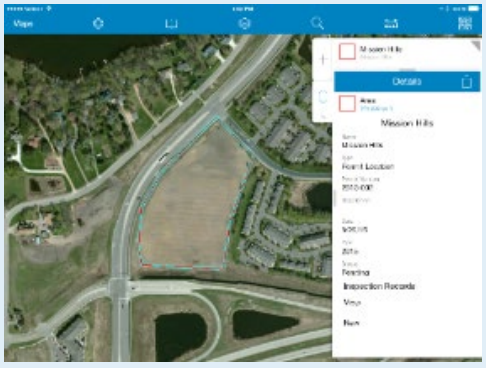
Some of the governmental agencies we are currently assisting with water-resource permitting reviews for the following water management organizations and municipalities:

Riley-Purgatory-Bluff Creek WD*	Ramsey-Washington Metro WD*	City of Minnetonka
Bassett Creek WMC*	Valley Branch WD*	City of Lakeville
Lower Rum River WMO	City of Inver Grove Heights	
Nine Mile Creek WD	City of Hastings	

** Includes assistance with initiating permitting programs*

Relevant project examples

Watershed district regulatory program support — Client: RPBCWD



In 2014, Barr helped the RPBCWD 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 relative to all RPBCWD rules.

Watershed district permit administration — Client: Valley Branch WD

As technical advisors to the Valley Branch WD managers, Barr reviews approximately 20 to 40 permits per year for conformance to the district's rules and regulations and the Minnesota WCA. Some of the review items include stormwater rate, volume, and 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 each project's goals while still conforming to the district's 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 managers, and process the approved permit. While the managers have their own inspector who handles the day-to-day inspections of permitted activities, at the direction of the managers, Barr inspects projects that could impact wetlands and performs other inspections as needed.

Urban watershed stormwater-development and permit reviews Client: Nine Mile Creek WD

Barr has served as the Nine Mile Creek WD's district engineer since 1960. For nearly six decades, we have assisted this Twin Cities district with developing four management plans that have guided water management within the 50-square-mile Nine Mile Creek watershed. The district was first established to provide flood control; however, its regulatory process has evolved to include water quality management, wetland management and protection, and stormwater management.

Since 1973, Barr has administered the district's permitting program, which provides oversight for a range of environmental management activities to help verify compliance with district regulations and the WCA. In 2008, Barr helped the district implement revisions to its program based on the district's rule revisions. We shepherd applicants through the permitting process, including preparing and distributing review memoranda and presenting the application materials to district managers. Over that five-year period, we have reviewed an average of 65 permits per year. The district requires permits for all projects that will disturb more than 50 cubic yards of material or alter an area that is 5,000 square feet or more in size. We examine impacts of proposed development on floodplains, stormwater management, wetlands, erosion and sediment control, waterbody crossings and structures, shoreline and streambank improvements, and surface-water appropriation. 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.

Stormwater development and redevelopment reviews Client: Bassett Creek WMC

Since the 1970s, Barr has performed stormwater development and redevelopment reviews on behalf of the BCWMC for proposed projects in the Bassett Creek watershed, covering a large area of the Twin Cities metropolitan area, including portions of the City of Minneapolis. These reviews help the commission meet its goals of managing the watershed's surface water resources to meet or exceed state water quality standards, reduce stormwater runoff volume to improve water quality, and protect against flood risks along the Bassett Creek trunk system. This work includes review of erosion and sediment control, rate control, and water-quality treatment; floodplain alterations; surface-water diversions; land-use changes and appropriations; utility crossings and bridges; and Minnesota Department of Natural Resources permit applications. Submittals are also reviewed to confirm that minimal impact design standards (MIDS) are incorporated into the development/redevelopment proposals and make sure any drainage modifications to the Bassett Creek tunnel are properly analyzed.

Hall's Island environmental review, permitting, design Client: Minneapolis Park and Recreation Board

The Hall's island re-creation project was awarded the 2018 Minnesota Brownfields ReScape Community Impact Award.

