Watershed modeling

Prepared for
Lower Mississippi River Watershed Management Organization

Submitted by
Barr Engineering Co.

September 2, 2025

BARR

September 2, 2025

Lower Mississippi River WMO
c/o: Joe Barten, Administrator via Dakota County SWCD
Dakota County Soil & Water Conservation District
4100 220th St. West, Suite 102
Farmington, MN 55024

Re: RFP to provide watershed modeling

Dear Joe:

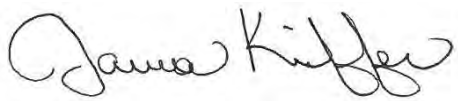
Barr is excited to submit our proposal to provide watershed modeling for the Lower Mississippi River WMO. Our proposal is based on the RFP; LMRWMO's response to questions dated August 22, 2025; our experience working on similar watershed modeling projects; and our expertise and extensive experience in the stormwater and natural resources management field. The proposed hydrologic, hydraulic, and water quality modeling represents an important and significant investment in future management of the water resources in the LMRWMO. Barr is dedicated to developing high-quality products to help the LMRWMO and its member cities make informed decisions now and into the future. We believe Barr is best positioned for this work because:

- **Our time-tested approach to hydrologic, hydraulic, and water quality modeling will provide results on which you can confidently base future decisions**. Our deep bench of hydrologic and hydraulic (H&H) and water quality experts have developed reliable, high-quality models for tens of thousands of acres of urban and suburban landscapes just like your watershed.

- **Our familiarity with your watershed, your organization, and your needs will help ensure a customized, collaborative, and efficient approach to maximize value.** Barr's familiarity with your organization and its goals and objectives will help us deliver a project that meets your desired outcomes. Greg Williams' involvement and role as your day-to-day engineer will promote regular communication and collaboration between the project team and all project partners

- **Analyses with an eye toward cooperative feasibility will help the LMRWMO and its partners implement common sense solutions.** We understand that consistent and comprehensive modeling across the watershed is a key step in identifying, prioritizing, and implementing future improvements. Barr and the LMRMWO have a successful history of turning studies into projects.

Thank you for the opportunity to present our proposal. We look forward to 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 Janna at JKieffer@barr.com or 952.832.2785 or Tyler at TOlsen@barr.com or 952.832.2930.



Janna Kieffer, PE
Vice President, Principal in Charge

Tyler Olsen, PE
Project Manager

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1 Why choose Barr?

Founded by a hydrologist, Barr has a long history of water resources work in Minnesota and the Twin Cities metropolitan area. At Barr, we solve clients' problems as if they were our own. We'll bring to your project the expertise we've gained from our work on thousands of projects—including yours—and a promise to do our best work on your behalf. We believe Barr is best positioned to assist you because:

Our tested approach to hydrologic, hydraulic, and water quality modeling will provide trustworthy results on which you can confidently base future decisions. Barr has developed a strong expertise in stormwater modeling in recent decades that is unmatched locally. Our deep bench of hydrologic and hydraulic (H&H) and water quality experts have developed models for tens of thousands of acres of urban and suburban landscapes like yours. With a focus on sound science and practical application, these models have helped our clients assess pollutant loading and flood risk to target and prioritize future improvements. Barr's modelers continuously build and improve our model input generation and QA/QC tools, allowing us to efficiently and cost-effectively create accurate and useful models. For example, the Barr-developed GIS-based water quality model (GIS WQM) that allows for rapid development of large-scale water quality models has been used to develop models spanning tens of thousands of acres, uniquely modeling over 1,000 BMPs. Our project manager, **Tyler Olsen**, and modeling team are proficient in P8, PCSWMM, and GIS-WQM, having used these models for several metro area clients.

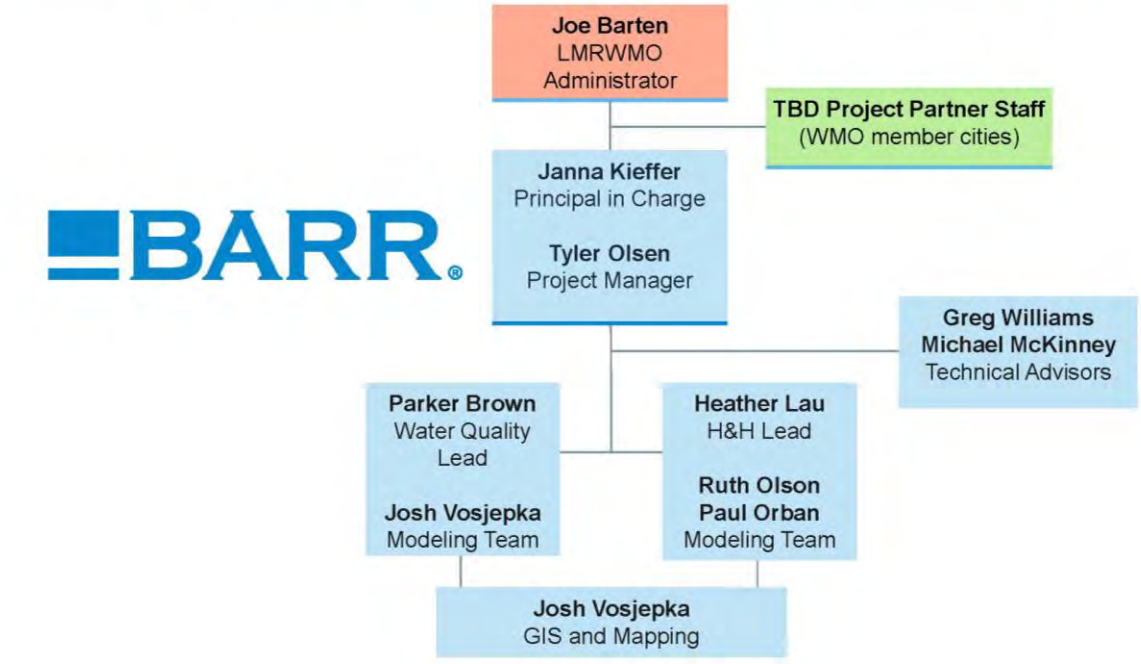
Our familiarity with your watershed, your organization, and your needs will help ensure a customized, collaborative, and efficient approach to maximize value. Barr's familiarity with the unique landscape of LMRWMO and your organization**,** its goals, and objectives will help us deliver a project that meets your desired outcomes. As a joint powers organization, we understand the value member cities bring to your projects and will treat them as an extension of the client. We have met with you and city staff to understand your modeling needs, leading to the development of draft H&H modeling guidance. Barr is currently performing H&H modeling for Inver Grove Heights, and members of that team will also be working on this project to better leverage our local modeling experience and promote consistency in watershed models. **Greg Williams**' involvement and role as your day-to-day engineer will promote regular communication and collaboration between the project team and all project partners.

Analyses with an eye toward cooperative feasibility will help the LMRWMO and its partners implement common sense solutions. We understand that consistent and comprehensive modeling across the watershed is a key step in identifying, prioritizing, and implementing future improvements. Barr and the LMRMWO have a successful history of turning studies into projects. Barr completed the Cherokee Heights culvert analysis and erosion control feasibility study in 2015, including modeling and conceptual projects, which led to implementing a stabilization project by the project partners, Following the WRAPS study, Barr assisted the LMRMWO in securing grant funding and performing in-lake alum treatments of Lake Augusta and Sunfish Lake. As a joint powers organization, we understand that successful projects are only possible through the collaboration of the LMRWMO and its cities. We will work with all members of the team to develop solutions that support the goals of all partners.

2 Proposer's team and key personnel

Our project team is selected based on expertise, prior experience, and availability to assist the LMRWMO with this project. The following organizational chart shows our team structure. Our team will be led by Janna Kieffer, who will serve as principal in charge, and Tyler Olsen, who will serve as project manager. Brief biographies of key staff members appear below; resumes are provided in *Appendix A*.

Lower Mississippi River Watershed Management Organization



Principal in Charge

JANNA KIEFFER, PE | Vice President, Senior Water Resources Engineer
MS, Civil Engineering

Janna Kieffer has 23 years of water resources management experience and serves as a client lead, project manager, and technical expert for municipal and WMO clients. Her work includes overseeing modeling, flood risk reduction studies, lake management studies, BMP performance assessments, feasibility studies, and watershed plans. Janna has worked with the LMRWMO since 2008 and collaborates often with our proposed team, overseeing numerous similar projects.

Project Manager

TYLER OLSEN, PE | Water Resources Engineer
MS, Civil Engineering (Water Resources)

Tyler has over seven years of experience with watershed management, surface water quality analysis/modeling, H&H modeling, stormwater management and planning, flood risk assessment, and green infrastructure design for public clients, including watershed districts, cities, and counties. He leads projects from the planning stage through construction and operations, maintenance, and monitoring. He also supports projects and clients by facilitating public engagement.

