Watershed Modeling

Lower Mississippi River Watershed Management Organization

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1. Letter of Transmittal

Stantec

September 2, 2025

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

Reference: Request for Proposals for Watershed Modeling

Eric Osterdyk
PE, CFM
Project Manager
(612) 380-491
eric.osterdyk@stantec.com

Todd Shoemaker
PE, CFM
Principal in Charge
612-414-7166
todd.shoemaker@stantec.com

Dear Mr. Barten,

Numerical modeling of surface water runoff is a crucial tool for the Lower Mississippi River Watershed Management Organization (LMRWMO or WMO) to effectively manage and protect water resources. By leveraging advanced modeling techniques, the LMRWMO can make informed decisions to protect and enhance the health of its water resources. Stantec's long history of serving this region with water resources projects is augmented by our technical prowess in hydrologic and hydraulic (H&H) and water quality modeling, which facilitates innovative application of modeling tools in the LMRWMO region.

Why Stantec?

We value communication. Communication is key to a successful project. Our team will communicate frequently with LMRWMO to provide progress updates and obtain feedback and comments—addressing them efficiently throughout the process.

We know the area. Stantec has first-hand knowledge of the challenges and opportunities within the watershed. Our Woodbury office is mere minutes from the watershed, and our chosen project team has served the surrounding communities (Cities of Eagan, Inver Grove Heights, and West St. Paul, along with Dakota County) and watersheds (Capitol Region Watershed District (CRWD) and South Washington Watershed District (SWWD)) for decades.

We know modeling. Stantec has developed SWMM and P8 models for numerous clients around the world to assist with watershed analysis and capital improvement project (CIP) identifications. We have completed multiple projects of similar size and complexity. Most recently, Stantec completed the modeling and mapping for the Phalen Creek Subwatershed project for the CRWD, which included XPSWMM and P8 modeling for over 1,500 acres divided into 561 subwatersheds.

We will provide LMRWMO modeling services that will:

- Evaluate storm sewer capacity issues, areas of flooding, and watershed pollutant loading
- Identify and prioritize future mitigation efforts
- Provide recommendations to aid in allocating resources to achieve the most significant pollutant reduction and water quality improvements

Our team will be led by Project Manager, **Eric Osterdyk**. His water resources expertise includes hydrologic and hydraulic modeling, water quality modeling, watershed permitting and rules development, construction stormwater permitting, stormwater design, wetland restorations, and SWPPP and ESC plan design. Eric has worked on state, county, municipal and watershed district projects including the Phalen Creek Subwatershed Modeling project for the CRWD (project manager), the Rural SWMM modeling project for Dakota County (lead modeler), and the Roberts Watershed Study for the City of Inver Grove Heights (modeler).

We are excited to work with you on this project and appreciate the opportunity to share our qualifications, work plan, schedule, and budget. This proposal will remain valid for a period of not less than 90 days from the date of the submittal. There are no addendums to acknowledge. We look forward to sharing our expertise and serving LMRWMO.

Sincerely,

Stantec Consulting Services Inc.

2. Proposer's Team

The organizational chart below identifies our key personnel who bring years of experience working together while delivering high-quality studies and projects. Each brings specific expertise to contribute to the success of your project–bringing together experts in watershed engineering, planning, and analysis; hydrologic, hydraulic, and pollutant modeling; erosion assessment; stormwater BMPs, and resilience.

> **Our team is uniquely positioned to provide the LMRWMO with comprehensive, innovative, and cost-effective modeling that provides strategic direction for future decision-making and prioritization of projects–promoting improved water quality and the prioritization of projects with potential grant funding opportunities.**

Recent grant awards for Stantec clients include: $400,000 LCCMR for Shingle Creek Natural Channel; $800,000 MPCA resiliency grant to reduce flooding in Eagan; and $40,000 MPCA resiliency grant to study feasibility of an infiltration trench in Crystal, MN.

Project Manager **Eric Osterdyk** is a licensed professional engineer and certified floodplain manager with eight years of experience in water resources including project management for water resources projects, hydrologic and hydraulic modeling, and water quality modeling.

Erik Megow has 16 years of experience as a water resources engineer. His experience includes water resources modeling and analysis using a variety of modeling and mapping applications. Erik will provide senior technical review.