To improve biodiversity and habitat connectivity while offering more opportunities for recreation and education along the upper Mississippi River, the Minneapolis Park and Recreation Board hired Barr and Tom Leader Studio to design the re-creation of Hall's Island. The project helped transform an industrial river corridor into a valuable habitat for birds, aquatic species, and other wildlife and a community asset for cyclists, runners, walkers, canoeists, kayakers, anglers, and nature enthusiasts.

In addition to engineering design and construction oversight, Barr led environmental review, supporting studies, and permitting efforts for project development. An environmental assessment worksheet was approved, including field wetland delineation and surveys for threatened and endangered species, specifically mussels. We led several meetings to engage agencies and address concerns in advance of permitting. We also developed permit applications on behalf of the Park Board, including permits and approvals from the U.S. Army Corps of Engineers, U.S. Fish and Wildlife Service, MPCA, Minnesota DNR, State Historic Preservation Office, Minnesota Office of the State Archaeologist, and City of Minneapolis.

2.6 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, but are not limited to:

- Topography and bathymetry surveying
- Detailed inventorying of infrastructure (utilities, buildings, basins, lakes, wetlands, ditches, outlets, etc.)
- Surveying within piping systems (requiring confined-space certification and entry, such as the TBI)
- Construction staking and construction monitoring
- Property corner locations
- Sediment accumulation surveys
- GPS/dated photography
- Client-tailored survey database development
- 3D laser scanning services
- Easement and property descriptions

Barr used UAS to capture images and video from construction of the Mouse River Enhanced Flood Protection Project, a $40 million multi-phase that included more than 8,900 feet of earthen levee, interior drainage pump stations, river crossings of municipal utilities, and 1,600 feet of bioengineered streambank restoration. Click here to view UAS video footage during construction of this award-winning project. For over a decade, Barr led a team that worked on the planning, design, permitting, and construction.

Relevant project examples

Drone surveys to support construction oversight and performance evaluation — Client: City of Edina

Edina's Morningside neighborhood is a low-lying area with historical flooding issues. The City of Edina hired Barr to evaluate the issue using hydrologic and hydraulic modeling of synthetic storm events and develop an infrastructure solution to provide flood risk reduction. The Morningside Flood Risk Reduction Infrastructure Design Project involved the expansion of a constructed stormwater pond located between Lynn Avenue and Kipling Avenue, the expansion of downstream Weber Pond, associated storm sewer and outlet structures, and a lift station within Weber Pond to lower the pond in advance of storm events. Barr used drones to take photos of the ponds during construction and to capture footage of the predictive pumping to evaluate performance.

Drone surveys for field quantities and design verification — Client: City of Shoreview

The urgent need for this project stemed from resultant record high surface and groundwater levels that threaten homes and infrastructure in or near the City's "Crestview Addition" and along a low-lying area of Gramsie Road. The City hired Barr to develop a solution to the flooding problem within the Crestview Addition and along Gramsie Road while minimizing impacts to surrounding wetlands. The Suzanne Gramsie Stormwater Improvements Project involved constructing an adaptive hydraulic connection between two water bodies: Suzanne and Gramsie ponds. Under typical conditions, the waterbodies are connected to allow Suzanne Pond pumps to draw down water in both Suzanne Pond and NW Gramsie Pond. When Gramsie Pond is high, the connection is closed in order to isolate flows between the water bodies. The project also involved upsizing the Suzanne Pond pump capacity and raising the low section of Gramsie Road. Barr used drones to take photos during construction and measure field quantities of erosion control measures (ex. erosion control blanket, pictured above.)

Easements for Glenmar flow diversion project — Client: City of Mahtomedi

The City of Mahtomedi designed three phases and is currently constructing the final phase of the Glenmar flow diversion project, which redirects flows that have historically flooded up to six homes near the Mahtomedi and

Willernie border and will prevent such flooding in the future. Though the flow diversion significantly reduced flooding of the residences, flood and drainage easements needed to be obtained. Barr prepared the legal descriptions and drawings for each easement, which were in turn filed with Washington County.

Stormwater pond maintenance Clients: Cities of Eagan, St. Louis Park, Mounds View, Hastings, and Northfield

Barr has performed routine and specialized monitoring and maintenance of more than 500 stormwater ponds. This work includes visual site assessments, sediment coring and analysis, surveying, data analysis, modeling, completion of construction plans and specifications, and construction observation. We design sediment removal projects in accordance with the latest MPCA guidance for sediment removal from stormwater ponds and collect sediment cores from each sediment removal location.