H&H Lead

HEATHER LAU, PE | Senior Water Resources Engineer
MS, Civil Engineering

Heather has 10 years of experience with H&H modeling, floodplain modeling, water quality modeling and management, and stormwater design. She develops models with PCSWMM, XPSWMM, HEC-HMS, and HEC-RAS to evaluate watershed hydrology, flooding extents, and opportunities for improvements. Using P8 and MIDS, she designs stormwater-quality-improvement facilities.

Technical Advisor

MICHAEL McKINNEY, PE | Senior Water Resources Engineer
MS, Environmental Engineering

Michael specializes in H&H modeling, water quality modeling, and project management. He has 12 years of experience and has developed numerous large, calibrated water quality and hydraulic models. Michael has managed and/or led technical modeling development of many large-scale, urban H&H and water quality improvement studies, including developing novel flood mitigation and water quality improvement prioritization strategies.

Technical Advisor

GREG WILLIAMS, PE | Senior Water Resources Engineer
MSCE, Civil and Environmental Engineering

Greg has 18 years of experience providing water resource services to watershed management organizations, industrial clients, and diverse municipal clients. He specializes in H&H modeling of urban and rural watersheds, water quality modeling, and development of watershed management plans. Greg has worked with the LMRWMO since 2012 and serves as the LMRWMO's day-to-day engineer.

Water Quality Lead

PARKER BROWN | Water Resources Engineer
BS, Civil Engineering

Parker has five years of experience in H&H analysis and civil engineering, including BMP design, stormwater modeling, and water quality modeling. At Barr, Parker contributes to stormwater planning efforts; conducts hydrologic runoff modeling and analysis; develops plans and specifications, reports, and spreadsheets; and provides GIS and computer-aided design and drafting (CADD) work.

H&H Support

RUTH OLSON, EIT | Water Resources Engineer

MS, Sustainable Water Development

Ruth joined Barr in 2023 and is involved in hydrologic and hydraulic (H&H) modeling related to stormwater infrastructure, flooding, and sanitary systems. She is currently providing modeling support on the Inver Grove Heights H&H modeling project.

H&H Support

JOSH VOSEJPKA | Senior GIS Specialist
MS, Geographic Information Science

Josh has 11 years of experience in GIS, with extensive experience with raster analyses and supporting H&H and water quality modeling. He works with LiDAR data, surveys topography and bathymetry, and designs flood control features for existing and proposed digital elevation models (DEMs). He uses these datasets to support H&H modeling by performing hydro-conditioning, delineating drainage areas, and calculating flow parameters.

3 Qualifications and experience

Below are similar projects completed by the Barr team within the last five years, with client contact information.

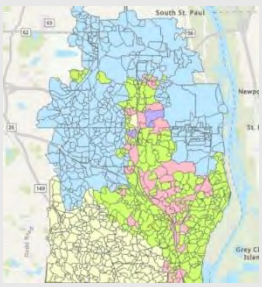
Inver Grove Heights hydrologic and hydraulic modeling (with WRMP Update)

City of Inver Grove Heights

Reference: Chris English; 651-450-2489; cenglish@ighmn.gov

Key personnel: Greg Williams (Project Mgr); Paul Orban and Ruth Olson (H&H Modeling)

Barr is assisting the City of Inver Grove Heights in updating its Water Resources Management Plan (WRMP). As part of this effort, Barr is developing or updating H&H modeling throughout the city. This includes creating new models of previously unmodeled areas using the PCSWMM modeling framework and converting existing models of varying detail into PCSWMM for a consistent approach.



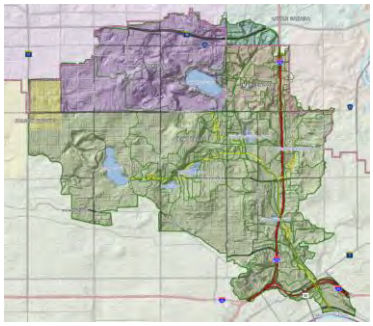
Following model development and QA/QC, Barr and the city will use model results to identify areas of flood risk and develop strategies to limit runoff, reduce flood risk, and/or improve water quality in developed areas. As part of the project, Barr will develop an H&H model user manual detailing model input development, allowing the city to update model inputs and maintain the model. The manual will document data sources, methods for calculating hydrologic parameters, and steps to identify key model results.

Trout Brook Interceptor modeling and calibration

Capitol Region Watershed District

Reference: Anna Eleria; 612-618-4357; aeleria@capitolregionwd.org

Key personnel: Michael McKinney (Project Mgr), Tyler Olsen (Water Quality Lead) Heather Lau (H&H Lead) Parker Brown (Modeler)



Capitol Region Watershed District (CRWD) hired Barr to update and calibrate their hydrologic and hydraulic modeling for the Trout Brook Storm Sewer Interceptor (TBI). The study area covers approximately 8,200 acres (19 square miles).

Barr used XPSWMM—which uses rainfall and watershed information to generate runoff that is routed through pipe, stream, and overland flow networks—to model the hydrology and hydraulics. To calibrate the model, we input 15-minute rainfall data collected at the University of Minnesota, St. Paul campus monitoring station, NEXRAD data, CRWD data, and Minnesota State Climatological Office data. We calibrated the model to flow recordings at stream-monitoring stations located in the CRWD using flow-monitoring data from a 2010 and 2007 storm event. The model was also calibrated to five ponds within the CRWD for the 2010 storm event and six for the 2007 event.

Barr used the calibrated model to analyze the 2-, 10-, and 100-year and 24-hour design events to characterize flow conditions in the existing system. Our analysis included a detailed assessment of the impacts of the Willow Reserve diversion and modeling of a flood-prone area in Maplewood. The methodology used for a new calibrated XPSWMM model better reflects existing urbanized watershed conditions than the previous modeling analyses developed using the SCS curve number method. It also provides the CRWD with a tool to analyze how changes in the watershed and to the TBI will influence flows and flooding in and around the TBI.

Citywide water quality modeling

City of Richfield

Reference: Mattias Oddsson; 612-861-9797; moddsson@richfieldmn.gov

Key personnel: Michael McKinney (Project Manager); Heather Lau (Modeler)

The City of Richfield requested assistance with developing a citywide water quality model to evaluate the performance of water quality BMPs and pollutant discharge loading related to regulatory requirements, including total maximum daily load (TMDL), stormwater pollution prevention plan (SWPPP), and Minnehaha Creek Watershed Deistic Plan requirements.

Barr worked with the city to review existing stormwater and BMP information and proposed a plan to develop citywide water quality models using two unique models: P8 and the Barr-developed GIS WQM. The P8 model was developed for regulatory compliance review, and the GIS WQM model was developed for rapid evaluation of BMP alternatives and as a water quality asset management program. The water quality models used data collected at key locations throughout the city to evaluate BMP performance, effective pollutant loading, and TMDL compliance.

For a follow-up project completed in 2021, Barr used the water quality models for a variety of applications, including:

- Evaluating pond performance to develop a pond maintenance prioritization list.
- Developing a street sweeping prioritization strategy.
- Conducting TMDL compliance modeling for MS4 Part 2 permit application reporting.

4 Work plan and budget for scope of services

The LMRWMO seeks to develop H&H and water quality modeling in priority areas. Updated modeling will allow the LMRWMO and cities to evaluate conditions, identify opportunities, and prioritize projects to improve water quality and reduce flood risk. Pollutants of concern include phosphorus, sediment, and chloride in stormwater runoff. Our approach uses established tools to track nutrients and sediment (P8 and GIS-WQM) and methods to assess chloride loading and potential reductions. Our approach promotes efficient water quality assessment of areas not covered by detailed H&H modeling.

4.1 Task 1: desktop analysis, project kickoff, and communication

Our first task will include collecting and organizing geospatial and tabular data over the study area of both grants. We will request geospatial, modeling, and monitoring data from cities and coordinate with city staff to obtain best-available models and subwatershed divides. We will develop basemaps of data and model extents and identify data gaps, assess their significance, and develop recommendations to address gaps. If gaps cannot be quickly addressed, we will make assumptions and note them to facilitate future work. We assume 20 hours of time for fieldwork to resolve data gaps.

After organizing data, we will attend an in-person kickoff meeting with the administrator, city staff, and partners (e.g., MnDOT, Metropolitan Council). At the meeting, we will clarify objectives and schedule, present data, and discuss data gaps. We will host virtual project check-in meetings with the administrator and city staff monthly. We will also schedule in-person meetings with city and WMO staff at key points in the project, including: 1) presenting preliminary results of WBIF-related modeling, 2) presenting preliminary results of AIG-related modeling, and 3) reviewing results of field reconnaissance of potential project locations (post-modeling). Later, we will present modeling results, project outcomes, and next steps to the LMRWMO Board of Managers at a regularly scheduled WMO meeting.