Patrick Flynn has 17 years of experience in water resources and brings a thorough understanding of hydrologic and hydraulic methods, as well as extensive experience in application of these methods for alternatives analysis and master planning efforts. Patrick's will provide senior modeling QA/QC.

Kaitlyn Avidan recently joined Stantec as a water resources designer. She has experience in hydrology studies and modeling. Kaitlyn will provide modeling and analysis support.

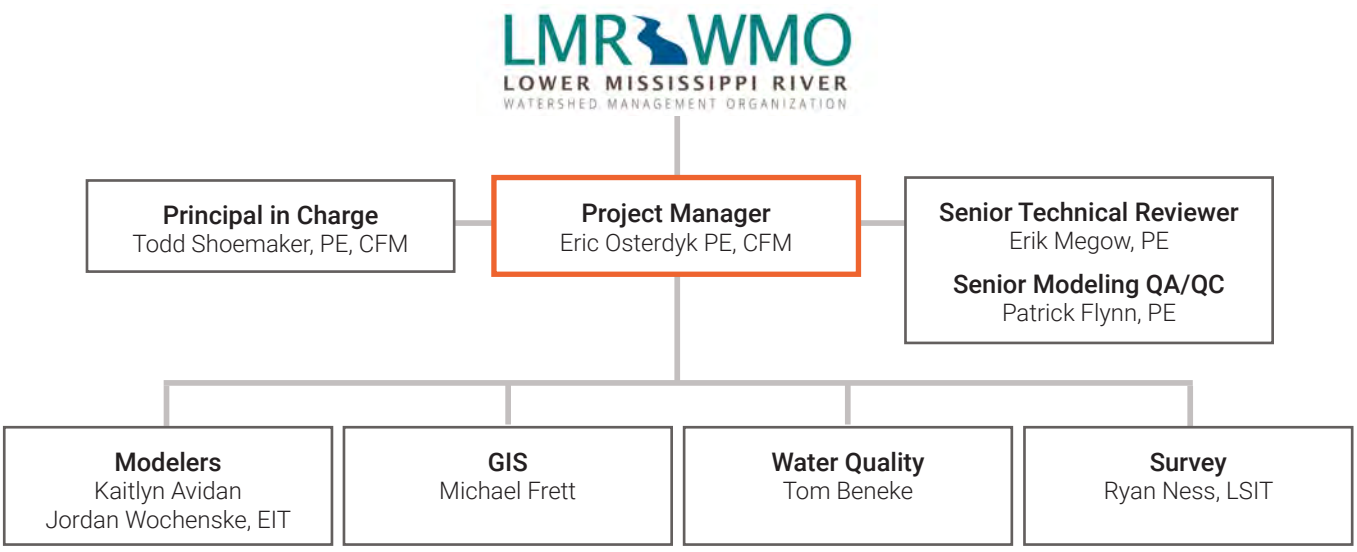
Jordan Wochenske has eight years of experience in water resources including hydrology and hydraulic modeling and is proficient in a variety of modeling software programs. Jordan will provide modeling and analysis support.

Michael Frett has six years specializing in water resources management focusing on water quality assessments and watershed modeling. Michael will provide GIS support for this project to analyze watershed characteristics, flood risk, and water quality.

Tom Beneke has 12 years of experience in water quality assessment, geospatial data analysis and mapping, and water quality modeling. Tom will provide water quality analysis and support to the team.

Ryan Ness has six years of experience in surveying and will provide survey support.

Todd Shoemaker has 25 years of experience in water resources and will be the Principal in Charge, providing project leadership and support.



3. Qualifications and Experience

Firm Overview

The Stantec community unites more than 34,000 employees working in over 450 locations across 6 continents. We are planners, architects, engineers, designers, scientists, and project managers, innovating together at the intersection of community, creativity, and client relationships. Balancing these priorities results in projects that advance the quality of life in communities across the globe.

At Stantec, we approach every project we undertake—whether at the local, regional, or watershed level—thoughtfully and execute it with excellence. We partner with our clients to design solutions that address their communities' unique needs throughout the water infrastructure lifecycle.

Dedicated to Watershed Concerns

Our local engineers, scientists, and planners are recognized leaders in water resources. We serve more than two dozen water management organizations in Minnesota, as well as other water management organizations, counties, and municipalities throughout the country. With a reputation for innovation, we provide creative recommendations evaluated in terms of cost effectiveness, reliability, practicality, and aesthetic qualities. Our watershed expertise includes the full range of services from diagnostic studies, hydraulic and hydrologic, water quality monitoring, concept planning, final design to construction.