2.7 Geographic information systems

At Barr, GIS software plays a key role in the management, analysis, and presentation of data. We routinely use GIS in our work and have nine experts devoted solely to GIS. In fact, virtually every project, study plan, and activity Barr performs relies on this technology. We frequently develop specialty applications and GIS databases for clients, especially for those who don't currently have robust GIS systems.

Barr develops GIS applications for the desktop and mobile environments. Many of our custom applications integrate with common software packages, including surface modeling, word processing, spreadsheet, and relational database programs. We also use GPS as a data collection tool for GIS.

ArcView GIS

Barr uses ArcView to manage, interpret, analyze, and present a wide range of data and to integrate data (such as relational database tables, CAD data, images, tabular data, and GPS data) into projects. We have used ArcView extensions to access, manipulate, and analyze raster-based data and create 3D GIS data sets. Applications include analyzing surface conditions, delineating wetlands, and performing volumetric analysis.

ArcView's object-oriented programming language can enhance the software's capabilities, and we've developed customized ArcView applications for internal and client use, such as data conversion, access, and interpretation, and for interfaces to scientific models.

Internet applications

Barr's services include developing online GIS applications. MapObjects and Visual Basic provide the capability to create interactive GIS websites with working maps that give web users the ability to make online spatial queries and perform analysis. Moreover, our expertise in Microsoft SQLServer and Oracle databases means we can build and maintain high-end databases to be accessed by those applications.

Relevant project examples

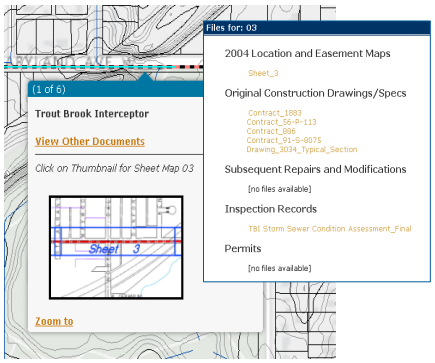
H&H modeling and GIS-based storm-sewer failure risk assessment Client: City of Richfield

For the City of Richfield, Barr developed a city-wide PCSWMM stormwater model. The model was calibrated using past storm data and run for one-year, 10-year, and 100-year events using Atlas 14 precipitation data. The city will use the model to implement flood mitigation initiatives, size and design new and replacement pipes and ponding basins, determine roadway flow-spread and catch-basin sizing, and analyze water quality.

The city has more than 10,000 storm-sewer pipe segments, many beyond normal design life. To help prioritize inspections, Barr performed a GIS-based risk assessment based on both the likelihood of pipe failure and degree of consequence of pipe failure. The 150 highest-scoring pipe segments in terms of relative failure risk were included in the city's capital improvements plan for video inspection and possible replacement or restoration.

Stormwater tunnel improvements and web mapping application

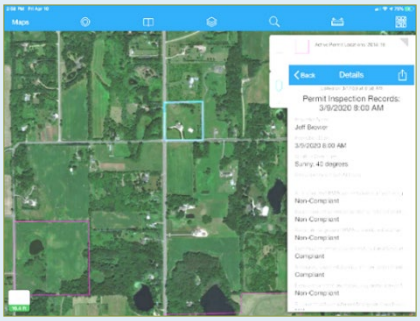
Client: Capitol Region WD



Barr's GIS specialists have developed and used GIS data and interfaces to perform hydrologic and hydraulic modeling analysis and prepare flood inundation maps of the district's Trout Brook Interceptor, a 6-mile storm sewer tunnel that services 8,150 acres and two major lakes. To help the district better manage the Trout Brook interceptor, Barr developed a web mapping application, which lets users view and access GIS data, including but not limited to interceptor size and elevations, access locations, stationing, flooding and associated pipe flow rates, property ownership data, Saint Paul storm sewer data, and subwatersheds. Additional information such as inspection photo locations and tunnel inspection condition ratings have been added to the map so that users can view photos and determine tunnel conditions based on geographic location. Additional documents, such as construction documentation, inspections, and reports related to the Trout Brook Interceptor, including the original construction plans from the 1920s and more recent repairs, can be accessed through the online document management system.