4.2 Task 2: H&H and WQ modeling of Thompson, Rogers, and Seidls Watersheds

H&H modeling

We will perform H&H modeling of the areas tributary to Thompson, Rogers, and Seidls Lakes (LMRWMO Priority 1A lakes) using PCSWMM software. Barr will review existing models from the cities, as available, and develop the models as original models (not built off existing models from others).

Barr will delineate subwatersheds matching the resolution and methods of the Inver Grover Heights PCSWMM modeling. We will incorporate relevant spatial data sets to develop hydrologic input parameters representing existing land use, then evaluate inflow and outflow boundary conditions utilizing information collected in Task 1. Using a 500-year Atlas 14 storm, Barr will develop surface storage and overland flow conveyances to store and route flows unable to enter the storm sewer system. We will incorporate BMP modeling in detail to streamline creation of the P8 models. We will determine watershed and pipe network inputs at a resolution appropriate for use in P8 modeling.

We will simulate the two-, five-, 10-, and 100-year, 24-hour Atlas 14 storm events, back-to-back 100-year 24-hour events, and a 100-year, 10-day snowmelt event to evaluate hydraulic performance and identify flood risk issues. The precipitation depths will be based on the LMRWMO Plan (i.e., centroid of the LMRWMO). High water levels for each watershed where ponding occurs will be mapped in GIS.

Water quality modeling

We will develop water quality models using P8 software. P8 provides accurate and detailed tracking of pollutant loading and removal through individual BMPs using particle size-based pollutant accounting and detailed device hydraulic inputs. P8 models are useful to evaluate retrofit opportunities in developed areas but require detailed inputs typically developed for H&H models. For areas we are modeling in PCSWMM, we will use PCWMM inputs, as applicable. This may include utilizing PCSWMM results to develop P8 rating curves for complex devices, utilizing hydrologic inputs, etc. If the PCSWMM models have more than 120 subwatersheds, we will merge PCSWMM subwatershed divides into large catchment divides along areas of similar land use and development density to allow a single P8 model to be used for each lake subwatershed. The P8 models will reflect major public BMPs within the lake subwatersheds.

We will run models for a 30-year period of record (e.g., 1995–2024) and document average annual pollutant loading, BMP treatment efficiency, and removals. We will map pollutant loading and reduction to identify areas with high output and/or minimal treatment.

Project identification

Based on model results, we will identify priority areas for additional water quality treatment and/or source load reduction (especially relevant for chloride). We will qualitatively assess these locations for factors affecting feasibility and cost-effectiveness (e.g., parcel ownership, size, topography, etc.). We will meet with WMO and city staff to review potential project locations (see Task 1). We will refine the list of priority areas and develop planning-level feasibility analyses for 10 sites appropriate to available data, site characteristics, and partner interests. We will develop one-page factsheets for each project. We will include a qualitative evaluation of each project for constructability, known utility information/conflicts, and permitting considerations. Finally, we will develop planning-level cost estimates for each site. We assume no detailed design work will be included in the feasibility analysis.

4.3 Task 3: water quality modeling of priority 1A and 1B watersheds

For areas outside those modeled in Task 2, we will develop a GIS WQM. The GIS WQM can assess pollutant loading and removal from areas without the need for a detailed H&H model, allowing for the most efficient assessment of the remaining ~8,000-acre study area.

The GIS WQM is a GIS-module that utilizes watershed, BMP, and stormwater infrastructure information to generate pollutant loading, route loading through the stormwater system, predict pollutant load removal at BMPs, and summarize pollutant loading and removal at any point within the stormwater infrastructure network. The pollutant reduction methodology within the GIS WQM is based on a methodology developed by Barr for the Minnesota Pollution Control Agency's (MPCA) Minimal Impact Design Standard (MIDS) Calculator. The model uses simplified watershed and BMP inputs to estimate annualized pollutant loading and pollutant reduction at modeled BMPs. The GIS WQM is an empirically based model for quickly evaluating BMP performance and pollutant loading. Due to its quick simulation speed, these models can be used to evaluate "what if" scenarios regarding implementation, modification, and cost-benefit.

We will build the GIS WQM flow network using storm networks from the cities, adding conveyances through ponds to provide a continuous flow network to each subwatershed outfall. We will utilize existing subwatershed data and delineate as needed. We will add BMPs to the GIS WQM using data provided in Task1. For each BMP, we will determine the permanent pool volume, water quality volume, and surface area (where required). We will use plan sheets, LiDAR, and other data, or make assumptions when this information is not available. We assume 80 hours of staff time to develop the BMP inputs (as the number of BMPs that will be included is unknown). Publicly owned BMPs at a regional-scale will be included in the model. We will not model private BMPs or small site-scale BMPs (e.g., residential rain gardens).

We will generate maps showing pollutant loading (i.e., "hot spot" mapping) and phosphorus and sediment removal efficiencies. As in Task 2, we will review data to identify and map areas of high chloride loading. Based on the results, we will identify priority subwatersheds for future improvements. For these priority areas, we will include qualitative recommendations for identifying potential treatment options in the future work of the LMRWMO and its partners. We will meet with WMO and city staff to review priority areas for additional treatment (see Task 1) and identify those linked to possible future redevelopment.

4.4 Task 4: field reconnaissance

After initial review of project locations with partners (see Task 1), we will visit at least 10 of the most promising sites. Visits will include field verification of infrastructure, land use, drainage patterns, and other characteristics. The level of detail may vary depending on the number of sites. We will present findings to WMO and city staff and revise the list of project locations and feasibility analyses based on feedback. We assume up to 20 hours for Barr staff to conduct the field reconnaissance at the priority project sites.

4.5 Task 5: final deliverables and model documentation

Barr will prepare a single **Final Report**. The report will differentiate between analyses performed for WBIF and AIG work plans, allowing for clear grant reporting and demonstration of grant objectives. The report will document model development and include tabular results by subwatershed, as applicable. The report will include figures and maps showing relative pollutant loading and flood risk (for H&H model areas). We will prepare a **Modeling Best Practice Guidance Document** applicable to H&H and WQ models developed in the LMRWMO. The document will build off H&H modeling guidance already developed by Barr for LMRWMO, the City of Inver Grove Heights model user manual (in progress), and information gleaned through the completion of this project. We will provide project data and documentation in PDF and/or original, editable format (e.g., MS Word or Excel) to LMRWMO.

4.6 Project budget

The following table presents our proposed project budget, by project task (see Sections 4.1 through 4.5), project staff, and expenses. The project breakdown includes the cost for each task allocated to the applicable grant; the totals are within the available grant funds. Assumptions associated with the proposed project costs are described in our scope narrative (see Sections 4.1 through 4.5). We understand that the LMRWMO requires the final report to be provided by November 3, 2026 and all project costs to be invoiced by January 3, 2027. We understand this date is limited by the WBIF grant timeline. Our project budget and task breakdowns are designed such that additional work related to the AIG grant scope (including documentation) *may* be completed after closure of the WBIF grant, if desired by the LMRWMO and member cities.

Proposal Section	Staff Name	Janna Kieffer	Tyler Olsen	Heather Lau	Michael McKinney	Greg Williams	Ruth Olson	Parker Brown	Paul Orban	Josh Vosjepka	Total Hours	Labor Cost	Expenses	Total Cost	Total WBIF Cost	Total AIG Cost
	Staff Role	Principal in Charge	Project Mgr. WQ Lead	H&H Lead	Technical Advisor	Technical Advisor	H&H Modeling	WQ Modeling	H&H Modeling	GIS Specialist						
	Staff Rate	$ 225	$ 165	$ 165	$ 175	$ 185	$ 125	$ 130	$ 140	$ 125						
	Project Task	Hours	Hours	Hours	Hours	Hours										
4.1	Desktop Analysis, Project Kickoff and Communication	7	48	26	7	5	0	0	0	12	105	$ 17,435		$ 17,435	$ 8,718	$ 8,718
4.2	Modeling of Seidls, Thompson, and Rogers Watersheds (WBIF scope)	13	70	66	30	6	170	120	36	30	541	$ 77,365		$ 77,365	$ 77,365	$ -
4.3	WQ Modeling of Priorty 1 Watersheds (AIG scope)	14	60	12	38	7	20	90	0	130	371	$ 53,425		$ 53,425	$ -	$ 53,425
4.4	Field Reconnaissance	0	28	24	0	0	0	0	0	0	52	$ 8,580	$ 200	$ 8,780	$ 4,390	$ 4,390
4.5	Deliverables and Documentation	20	76	64	24	10	36	24	8	36	298	$ 46,890		$ 46,890	$ 23,445	$ 23,445
	Project Totals	**54**	**282**	**192**	**99**	**28**	**226**	**234**	**44**	**208**	**1367**	**$ 203,695**	**$ 200**	**$ 203,895**	**$ 113,918**	**$ 89,978**

Notes: Assumptions associated with this cost estimated are included in the scope narrative (see Section 5).
Costs related to the scope of both grants are split evenly between the two grants.