Hydrologic, Hydraulic, and Pollutant Modeling

Our professionals are experienced with computer model-based designs for hydrologic and hydraulic studies, water quality analyses, and flood studies. This runs from planning, which includes hydrologic and hydraulic modeling platforms (XPSWMM, PCSWMM, ICPR, ICM, InfoSWMM, HEC-RAS, and HydroCAD), to water quality modeling platforms (P8, MIDS, WinSLAMM, among others), and 3D Computational Fluid Dynamics (FLUENT, Fieldview, and Flow-3D). This includes local and regional expertise, as well as Stantec's hydraulic modeling Delivery Center. Our Delivery Center has 75 modeling staff to support projects across North America. The Delivery Center works with local staff to provide technical leadership and specialized project delivery services related to the analysis, systems modeling, and development of solutions related to the management, planning, and operational enhancement of urban water systems.

Water Quality

Stantec is actively involved in the management and development of water resources. We focus on protecting and restoring sensitive water resources and managing risks associated with sedimentation and flooding.

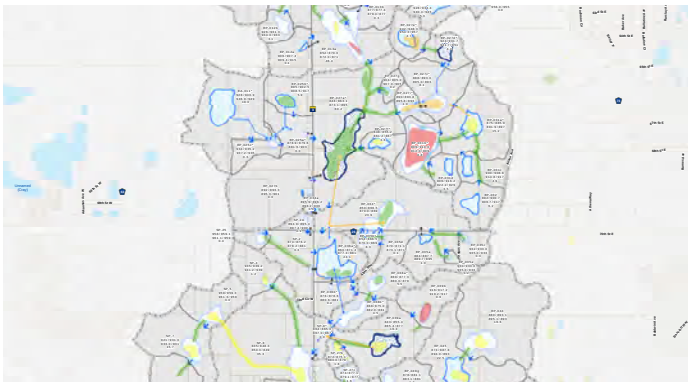
Our blueprint for subwatershed assessments or lake management typically includes studying the waterbody, diagnosing pollutant loading, identifying mitigation measures, securing project funding, and implementing management practices.

Our holistic approach to developing and managing water resources balances environmental, social, and economic needs. We consider the inter-dependent management of surface water and groundwater, and how that impacts your water's quantity and quality.

Federal, State, and Regional Programs

We regularly work with agencies to improve, enhance, and protect the natural resources in Minnesota. Our team works with these partners on regulatory, funding, and planning initiatives critical to the state. Through our strong relationships, we help navigate overlapping initiatives and streamline programs for more effective implementation. A prime example of this is the Thompson Oaks project that was led by Dakota County water resources, but stakeholders/partners included County parks, City of West Saint Paul, funding from BWSR, and private developers.

Project Experience



Robert Trail Watershed Study

Inver Grove Heights, Minnesota | 2015-2021

The City of Inver Grove Heights selected Stantec to evaluate how runoff from future land use would be conveyed to protect people and property within the watershed. The City anticipates new development to occur within the Robert Watershed Corridor over the next decade and beyond per the City's Comprehensive Plan.

Stantec studied the area using the PCSWMM computer model. The Developed Model was executed to predict high water elevations caused by development (and a corresponding increase in impervious surface) throughout the watershed. Grading plans for two proposed developments were used to accurately predict and model land use and storage in the proposed developments. The predicted high water elevations were then used to establish emergency overflow route conveyances, and low floor elevations. Stantec created preliminary plan and profile drawings of the proposed conveyance routes and estimated construction costs to implement the conveyances.

Stantec conducted primary technical plan reviews for future development in the City in conformance with the City's Stormwater Manual. As part of this analysis, we updated the "living" PCSWMM model for the Northwest Area (NWA) to determine impacts on the area's regional landlocked basins which include the CSAH 26 roundabout and associated infiltration basin, Holiday gas station and associated extended wet detention basin, a road reconstruction with infiltration basin and regional basin expansion (TH 3 & 65th), a 7-acres, 28 house subdivision (Builder Jones), and a 40-acre subdivision that consisted of 120 single family homes, a 100+-unit apartment complex, and multiple infiltration basins (Canvas).