Mobile data collection and reporting for permit administration

Client: Valley Branch WD



As technical advisor to the Valley Branch WD (an MS4 permit holder), Barr reviews approximately 20 to 40 permits per year for conformance to district rules and regulations and the WCA. Barr developed a mobile data collection and reporting system to facilitate permit status tracking and inspections. The system integrates ArcGIS Online and the Esri Collector applications, along with a custom multi-user relational geodatabase and Python script. The geodatabase stores permit information, including the permit location, number, and status, as well as project plan sheets and drawings. The database also stores inspection information, including inspection date, inspector name, and responses to compliance questions. Photos taken during the inspection are also stored in the database, as are the locations where corrective actions are required.

Inspection information and corrective action locations are collected using an iPad and the Esri Collector app. The Collector app is a map-centric tool and integrated data entry form for streamlining field data collection. Field-collected data is written via cellular or Wi-Fi to the database hosted on Barr's server. Inspection reports are generated daily by an automated system using a Python script scheduled to run each night. The script identifies inspections completed that day and generates a two-page PDF report that contains information collected during the inspection, including responses to compliance questions, photos, and photo captions. The reports can be automatically emailed to a customized email list.

GIS services for flood risk management

Client: City of Rochester

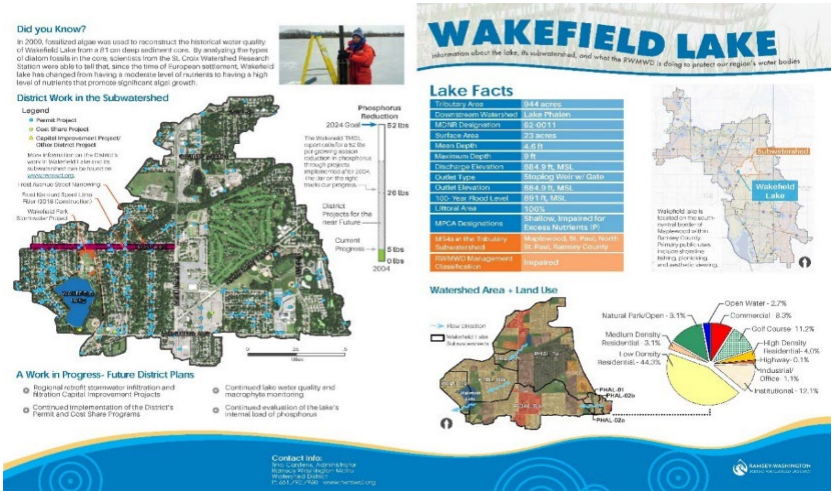
For over 10 years, the City of Rochester has been leveraging Barr's GIS staff to improve flood risk management for their community. Barr developed inundation mapping for the effective FEMA flood insurance study; created a flood-forecast display tool that allows the community to visualize a given flood stage based on national weather service flood forecasts at stream gages.

Creating the tool involved developing four different inundation map libraries associated with four different USGS stream gages. When the national weather service issues a flood-stage forecast for one of those gages, the city can initiate a process that uses the flood-stage forecast to generate a map showing the associated inundation area. This map can be shared with emergency management personnel so they can proactively close roads and trails, notify affected residents, and focus flood-fighting efforts. The tool also enables the city to generate a list of affected parcels so property owners can be notified. In addition to the desktop GIS tool, Barr created a web map that allows non-GIS users to have access to floodplain data through a web browser.

2.8 Graphic Design

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 schoolchildren and mall shoppers to pedestrians and motorists viewing signage from their cars. For example, Barr recently developed interpretive signage (right) to accompany a rain garden installed in the Duck Lake watershed to educate the public on the importance of water quality measures and encourage homeowners to implement similar but smaller solutions on their own properties.



We created this flyer for RWMWD's Wakefield Lake using narrative and graphics we created for the District's watershed management plan.

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.