5 Conflict of interest

Barr has previously and continues to provide consulting services to cities within the LMRWMO and agencies with jurisdiction in the watershed (e.g., Minnesota Pollution Control Agency). Members of this project team are providing modeling and planning services to the City of Inver Grove Heights.

Barr does not believe there are any conflicts of interest in providing the services described in this proposal. Rather, we generally consider potential overlap of our project work with LMRWMO and its member cities as a positive, as it can improve understanding of the project, the landscape, and partners, and promote project efficiency.

Appendix A

Resumes

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barr.com

JANNA KIEFFER, PE

Vice President, Senior Water Resources Engineer

EXPERIENCE

Janna Kieffer has 25 years of water resources management experience and serves as a client lead and technical expert for municipal and watershed management organization clients. She has worked with several cities on stormwater and natural resources management in park systems, including St. Paul (Lilydale Regional Park), Edina (Rosland Park, Mavelle and Bristol Park, Morningside Park, Centennial Lakes, Braemar Golf Course), and Bloomington (Normandale Lake). Through her project and permitting experience, she has a unique understanding of the complexities of balancing water management objectives with park design and operation needs. Through her work with water management organizations, she has considerable experience working with city partners and other public and private entities to incorporate stakeholder needs and successfully meet project objectives.

Project work

City of Minnetonka; city-wide flood planning and modeling updates; Minnetonka, MN; principal in charge

- Oversaw a city-wide hydrologic and hydraulic modeling analysis, including updating the XP-SWMM models, simulating flood conditions based on updated NOAA Atlas 14 precipitation frequency estimates, determining 100-year flood elevations, identifying flood risk, and evaluating future infrastructure improvements to reduce flood impacts.

City of Minnetonka; water resource management plan; Minnetonka, MN; principal in charge

- Oversaw development of the City of Minnetonka's 2021 water resource management plan. Work included updating the city's policies, stormwater treatment design standards, and other plan components to meet the requirements of the Nine Mile Creek and Minnehaha Creek Watershed Districts.

Education

BS, Engineering (Civil Specialty), Colorado School of Mines, 1998

MS, Civil Engineering, Mississippi State University, 2002

Registration

Professional Engineer: Michigan, Minnesota

JANNA KIEFFER, PE

City of Minnetonka; storm sewer failure risk analysis; Minnetonka, MN; project engineer

- Conducted a storm sewer failure risk analysis for the city of Minnetonka to identify pipes with the greatest failure risk, including likelihood and consequences, and to prioritize future inspections and replacement.

City of Minnetonka; pond inventory and maintenance program; Minnetonka, MN; project manager

- Managed the development of a pond inventory and maintenance program for the City of Minnetonka. Project work included identifying stormwater ponds to be maintained by the city in GIS, assessing sedimentation in selected stormwater ponds, and identifying and prioritizing future maintenance activities for these stormwater ponds.

Nine Mile Creek Watershed District; Nine Mile Creek Atlas 14 flood risk characterization; Eden Prairie, Minnesota; principal in charge

- Oversaw a flood risk and resiliency study for the Nine Mile Creek watershed, including updating the detailed hydrologic and hydraulic model for a 50-square-mile watershed, calibrating the model to observed creek flows, determining flood elevations using Atlas 14 precipitation frequency estimates, evaluating potential flood impacts, and preparing flood-damage cost estimates.

Nine Mile Creek Watershed District; Nine Mile Creek flood resiliency analysis; Eden Prairie, Minnesota; principal in charge

- Oversaw a study to identify and evaluate flood storage projects along Nine Mile Creek, including conceptual design, hydrologic and hydraulic modeling, evaluating flood reduction benefits, and preparing cost estimates.

Nine Mile Creek Watershed District; District Engineer; Eden Prairie, Minnesota; principal in charge

- Served as lead engineer for the Nine Mile Creek Watershed District. Oversaw technical assistance related to implementation of the regulatory program, lake and stream monitoring and data analysis, water quality studies, flood management, engineering feasibility studies, design and construction administration of capital improvement projects, watershed management planning, and other day-to-day watershed management activities.

Nine Mile Creek Watershed District; watershed-wide XP-SWMM model; Hopkins, Minnesota; project engineer

- Developed a comprehensive XP-SWMM model of the Nine Mile Creek watershed, including the Central Park area and other portions of Hopkins that drain to Nine Mile Creek.

Nine Mile Creek Watershed District; Lynmar Basin Flood Storage and Stormwater Retrofit; Edina, Minnesota; principal in charge

- Oversaw the concept design, feasibility study, design, and construction of a large stormwater and floodwater storage basin in the Mavelle and Bristol Park. The project involved converting a large turfed open space within a residential area into a shallow flood basin with lush native plantings and stone pathways to promote connecting with nature. Engagement with residents was an important part of the project, and included a resident survey and site meetings to solicit ideas and concerns.

JANNA KIEFFER, PE

Multiple clients; securing grant funds for stormwater and flood mitigation projects; Minnesota; grant writer

- Prepared grant applications and successfully securing funding for numerous clients, including the Shell Rock River Watershed District, City of Minnetonka, City of St. Paul, Nine Mile Creek Watershed District, and Lower Mississippi River Watershed Management Organization.

City of St. Paul; Lilydale Regional Park; St. Paul, Minnesota; project engineer

- Conducted a feasibility study of a steep ravine area in St. Paul, which included stormwater modeling, slope stability analysis, alternatives analysis, and facilitation of stakeholder participation

Nine Mile Creek Watershed District; Centennial Lakes Park stormwater volume reduction plan; Edina, Minnesota; project engineer

- Prepared a regional stormwater volume-reduction plan for the Centennial Lakes Park in Edina, including development of concept-level infiltration system designs, stormwater modeling to quantify benefits, and completion of a cost-benefit analysis. The project also included an environmental investigation and the development of recommendations.

Minnesota Pollution Control Agency; Minimal Impact Design Standards (MIDS); St. Paul, Minnesota; project engineer

- Served as a key team member of the Minimal Impact Design Standards (MIDS) project team for the Minnesota Pollution Control Agency, including conducting a continuous hydrologic modeling analysis to support development of stormwater volume control standards, developing volume and pollutant crediting approaches for the MIDS calculator, developing standard design templates, preparing memoranda and report, presenting information at MIDS stakeholder work group meetings, and conducting training sessions for the MIDS calculator.

Lower Mississippi River Watershed Management Organization; stakeholder engagement for the LMRWMO Watershed Restoration and Protection Strategy; St. Paul, Minnesota; project engineer

- Conducted stakeholder involvement for a watershed restoration and protection strategy (WRAPS) and total maximum daily load (TMDL) for the Lower Mississippi River Watershed Management Organization, including development of a resident survey and facilitation of meetings with citizens and technical stakeholders.

City of Edina; stormwater management services; Edina, Minnesota; project engineer

- Provided stormwater management services to the city of Edina, including developing a comprehensive water resources management plan and subsequent update, developing and using XP-SWMM stormwater hydrology and hydraulics models to identify and improve flooding issues, conducting P8 water-quality modeling, and providing Federal Emergency Management Agency review and appeal support.

City of Calgary; City of Calgary Low Impact Development (LID) Investigation; Calgary, Alberta; principal in charge

- Oversaw the investigation of stormwater green infrastructure installations for the City of Calgary, including inspection, sampling, and analysis of 30 practices (bioretention areas, bioswales, and soil cells). The investigation also included the development of an inspection scoring system, data analysis, and recommendations for improved performance of LID practices.

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TYLER OLSEN, PE

Water Resources Engineer

EXPERIENCE

Tyler has seven years of experience involving watershed management, surface water quality analysis and modeling, hydrologic and hydraulic modeling, stormwater management and planning, flood risk assessment, and green infrastructure design for public clients, including watershed districts, cities, and counties. He leads projects from the planning stage through construction, including operations, maintenance, and monitoring. In addition to providing project management and engineering services, Tyler helps clients strategically implement projects by quantifying benefits such as pollutant reduction, flood risk reduction, and equitable impact. He also supports projects and clients by facilitating public engagement and has helped secure more than $30 million in grant and loan funding for clients.

Project experience

South Washington Watershed District; Lake Management Plan; Minnesota; modeling lead

- Developed water quality models (P8) for nine suburban lakes within the South Washington Watershed District. Utilized modeling results to inform in-lake modeling and recommend load reduction opportunities to meet state water quality standards in lakes.