Key Personnel & Project Role
Todd Shoemaker - Project Manager, Eric Osterdyk - Lead Modeler

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

Thompson Oaks River to River Greenway and Water Quality Design

West Saint Paul, Minnesota | 2023

The Thompson Oaks brownfield site was transformed from a local liability to an attractive point of connection for the neighborhood.

The former golf course along the River-to-River Greenway in West Saint Paul had been used as a dumping ground for construction debris, creating a brownfield site. Dakota County hired Stantec to evaluate concepts to manage the impacted soil while unlocking future development and enhancing natural areas and stormwater management.

The Stantec team refined a concept that avoided impacts to existing jurisdictional wetlands, managed environmentally impacted soils on-site, increased pollutant removal of stormwater runoff, and provided trail connections and a natural experience for greenway users. The concept included native prairie grasses and flowers to create pollinator habitat, riparian buffers, and a variety of aquatic habitats as well as multiple crossings of the water features to enhance pedestrian connectivity and improve access to community features such as the adjacent Wentworth Library.

The stormwater management system filters runoff from 25% of West St. Paul, removing approximately 93 pounds per year of total phosphorus and benefitting the downstream Mississippi River.

The site now provides a key extension to the River-to-River Greenway, upgraded stormwater management for the neighborhood, and a place where the community can gather for recreation.

Key Personnel & Project Role
Todd Shoemaker - Project Manger

Reference:
Mark Ryan | 952-891-7596 | mark.ryan@co.dakota.mn.us

This project won a 2024 American Council of Engineering Companies (ACEC) Minnesota Grand Award.

County Road 6 P8 Model Calibration

Hennepin County, Minnesota | 2022-2023

Minnehaha Creek Watershed District (MCWD) tasked Stantec with estimating pollutant removals, and associated monetary costs, under five different design scenarios for a stormwater pond in a heavily managed ~3,700-acre watershed. The project required merging two previously developed P8 models into one larger P8 model domain with 97 devices across 85 watersheds.

The merged P8 model was then calibrated to hourly conditions using an automated R-based workflow to match streamflow magnitude and timing. The streamflow calibrated model was parameterized to match both inflow and outflow growing season pollutant concentrations using reduction percentages derived from the long-term monitoring data. These estimate pollutant reductions were further validated by estimating observed pollutant loads from the USGS LOADEST regressions and comparing it with the P8 simulated loads. The streamflow and pollutant calibrated model were then used to simulate five pond scenarios for comparison of total pollutant removals (lbs removed) versus removal cost.

Key Personnel & Project Role

Eric Osterdyk - H&H Model, Tom Beneke - Water Quality Model Lead

Reference:

Brian Beck | 952-471-8306 | bbeck@minnehahacreek.org

Long Lake Creek Subwatershed Assessment

Hennepin County, Minnesota | 2022

The purpose of the Long Lake Creek Subwatershed assessment was to identify watershed and in-lake Best Management Practices (BMPs) to improve water quality for the four lakes in the Upper Long Lake Creek Subwatershed. Stantec provided QA/QC for P8 models created by the Minnehaha Creek Watershed District, identified watershed BMPs, prioritized and developed concept designs for BMPs with calculated load reductions and cost estimates.

Key Personnel & Project Role

Todd Shoemaker - Project Manager, Eric Osterdyk - Lead Modeler

Reference:

Becky Christopher | 952-641-4512 | bchristopher@minnehahacreek.org

Dakota County Rural SWMM Modeling

Dakota County, Minnesota | 2020

Stantec created a stormwater management model (SWMM) to study 450-square miles of primarily rural, watersheds within the Dakota County boundaries: the Vermillion River Watershed and the North Cannon River Watershed. The goal of the study was to identify flood and erosion prone areas and identify potential water quality improvement project locations (specifically wetland restoration and water retention projects) within both watersheds.

Stantec converted the existing XPSWMM model to PCSWMM and added in watersheds and conduits to model the lower reaches of the Vermillion River. Stantec created a new PCSWMM model of the North Cannon River. Areas added were based on a combination of survey, LiDAR and GIS data. We calibrated newly added areas to river gauge information.