Barr uses illustrations and easily understood text to create educational materials that make complex topics comprehensible and interesting to non-technical audiences. We're regularly called upon by cities and natural resource management groups to develop informative yet easy-to-understand presentations, reports, interpretive signs, brochures, environmental identity systems, and interactive digital tools and features and websites. Our hallmark is clear and compelling communications that illustrate environmental problems and solutions and inspire stewardship.

Relevant project examples

Interpretive signage for BMP features — Client: Capitol Region WD

Barr designed several low-impact stormwater treatment systems along the Green Line light rail corridor that links the cities of Minneapolis and Saint Paul. We then worked with CRWD to develop interpretive signs that illustrate how each type of system captures and cleans polluted street runoff, as well as educate the public on the importance of green infrastructure and water quality in the urban environment. The signs have since served as a template for interpretive signage throughout CRWD. More recently, Barr developed interpretive signage for the Como Park Senior High School and Seminary Pond water quality projects.

District green-infrastructure forum

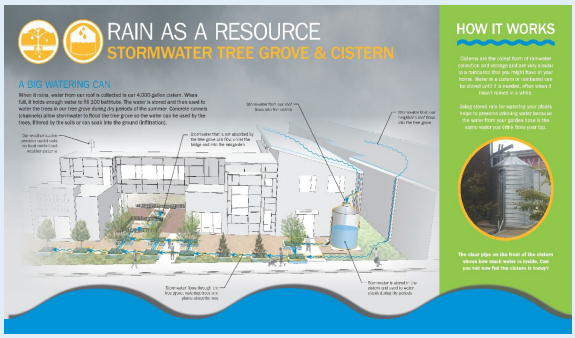
Client: Capitol Region WD

In January 2017, the Capitol Region WD 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 intentions for the forum were 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.

Stormwater reuse for irrigation and education

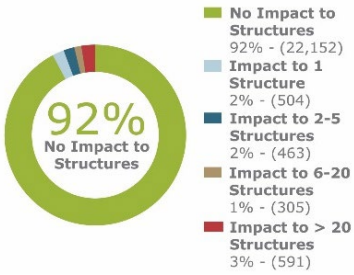
Client: Mississippi Watershed Management Organization

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 design is underway; an artificial ravine to the Mississippi River cleans urban stormwater runoff while allowing visitors to access the shore.



Climate resiliency planning storm-sewer failure risk assessment

Client: South Washington WD



The South Washington WD worked with Barr to develop a plan to improve the climate resiliency of the district and its member communities. Barr developed and facilitated a two-day planning workshop with policymakers and stakeholders from across the watershed. During the workshop, participants identified climate hazards and risks to their communities and developed high-level prioritized strategies to respond to those risks. Using the workshop feedback, Barr developed recommendations to address increased climate-change risk to the groundwater, natural resources, and storm-sewer infrastructure in the district. We also investigated climate-change risks to 25,000 storm-sewer pipes in the district by assessing the likelihood and potential consequences of pipe failure.

Interpretive signage for water treatment plant

Client: City of New Brighton

In 2019, Barr developed several interior and exterior interpretive signs for the newly upgraded water treatment plant in New Brighton. Working closely with the city, Barr utilized two- and three-dimensional illustrations to create signs and informative graphics explaining the water treatment process in detail. Illustrative graphics included wall-mounted, post-mounted, and graphic wraps covering large processing equipment. Barr's designers, working with plant managers and systems engineers, transformed complicated industrial and scientific processes into interpretive signs that clearly communicate complex messages to a diverse audience.

2.9 Technology/website enhancement

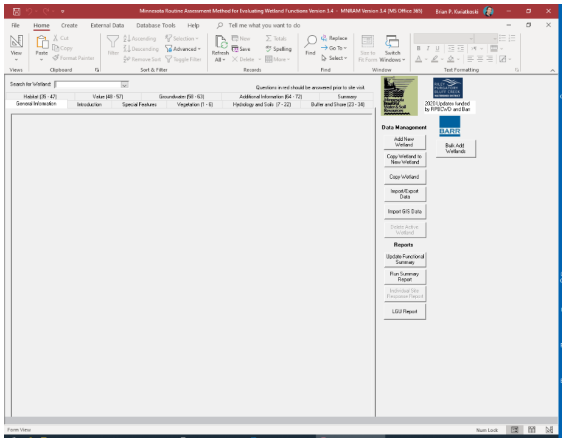
Your website is perhaps the most valuable resource in your education toolbox. It gives citizens a place to connect, get involved, and learn about the district's efforts to manage area waters. Barr helps clients enhance their websites and make wise use of technology to work more efficiently and effectively. The following are some of the features and services our team can provide.