Ramsey-Washington Metro Watershed District; flood-risk reduction feasibility studies, modeling, planning, and implementation; Minnesota; project manager

- Led feasibility studies for flood-prone areas within the Ramsey-Washington Metro Watershed District to identify solutions for removing habitable structures from flood risk. Work included XPSWMM modeling of existing conditions and proposed project alternatives analysis. Provided engineering design services and construction administration services to implement selected projects following feasibility study completion.

Education
MS, Civil Engineering (Water Resources), University of Minnesota, 2017

BS, Environmental Engineering, University of Minnesota, 2016

Registration
Professional Engineer:
Minnesota

Digital skill set
ArcGIS Pro, MIDS, P8, XPSWMM, HydroCAD

TYLER OLSEN, PE

Ramsey-Washington Metro Watershed District; BMP and green infrastructure feasibility studies; Minnesota; project manager

- Conducted feasibility studies for several subwatersheds throughout the watershed district to identify potential BMP and green infrastructure implementation locations and prioritize the watershed district's planning efforts for areas of interest. Feasibility analysis included water quality modeling, site identification, feasibility analysis of projects, cost estimating, and prioritization of projects.

Capitol Region Watershed District; Trout Brook Interceptor XPSWMM and P8 modeling; Minnesota; modeler

- Performed modeling for intersection-scale XPSWMM and P8 models for the 8,000-acre watershed to the Trout Brook Interceptor. Model development included creating processes to track and merge datasets from numerous project partners and incorporating technical advisory committee feedback. This project incorporated XPSWMM model calibration and P8 water quality model calibration.

Mississippi Watershed Management Organization and Minneapolis Park and Recreation Board; Upper Harbor Terminal district stormwater system and regional park; Minnesota; project engineer

- Provided hydrologic, hydraulic, and water quality modeling services for a district stormwater framework and system for the proposed redevelopment of the 50-acre Upper Harbor Terminal in Minneapolis along one mile of the Mississippi River. Provided economic analysis for long-term financing of the district stormwater components. Assisted with the civil design for the 19.5-acre park portion of the redevelopment, including the design of several large bioinfiltration basins and two streams that treat and reuse water from 70 acres of off-site drainage. Also participated in stakeholder meetings to identify concepts that meet the needs and desires of a diverse group of partners. Barr is working on this project for the Mississippi Watershed Management Organization and the Minneapolis Park and Recreation Board and is collaborating with the City of Minneapolis and a developer.

Mississippi Watershed Management Organization; flood mitigation and water quality improvement prioritization; Minnesota; modeler

- Created hydrologic and hydraulic models to help prioritize future flood mitigation and water quality improvement projects.

City of Edina; comprehensive water management plan; Minnesota; modeler

- Completed 2D XPSWMM modeling for an amendment to the City of Edina's comprehensive water management plan.

City of Fridley; flood risk reduction and water quality project identification; Minnesota; modeler

- Performed XPSWMM and P8 water quality modeling in the Norton Creek and Farr Lake subwatersheds to identify several flood risk reduction and water quality improvement projects. Ramsey-Washington Metro Watershed District; Wakefield Lake watershed modeling; Minnesota; modeler

Hennepin County; climate change vulnerability assessment; Minnesota; project engineer

- Assisting with developing CCVA and summarizing climate change trends, hazards, and risks related to managing county infrastructure. Worked with county workgroup teams to map features and populations at risk of impacts due to climate change.

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HEATHER LAU, PE

Senior Water Resources Engineer

EXPERIENCE

Heather has 10 years of experience with hydrologic and hydraulic modeling, floodplain modeling and permitting, water-dam risk assessments, water quality management, and stormwater permitting. She develops models with PCSWMM, XPSWMM, HEC-HMS, and HEC-RAS and uses them to characterize watershed hydrology, evaluate and design water-dam outlets, determine flooding extents in urban and rural settings, identify storm-sewer network deficiencies, and evaluate opportunities for flood risk reduction. Using P8 and MIDS, she designs stormwater-quality-improvement facilities and manages projects from feasibility to construction.

Project work

Confidential client; evaluation of PFAS reduction in stormwater; nationwide; project manager and lead modeler

- Led development of stormwater runoff models for various sites across the country to help identify runoff potentially contaminated with per- and polyfluoroalkyl substances (PFAS) and conceptual-level treatment options.

Specialty Granules LLC; stormwater modeling evaluation; Panamint Valley Limestone; lead modeler

- Led the development of a stormwater runoff model to evaluate runoff for siting and sizing conceptual-level erosion and sediment control best management practices (BMPs).

Capitol Region Watershed District; stormwater management study; Minnesota; modeler

- Developed P8 water quality models and assisted with planning-level siting and sizing of water quality improvement projects in the St. Paul Capitol area in Minnesota.

Education

MS, Civil Engineering, Virginia Polytechnic Institute and State University, 2014

BS, Civil and Environmental Engineering, Virginia Polytechnic Institute and State University, 2013

Registration

Professional Engineer: Minnesota

Digital skill set

ArcGIS and ArcGIS Pro
HEC-RAS, HEC-HMS, HEC-ResSim
MIDS
PCSWMM
P8
RMC-BestFit and RMC-RFA
RiverWare
XPSWMM

HEATHER LAU, PE

City of Moberly; stormwater master plan; Missouri; project manager and lead modeler

- Developed city-wide PCSWMM models to evaluate flood-risk and identify planning-level flood-risk reduction projects. The project involved development of a prioritization framework and stormwater master plan.

Riley-Purgatory–Bluff Creek Watershed District; stormwater capital improvement projects; Minnesota; project manager and engineer of record

- Conducted feasibility studies, design, and construction services for various stormwater improvement and flood reduction projects throughout the District, including wetland restoration, stream restoration, stormwater infrastructure upgrades, and installation of proprietary water quality improvement devices.

South Washington Watershed District; stormwater park; Minnesota; lead modeler and engineer of record

- Developed 1D/2D PCSWMM models of the drainage area to the Hasenbank stormwater park in Woodbury. The models were used to design a series of infiltration basins, a diversion structure, and a pump system in the larger Hasenbank stormwater park.

City of Edina; Morningside flood infrastructure design; Minnesota; modeler

- Developed P8 models to simulate the water quality impacts of a project to reduce flood risk in Edina's Morningside neighborhood.

City of Moberly; southeast development conceptual-level improvements; Missouri; lead modeler

- Developed a PCSWMM model of the southeast portion of the city of Moberly to evaluate conceptual-level flood-risk reduction options.

City of Moberly; 7 Bridges Road conceptual level-improvements; Missouri; lead modeler

- Developed a PCSWMM model of the Sweet Spring Creek watershed to evaluate conceptual-level detention options to reduce overtopping on 7 Bridges Road.

Barrick Gold Corporation; stormwater improvement plan; Dominican Republic; modeler

- Used HEC-HMS and site-specific water quality data to develop a feasibility-level stormwater improvement plan for the Barrick Pueblo Viejo Mine in the Dominican Republic.

Lumina Gold Cangrejos; surface-water analyses; Ecuador; lead modeler

- Developed and calibrated surface-water models with PCSWMM to evaluate stormwater conveyance designs for the Lumina Gold Cangrejos Mine in Ecuador.

City of Saint Paul; St. Anthony Park H&H and WQ modeling; Minnesota; modeler

- Developed XPSWMM and P8 water quality models of the St. Anthony Park watershed.

Capitol Region Watershed District; stormwater management feasibility study; Minnesota; modeler

- Assisted with XPSWMM modeling and design of a district storm-sewer system for the 122-acre former Ford site (Highland Bridge) in St. Paul, Minnesota.

HEATHER LAU, PE

Training

- RiverWare Simulation Training, 2024
- USACE RMC DLS 216 - Flood Hazard for Risk Assessment, 2024
- USACE RMC DLS 114 - Flood Hazard Analysis Using RMC-BestFit and RMC-RFA Software, 2023
- CPR and First Aid Certification, 2023
- PCSWMM, 2018

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MICHAEL McKINNEY, PE

Senior Water Resources Engineer

EXPERIENCE

Michael specializes in hydrologic and hydraulic (H&H) modeling, water quality modeling, and project management. He has over 12 years of experience and has developed numerous large, calibrated water quality and hydraulic models. Michael has managed and/or led technical modeling development of many large-scale, urban H&H and water quality improvement studies, including development of novel flood mitigation and water quality improvement prioritization strategies. Michael has extensive experience with Twin Cities metro-area watershed districts, watershed management organizations, and municipalities and routinely coordinates with technical advisory committees, community advisory committees, and managerial boards.