After building the models, Stantec ran storm simulations for several design storm events, created inundation maps and identified approximately fifty potential stormwater improvement project locations. Potential projects identified included wetland restoration projects, flood storage projects, water quality improvement projects, or some combination thereof. We then calculated estimated pollutant loading and volumes of flooded water at each of the potential project locations to allow for ranking potential project sites by severity of flooding or pollutant loading.

Stantec collaborated with project stakeholders to screen and rank the individual project locations to identify ten sites for further study. We then created preliminary grading plans, cost estimates, and evaluated potential pollutant reduction and flood improvement. The projects were reranked to provide a list of high priority projects to pursue as funding is available. Four projects are identified as the “best” potential projects, and two are identified as the “worst” potential projects. The remaining four are “average” potential projects.

Stantec summarized project findings and recommendations in a series of memoranda and reports. Final deliverables included catalogued GIS data, electronic PCSWMM models, and a final technical report documenting Stantec’s methodologies.

Key Personnel & Project Role

Eric Osterdyk - Lead Modeler, Todd Shoemaker - Project Manager

Reference:

Mark Ryan | 952-891-7596 | mark.ryan@co.dakota.mn.us

4. Key Personnel

Eric is a water resources engineer with expertise in hydrologic and hydraulic modeling, water quality modeling, watershed permitting and rules development, construction stormwater permit, stormwater design, wetland restorations, and SWPPP and ESC plan design. Eric routinely uses programs such as PCSWMM, XPSWMM, HydroCAD, HEC-RAS, P8, MIDS Calculator, AutoCAD Civil 3D, and ArcGIS to assist in his technical analyses and designs.

Education

BS, Environmental Engineering, University of Wisconsin, Platteville, Wisconsin

BS, Wildlife Ecology, Research, and Management, University of Wisconsin, Stevens Point, Wisconsin

Registrations

Professional Engineer: MN

Certified Floodplain Manager (CFM)

Eric Osterdyk PE, CFM

Project Manager

RELEVANT EXPERIENCE

Inver Grove Heights H&H Model Update | MN | Water Resources Engineer
Eric helped develop and perform QA/QC on the update to a 1,220-square acre hydrology and hydraulics model using the PCSWMM computer model. The model predicts high water levels, flow rates, and velocities for current and anticipated future land use conditions. The model will be used to identify future routing methods for landlocked basins. Eric conducts primary technical plan review for future development in the City of Inver Grove Heights in conformance with the City's Stormwater Manual. Part of this analysis includes updating the "living" PCSWMM model for the Northwest Area (NWA) to determine impacts on the area's regional landlocked basins. These developments include the CSAH 26 roundabout and associated infiltration basin, Holiday gas station and associated extended wet detention basin, a road reconstruction with infiltration basin and regional basin expansion (TH 3 & 65th), a 7-acres, 28 house subdivision (Builder Jones), and a 40-acre subdivision that consisted of 120 single family homes, a 100+-unit apartment complex, and multiple infiltration basins (Canvas).

Rural SWMM Model | Dakota County, MN | Primary Modeler
Eric created a 450-square mile, county-wide PCSWMM stormwater model to evaluate flooding and water quality in rural reaches of the County. Eric converted the existing XPSWMM model for the Vermillion River to PCSWMM and created a new PCSWMM model for the North Cannon River and its tributaries. The model was used to identify approximately 50 potential stormwater improvement project locations, which were narrowed down to ten sites to further study. Potential projects identified included wetland restoration, flood storage, and water quality improvement projects. Eric created preliminary grading plans in Civil3D, cost estimates, and evaluated pollutant reduction and flood improvement for the ten final project locations.

Minnehaha Creek Watershed District (MCWD) Long Lake Creek Subwatershed Assessment | MN | Water Resources Engineer
Eric assisted in the Long Lake Creek Subwatershed assessment. The purpose of this assessment is to identify watershed and in-lake Best Management Practices (BMPs) to improve water quality for the four lakes in the Upper Long Lake Creek Subwatershed. During this assessment Eric provided QA/QC for P8 models created by the District, identified watershed BMPs, and prioritized and developed concept designs for BMPs with calculated load reductions and cost estimates.

Todd Shoemaker PE, CFM

Principal in Charge

Todd has more than 20 years of experience in water resources and environmental engineering. His water resources expertise includes watershed and stormwater management, hydrologic/hydraulic and water quality computer modeling, ravine and stream bank stabilization, floodplain management and regulation, and wetland restoration and permitting. His environmental engineering experience includes establishing and managing a $5 million inflow and infiltration program for the City of Dubuque, IA.