Mobile/interactive applications

Barr can help the district develop interactive applications, such as the mobile inspection tool for RPBCWD permit inspections.

Database services

Our customized database applications are web-based for simple use, easily modified or upgraded. Our team understands what your customers expect, and can integrate maps, photos, video, and sound to enhance the user experience.



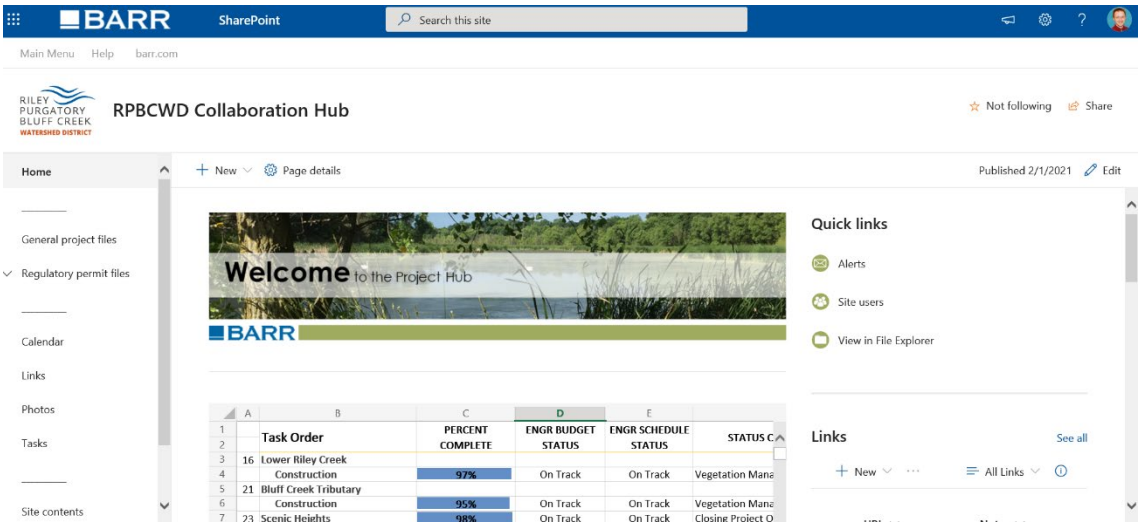
Barr partnered with RPBCWD to convert BWSRs Minnesota Routine Assessment Method (MnRAM) database to function on current Windows platforms while improving functionality and

Web maps for data access

Barr develops web maps that provide client staff and project team members with immediate, 24/7 access to project data and an ability to edit data simultaneously. Web maps can also make data more accessible for regulators and stakeholders—a valuable benefit during environmental review and permitting processes.

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.

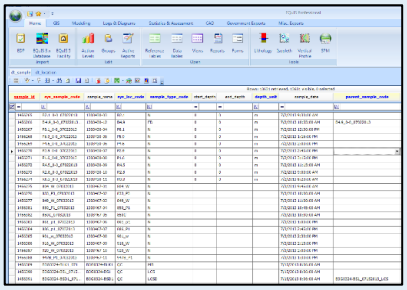


For the RPBCWD, Barr developed a collaboration portal to share comments and track the progress of permits and capital improvement project implementation while also streamlining data transfers and sharing.

Relevant project examples

EQuIS data management

Clients: RPBCWD, Nine Mile Creek WD



screenshot of the RPBCWD's EQuIS data

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. Barr has continued to work closely with the RPBCWD to manage its field and laboratory data in EarthSoft's EQuIS software.

Watershed district web mapping

Client: Capitol Region WD

On behalf of the Capitol Region WD, 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 popup, 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.

Interactive mapping website

Client: Hennepin County

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. 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 EPA, MPCA, City of Minneapolis, and local neighborhood associations.