Project experience

City of Minneapolis; GIS-based water quality modeling; Minnesota; modeler

- Developed an empirical, annualized GIS WQM model that can predict pollutant loading from land use based on land-use density characteristics, estimate removal from BMPs, and track pollutant loading and impacts of treatment trains through all elements of the link-node routing network. The city is currently using the model for water quality evaluation and asset management.

Capitol Region Watershed District; Trout Brook Interceptor XPSWMM and P8 modeling; Minnesota; project manager

- Managed the development of intersection-scale XPSWMM and P8 models for the 8,000-acre watershed to the Trout Brook Interceptor. Model development included creating processes to track and merge datasets from numerous project partners and incorporating technical advisory committee feedback. This project is in progress and will incorporate XPSWMM model calibration and may include P8 water quality model calibration.

Education
MS, Environmental Engineering, University of Nebraska–Lincoln, 2012

BS, Biological Systems Engineering, University of Nebraska–Lincoln, 2010

Registration
Professional Engineer: Minnesota

Digital skill set
PCSWMM, XPSWMM, HydroCAD, P8, ArcGIS Pro, HEC-RAS, HEC-HMS, AutoCAD

MICHAEL MCKINNEY, PE

Nine Mile Creek Watershed District; flood risk assessment: Atlas 14 and beyond; Minnesota; project manager

- Assessed flood risk for the watershed district, including projecting and modeling mid-century climate change rainfall events, updating model calibration, evaluating risk of crossing clogging and failure, and quantifying flood damage costs across the 44-square-mile watershed.

Ramsey-Washington Metro Watershed District; street sweeping improvement study; Minnesota; project manager

- Managed the development of a novel street sweeping prioritization study for the Ramsey-Washington Metro Watershed District. The prioritization strategy involved using the Barr-developed GIS-Based Water Quality Model (GIS WQM) to evaluate and rank the effectiveness of street sweeping on all street surfaces, based on both (a) raw total recovery and (b) pollutant reduction prevented from reaching downstream waterbodies. The study has been used to inform development of similar studies for other organizations, including Capitol Region Watershed District and Shell Rock River Watershed District.

Ramsey-Washington Metro Watershed District; pond performance and assessment prioritization study; Minnesota; project manager

- Designed and managed a study to evaluate the assessment priority of all modeled ponds and wetlands within the Ramsey-Washington Metro Watershed District. The study also included developing inspection and assessment recommendations to meet MS4 reporting requirements. The study has been referenced in subsequent pond improvement studies completed by RWMWD.

City of Edina; York Avenue Pond flood mitigation study and design; Minnesota; project manager

- Managed the development of a flood mitigation study for York Avenue Pond located in the City of Edina. The study involved developing alternatives to mitigate flood impacts within the study area, including alternatives to expand the pond and increase pumping rate from the pond. Michael helped coordinate pond survey efforts and outreach efforts in the community. Michael also managed a follow up study, which developed 30% plan details for the preferred alternative for incorporation into an MPCA implementation grant submittal.

City of Saint Paul; Saint Anthony Park XPSWMM and P8 modeling; Minnesota; project manager

- Managed the development of a detailed XPSWMM and P8 model for the Saint Anthony Park storm sewer tunnel watershed. Developed a streamlined methodology for incorporating Saint Paul rate control areas throughout the more than 4,000-acre watershed and developed processes to convert model input parameters to be consistent with Saint Paul model development guidance.

Affiliations

- American Society of Agricultural and Biological Engineers
- American Society of Civil Engineers
- National Society of Professional Engineers

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GREG WILLIAMS, PE

Senior Water Resources Engineer

EXPERIENCE

Greg has 18 years of experience providing water resource services to watershed management organizations, industrial clients, and diverse municipal clients. He specializes in hydrologic and hydraulic modeling of urban and rural watersheds, water quality modeling, and development of watershed management plans. His experience allows him to synthesize input from clients and other stakeholders to find solutions to challenging problems related to hydrology, water quality, and resource management and the interrelated aspects of those fields.

Project work

City of Inver Grove Heights; water resources management plan and modeling update; Minnesota; project manager, plan writer

- Managed an update to the city's water resources management plan. The update includes developing or updating hydrologic and hydraulic modeling throughout the city using PCSWMM. The project also includes updating the plan's priority issues, measurable goals, policies and performance standards, and targeted implementation program.

Lower Mississippi River Watershed Management Organization; watershed management plan update; Minnesota; project manager

- Managed the 2023–2032 update of the Lower Mississippi River WMO's watershed management plan. The WMO covers 55 square miles and portions of seven cities in northern Dakota County. Work included engaging citizen and technical advisory committees, classifying priority resources, setting measurable goals and implementation actions, and guiding the plan through agency review.

Education

MSCE, Civil and Environmental Engineering, University of Washington, 2005

BCE, Civil Engineering, University of Minnesota, 2003

BA, English (Writing), University of Minnesota, 2003

Registration

Professional Engineer:
Minnesota

GREG WILLIAMS, PE

Bassett Creek Watershed Management Commission; watershed management plan update; Minnesota; project manager, plan writer

- Managed the project working closely with the Bassett Creek Water Management Commission, its administrator, and its plan steering committee (PSC) on updating the Commission's 2026 watershed plan. Work included 1) performing a gaps analysis early on to identify complex issues most in need of updating in the Plan; 2) working with the administrator to develop and execute a partner engagement plan; 3) addressing priority issues, establishing measurable goals, revising policies and program descriptions, and developing a targeted implementation schedule; and 4) updating the commission's standards (requirements document). The plan is undergoing formal review.

Valley Branch Watershed District; watershed management plan update; Minnesota; project manager, plan writer

- Managed a 2026–2035 update to the Valley Branch Watershed District's watershed management plan. The district covers 70 square miles of suburban and rural land in the east Twin Cities metro area. Work includes designing and executing a public and partner engagement program, identifying and prioritizing issues, establishing measurable goals, designing a targeted 10-year implementation program, and guiding the plan through agency review.

Capitol Region Watershed District; climate resiliency framework development; Minnesota; project manager

- Managed the development of a climate resiliency framework that includes actions and strategies the district will pursue to mitigate local impacts of climate change. Work included reviewing existing plans; facilitating workshops with district staff, managers, the community advisory committee, and technical partners; establishing goals and supporting actions; and developing a five-year implementation schedule.

Black Dog Watershed Management Organization; watershed management plan update; Minnesota; project manager

- Managed the 2022–2032 update of the Black Dog WMO's watershed management plan. The WMO covers 36 square miles and portions of four cities in northern Dakota County. Work included engaging citizen and technical advisory committees, classifying priority resources, setting measurable goals and implementation actions, and guiding the plan through agency review. After plan development, he led the team developing the goal-tracking document.

Capitol Region Watershed District; watershed management plan development; Minnesota; project manager, plan writer

- Managed the update to the Capitol Region Watershed District's 2020 watershed management plan. Developed and executed a comprehensive public and partner engagement plan emphasizing equity and representation, prioritized issues, set measurable goals, developed an implementation program that targets quantifiable actions to be performed over a 10-year planning window, and created a graphic-based document accessible to a range of audiences.

Lower Minnesota River West, Greater Zumbro River, and Cedar—Wapsipinicon River One Watershed One Plan Partnerships: comprehensive watershed management plan development; Minnesota; project manager

- Led the planning efforts to develop 10-year plans for each of the above watersheds that met BWSR's 1W1P requirements. The work included facilitating public engagement; identifying and prioritizing issues; developing measurable goals and policies; identifying implementation strategies for targeted areas; identifying and prioritizing an implementation program; and coordinating with planning work groups/steering teams, technical advisory groups/advisory committees, and policy committees.

GREG WILLIAMS, PE

- Lower Minnesota River West watershed—The 778-square-mile planning area includes the 403-square-mile Rush River watershed, the 241-square-mile High Island Creek watershed, the direct watershed to the Minnesota River, and a portion of Silver Creek and Bevens Creek watersheds. The partnership includes McLeod, Nicollet, and Sibley counties and SWCDs and the High Island Creek Watershed District. Approved in 2023.
- Greater Zumbro River watershed—The 1,654-square-mile planning area includes the 1,421-square-mile Zumbro River watershed and 233-square-mile tributary area to Lake Pepin. The partnership includes six counties and SWCDs, the Bear Valley Watershed District, and the City of Rochester. Approved in 2021.
- Cedar River and Wapsipinicon River watershed—The 590-square-mile planning area includes the Cedar River Watershed District, Turtle River Watershed District, and remaining areas tributary to the Cedar River outside of the districts. Approved in 2019.

Lower Rum River Watershed Management Organization; watershed management plan and performance standards update; Minnesota; project manager

- Managed the 2022–2031 update of the Lower Rum River WMO's watershed management plan. The WMO covers portions of three cities in Anoka County. Work included engaging citizen and technical advisory committees, identifying priority issues and classifying priority resources, setting measurable goals and implementation actions, and guiding the plan through agency review. Work also included review and updates to the Lower Rum River WMO's performance standards and assistance with the permit application process and forms.

South Washington Watershed District; stormwater design manual update; Minnesota; plan writer

- Updated a stormwater design manual for the South Washington Watershed District to assist developers in meeting stormwater management performance standards, including nutrient reduction, volume reduction, and rate control.

South Washington Watershed District; gaps analysis of watershed management plan; Minnesota; plan writer

- Developed a gas analysis of the existing South Washington Watershed District watershed management plan to identify emerging issues and focus areas for an upcoming plan update, including review relative to the district's climate resiliency plan.

Ramsey-Washington Metro Watershed District; watershed management plan development; Minnesota; plan writer

- Contributed to the Ramsey-Washington Metro Watershed District's 2017 watershed management plan. Tasks included assessing modeling and monitoring data to identify priority resources and issues; developing goals and identifying associated signs of success; prioritizing an implementation program with actions cross-referenced to applicable goals; and creating a graphic-based, public-facing summary document.

Numerous municipal clients; surface water management plan updates; Minnesota; project manager

- Managed updates to surface water management plans for the cities of Apple Valley, Golden Valley, Hastings. Lakeville, and Richfield. Tasks included inventorying water resources, assessing stormwater management issues, developing stormwater management policies, and developing implementation programs.

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PARKER BROWN

Water Resources Engineer

EXPERIENCE

Parker has five years of experience in hydrologic and hydraulic (H&H) analysis and civil engineering, including best management practice (BMP) design, stormwater modeling, and water quality modeling. At Barr, Parker contributes to stormwater planning efforts; conducts hydrologic runoff modeling and analysis; provides open-channel and pipe flow design; conducts water quality and hydrologic measurements; performs construction observation, surveying, and materials testing; develops plans and specifications, reports, and spreadsheets; and provides geographic information system (GIS) and computer-aided design and drafting (CADD) work.

Project experience

City of Clive; University Boulevard flood study; Polk County, Iowa; H&H modeler

- Performed preliminary hydrologic analysis and design of water quality features in the Walnut Creek watershed.

Capitol Region Watershed District (CRWD); Trout Brook interceptor detailed modeling; Ramsey County, MN; modeler

- Assisted with the development of a model and feasibility analysis of flood risk reduction areas identified by CRWD.

City of Saint Paul; Beltline, Davern, and Phalen Lake watershed modeling; Ramsey County, MN; modeling lead

- Led a team of modelers in the development of three watershed-wide models within the City of Saint Paul.

Education
BS, Civil Engineering, University of Minnesota Twin Cities, 2020

Digital skill set
AutoCAD, Civil 3D, MATLAB, R, HEC-RAS/HMS, SWMM, P8

PARKER BROWN

Ramsey-Washington Metro Watershed District (RWMWD); Phalen Chain of Lakes flood-risk reduction; Ramsey and Washington Counties, MN; modeler

- Conducted preliminary analysis of flood-risk reduction measures within the Phalen Chain of Lakes watershed. Worked through the design and construction phase of select flood-risk reduction measures.

City of Edina; stormwater services; Edina, MN; modeler

- Updated existing models and organized feasibility level flood mitigation alternatives for the President's neighborhood.

Department of Iron Range Resources and Rehabilitation; Embarrass River drainage channel damage assessment; St. Louis County, MN; modeler

- Developed a hydrologic model for inflows to the Embarrass River Drainage Channel. Worked with the design team to develop concepts for slope stabilization and future resilience.

Additional Minnesota watershed and municipality experience

- Reviewed and modeled stormwater design for the former Ford (Highland Bridge) site in Saint Paul.
- Modeled a 30-percent design of BMPs near Powers Lake for the South Washington Watershed District. Quantified volume and volume reduction with XPSWMM, determined water quality benefits with P8 and MIDS calculators, and sized BMPs.
- Conducted XPSWMM modeling of the Brook Drive crossing over Nine Mile Creek in Edina. The model was used to evaluate the feasibility of no-rise conditions for a culvert replacement.
- Assisted with the development of the Trout Brook interceptor detailed model for the CRWD. Gathered storm sewer data, generated subwatershed divides, determined longest-flow paths, generated P8 inputs, and performed volume capture in XPSWMM.
- Modeled the Phalen Chain of Lakes system in the RWMWD to determine flood reduction options, specifically for areas near Ames Lake Park.
- Performed field inspections of conveyance systems in the Valley Branch Watershed District. Conveyance systems include underground storm sewers, dams, underground and aboveground control structures, ditches, creeks, and ravines.
- Helped write reports for the Valley Branch Watershed District, including the district's annual reports, the 2022 Valley Creek erosion inventory report, and the 2021 Valley and Kelle's Creek erosion control feasibility study.
- Assisting with XPSWMM modeling of the more than 4,000-acre Saint Anthony Park watershed for the City of Saint Paul.
- Helped model the Farr Lake subwatershed for the City of Fridley.
- Modeled study areas in 2-D XPSWMM as part of the City of Edina's comprehensive water resources management plan.
- Assisted with administrative tasks and performed construction observation for a three-building Habitat for Humanity townhome development in Prior Lake.

PARKER BROWN

- Conducted infiltration testing and construction observation for various developments on behalf of the City of Inver Grove Heights.
- Completed development permit reviews for the Nine Mile Creek Watershed District and Elm Creek Watershed District.

Work before Barr

City of Minneapolis Public Works Department; Minneapolis, MN; intern

- Conducted field tests of fresh concrete used in resurfacing throughout the city; sampled asphalt, soil, and tested grain size distribution and density; and assisted engineers, technicians, and contractors with road construction projects.

St. Anthony Falls Laboratory; Minneapolis, MN; research assistant

- Assisted with field sampling and analysis; conducted chemical analysis of regional water samples to determine phosphorus content; and recorded and organized data to be reported and presented.

Hennepin County Public Works; Hennepin County, MN; engineering technician aide

- Analyzed traffic data with the goal of improving safety on county roads; assisted engineers with transportation planning, including road surveys, traffic studies, and project drafting; and participated in public outreach events for future construction projects.

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RUTH OLSON, EIT

Water Resources Engineer

EXPERIENCE

Ruth joined Barr in 2023 and is involved in hydrologic and hydraulic (H&H) modeling related to stormwater infrastructure, flooding, and sanitary systems.

Project experience

Owatonna Public Utilities; Comprehensive plan and model; Owatonna, MN; modeler

- Prepared an updated water system comprehensive plan and updated the existing distribution system model to evaluate potential future development conditions.

City of Inver Grove Heights; Water resources management plan; Inver Grove Heights, MN; modeler

- Updated the city's water resources management plan, which included developing a citywide H&H model for the purpose of identifying areas of flood risk to private and public property and infrastructure in landlocked and non-landlocked basins, and along stormwater conveyance routes, and prioritizing areas and relevant strategies to improve water quality.

City of Richfield; Richfield model update; Richfield, MN; modeler

- Updated existing stormwater model based on development, street reconstruction, and stormwater projects since the model was developed.

Nine Mile Creek Watershed District (NMCWD); adaptive level control system (ALCS); Twin Cities, MN; modeler

- Analyzed implementation of ALCS, including additional evaluation of flood reduction benefits, water quality protection for the stream, wetlands and lakes, and engagement with

Education
MS, Sustainable Water Development, University of Glasgow, 2023

BS, Chemical Engineering, Northwestern University, 2022

Registration
Engineer in Training:
Minnesota

Digital skill set
PCSWMM, XPSWMM, ArcGIS Pro, ArcMap, GIS, HEC-RAS

RUTH OLSON

stakeholders and regulators. The NMCWD includes Hopkins, Minnetonka, Edina, Eden Prairie, Richfield, and Bloomington, Minnesota.

City of Richfield; sanitary sewer model; Richfield, MN; modeler

- Developed a sanitary sewer model and evaluated capacity remaining in the system to serve planned redevelopment within the City.

Valley Branch Watershed District; McDonald Lake water quality model; Washington County, MN; modeler

- Incorporated monitoring data and modeling to create a holistic summary of current lake conditions, water quality challenges, and recommended management strategies, including specific projects that could be implemented.

City of Minneapolis; 35W stormwater model; Minneapolis, MN; modeler

- Developed detailed hydrologic and hydraulic modeling for the 35W South Area of Minneapolis and developed a standard operating procedure (SOP) document to convert existing models from XPSWMM to PCSWMM.

City of Edina; adaptive level control system; Edina, MN; modeler

- Evaluated innovative solutions for flood risk reduction and water quality improvements using Adaptive Level Control Systems (ALCS).

Publications and presentations

- Olson, Ruth. “Potential of PFCA and Precursor Leaching from Application of Biosolid Fertilizer in Agriculture.” Master’s thesis, 2023.

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JOSH VOSEJPKA

Senior GIS Specialist

EXPERIENCE

Josh has 12 years of experience using geographic information systems (GIS), with extensive experience with raster analysis and a wide variety of hydrologic and hydraulic (H&H) modeling projects. He works with LiDAR data, surveys topography and bathymetry, and designs flood control features to create existing and proposed condition digital elevation models (DEMs). Josh performs terrain analyses to identify areas of increased erosion risk and potential sinkhole locations and to develop inundation extents from modeled water surface elevations. He also conducts remote sensing and aerial imagery analyses to extract impervious surfaces and water body features, performs vegetation mapping, and completes land cover classification.

Project work

Sibley County; Lower Minnesota River West One Watershed, One Plan (1W1P); Minnesota; GIS specialist

- Performed terrain analysis to identify areas of increased erosion potential for the Lower Minnesota River West 1W1P project. The 778-square-mile planning area includes the 403-square-mile Rush River watershed, the 241-square-mile High Island Creek watershed, the direct watershed to the Minnesota River, and a portion of the Silver Creek and Bevens Creek watersheds. The partnership includes McLeod, Nicollet, and Sibley counties and soil and water conservation districts (SWCDs) and the High Island Creek Watershed District. The plan was approved in 2023.

North Dakota State Water Commission; Mouse River enhanced flood protection; North Dakota; GIS specialist

- Developed DEMs for the Mouse River enhanced flood protection project of existing conditions and proposed-condition surfaces using LiDAR data, bathymetry, and proposed flood protection

Education

MS, Geographic Information Science, University of Denver, 2015

BS, Geography (Geographic Information Systems), Minnesota State University, Mankato, 2012

Digital skill set

ArcGIS Pro 3.x, Python, Remote Sensing/Image Analysis, DEM Development, H&H Model Support

JOSH VOSEJPKA

features (levees, channels, overflows, etc.). Conducted post-processing of HEC-RAS models to identify floodwater inundation extents and impacts.

Shell Rock River Watershed District; Fountain Lake restoration; Minnesota; GIS specialist

- Developed existing- and proposed-conditions DEMs for use in dam break modeling for the Shell Rock River Watershed District's restoration of Fountain Lake.

Rural Municipality of Corman Park; South Saskatchewan River flood study; Saskatchewan; GIS specialist

- Developed DEMs for use in H&H modeling and utilized color-infrared aerial imagery to determine floodwater extents for use in model calibration as part of the South Saskatchewan River flood study.

City of Minneapolis; pipeshed and water quality study; Minnesota; GIS specialist

- Completed multiple tasks for the Minneapolis pipeshed and water quality study, including DEM creation, incorporating building elevations and sewer pipelines.

Bassett Creek Watershed Management Commission; watershed-wide P8 modeling; Minnesota; GIS specialist

- Determined pond and watershed characteristics, including pond volumes, surface areas, and overflow elevations, for P8 modeling of the entire Bassett Creek watershed and routine updates.

Ramsey-Washington Metro Watershed District; stormwater best management practice (BMP) retrofit study; Minnesota; GIS specialist

- Assisted with a stormwater BMP study for commercial and school properties in the Ramsey-Washington Metro Watershed District. Helped develop a scoring index to determine parcels that were suitable for stormwater BMP improvements and incorporated a number of variables such as impervious surface percentage, slope, and proximity to utilities.

City of Edina; Annual H&H Model Updates; Minnesota; GIS specialist

- Helped determine drainage-area storage volumes and processes XPSWMM modeling elevations to develop inundation extents for a number of rainfall conditions, as well as estimated flood impact to buildings as part of the annual H&H model update for the City of Edina.

Ramsey-Washington Metro Watershed District; groundwater recharge projects; GIS specialist; Minnesota

- Assisted with site selection for groundwater recharge projects within the Ramsey-Washington Metro Watershed District. Used color/infrared imagery to create an impervious-surface dataset, conducted a per-watershed analysis of impervious surfaces and green space, assessed proximity to stormwater utilities, and determined surface flow directions derived from LiDAR topography.

Multiple Public Clients, Minnesota, GIS specialist

- Developed GIS data, including impervious surfaces, tree canopies, and road surfaces, for the modeling of street sweeping removals for multiple cities and watershed districts.

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PAUL ORBAN, EIT

Water Resources Engineer-in-Training

EXPERIENCE

Paul helps clients solve problems related to water resources and environmental regulations. He provides hydraulic and hydrologic analysis, on-site assistance, site evaluations, and technical report writing. Paul's experience includes river engineering, dam breach modeling, municipal and highway stormwater modelling, mine water management, industrial water balances, and numerous environmental field programs. Paul has served as task manager and modeler for both hydrologic and hydraulic models in support of feasibility studies across Canada and the United States.

Project work

City of Inver Grove Heights; water resources management plan and modeling update; Minnesota; modelling task manager and contributor

- Acted as task manager for the development and update of hydrologic and hydraulic modeling throughout the city using PCSWMM**.**

Eden Prairie and Riley Purgatory Bluff Creek Watershed District; stormwater model update and flood-risk-area prioritization; Minnesota; hydrologic and hydraulic modeler

- Served as stormwater model to refine and update a PC-SWMM model for flood mapping and floor-risk prioritization in Eden Prairie, Minnesota. Increased model resolution from 500 to 1,100 sub-watersheds. Validated model to 28 locations. Developed a flood-risk-prioritization spreadsheet to assign risk scores based on structures, flood frequency, social vulnerability, and critical infrastructure

Alberta EPA; Lacombe flood study; Alberta; hydraulic modeler

- Served as hydraulic modeler for the Lacombe Alberta Flood Study. Work has included site visit, survey coordination, and development of the hydraulic model methodology. Future work

Education
BSc, Environmental Engineering, University of Regina, 2019

Registration
Engineer-in-Training: Alberta

Digital skill set
HEC-RAS; SRH-2D; AdH; PC-SWMM; XP-SWMM; HydroCAD; ArcGIS

PAUL ORBAN, EIT

will involve creation of a one- and two-dimensional model incor-porating fully two-dimensional domains in undefined reaches.

Nose Creek Watershed Partnership; Phase II HEC-RAS model development; Alberta; hydraulic modeler

- Served as hydraulic modeler for the development of a large HEC-RAS model of a 140-kilometer reach of Nose Creek in Central Alberta. Modeling included all three phases of the HEC-RAS software, 1D, coupled 1D/2D and fully 2D. Work included low- and high-flow calibration, as well as a sensitivity analysis.

Confidential mining client; mine expansion; Saskatchewan; hydrologic and hydraulic modeler

- Developed 2D-HEC-RAS dam breach models for two large ponds and a Monte Carlo site water balance as hydrologic and hydraulic modeler for a mine expansion. Work also involved HEC-RAS hydraulic modeling and design of stormwater channels, emergency overflows, and a surface water diversion channel.

North Dakota Department of Transportation; bridge expansion; hydrologic and hydraulic modeler

- Served as hydraulic modeler for the expansion of a bridge across the Little Missouri River in North Dakota. Work included development of existing and proposed SRH-2D models incorporating several large multi-span bridges, low- and high-flow calibration, and scour estimation using HEC-18 and the FHWA Hydraulic Toolbox.

North Dakota Department of Transportation; bridge scour estimation; hydraulic modeler

- Developed eight SRH-2D models to support scour calculations. Hydraulic structures ranged from small single span bridges to large multi-span bridges with large floodplains.

Alberta Agriculture and Irrigation; St. Mary Alberta temperature model; field lead and hydraulic modeler

- Served as field lead for a river temperature monitoring and modeling project. Responsible for continuous monitoring of stream temperature and stream discharge measurements.

Municipal District of Bonnyville; St. Marie Master Drainage Plan; Alberta; hydrologic and hydraulic modeler

- Developed a HydroCAD model of a rural community and surrounding watershed. Assessed and recommended flood-mitigation options.

North Dakota Department of Transportation; culvert crossing replacement analysis; hydrologic and hydraulic modeler

- Performed hydraulic modeling for the replacement alternative analysis of a large culvert crossing. Alternative analysis led to the design of an 1,800 ft 7x10 ft box culvert with an outlet structure and two bends. Developed a HEC-RAS model for the replacement design of a large stormwater culvert. Designed a CSU Basin outlet structure for energy dissipation into a highway embankment. Developed an Adaptive Hydraulics Model for the refinement of the CSU basin and culvert bends.

Confidential mining client; creek diversion; British Columbia; hydrology modeler

- Served as hydrology modeler for a creek diversion project. Work included a regional analysis of stream gauge data, localize storm inflow hydrology and groundwater inflows.