Education

MS, Civil and Environmental Engineering, University of Wisconsin, Madison, Wisconsin

BS, Civil Engineering and Environmental Engineering Certificate, University of Wisconsin, Madison, Wisconsin

Registrations

Professional Engineer: MN

Certified Floodplain Manager (CFM)

RELEVANT EXPERIENCE

- Robert Trail Watershed Study | Inver Grove Heights | Project Manager
- Dakota County PCSWMM Model and Model Expansion | MN | Senior Engineer
- Coon Creek Watershed District XPSWMM Model Update and Subwatershed Maps | MN | Water Resources Engineer
- Ryan Lake Subwatershed Study | Crystal and Robbinsdale, MN | Project Manager and Senior Engineer

Erik Megow PE

Senior Technical Review

Erik is a water resource engineer with more than 14 years of experience as a consulting engineer and water resources. Erik brings expertise in stormwater best management practice design, regulatory review, hydraulic and hydrology modeling, stream restoration and stabilization design, floodplain analysis, stormwater management, and surface water mixing zone modeling. Erik has experience and is proficient using XPSWMM, PCSWMM, EPA-SWMM, HydroCAD, HEC-RAS, HY8, CORMIX, P8, MIDS, Qual2k, ArcMap (GIS), and ArcGIS Pro.

Education

BS, Mechanical Engineering, University of Minnesota, Twin Cities, Minnesota

BA, Physics, Lawrence University, Appleton, Wisconsin

Registrations

Professional Engineer: MN

RELEVANT EXPERIENCE

- Elm Creek Watershed Management Commission Comprehensive Stormwater Management Plan/Active Water Quality Management Program/HUC 8 HEC-RAS Modeling Updates | Plymouth, MN | Project and Client Manager
- Minnehaha Creek Watershed District | Minnetonka, MN | Lead Permitting Engineer and Project Manager
- HUC-8 FEMA Updates | Twin Cities, MN | Project Manager and Lead Modeler
- Blue Lake BMP Assessment and Construction | Isanti, MN | Project Manager and Lead Design Engineer

Patrick Flynn PE

Senior Modeling QA/QC

Patrick brings a thorough understanding of hydraulic and hydrologic methods and approaches as well as extensive experience in application of these methods for alternatives analysis and master planning efforts. He has built and calibrated H&H models using all of the industry standard H&H software packages to support real-time control alternatives analysis, 2D flood inundation analysis, conveyance and storage alternatives, and integrated WWTP and collection systems analysis. He was lead modeler for several of the largest sanitary and combined sewer collection systems in the US and Canada, and is Stantec's Urban Water Resources H&H Modeling Technical Lead.

Education

BS, Civil Engineering, Purdue University, West Lafayette, Indiana

Registrations

Professional Engineer: IN

RELEVANT EXPERIENCE

- CSO and Stormwater Drainage Technical Services Support | Cambridge, IN | H&H Modeling Technical Lead
- Indianapolis Stormwater Program Management | IN | Lead H&H Modeler
- Atlanta Program Management Services Team (FC-9838) | GA | Hydraulic Modeling Project Lead
- System Wide Model Recalibration* | Fort Wayne, IN | Lead Modeler

** denotes projects completed prior to joining Stantec*

Kaitlyn Avidan

Modeler

Kaitlyn has one year of experience in hydrology studies, constraint analysis, data collection, hydrologic modeling, stormwater management designs, and report writing. She recently graduated from the University of Wisconsin at River Falls double majoring in environmental engineering and environmental science. Kaitlyn has experience and is proficient using XPSWMM, PCSWMM, HydroCAD, HEC-RAS, FLO-2D, QGIS, AutoCAD Civil 3D, and ArcGIS Pro.

Education

BS, Environmental Engineering and Environmental Science, University of Wisconsin, River Falls, Wisconsin

Certifications

Erosion and Stormwater Management Certification Program, Construction Site Management, University of Minnesota

RELEVANT EXPERIENCE

- Phalen Creek H&H Model | Saint Paul, MN | Water Resources Designer
- HUC-8 XPSWMM Model Updates for Coon Creek Watershed District | MN | Modeler
- County Ditch 60 Subwatershed Assessment | MN | Modeler
- Pleasure Creek XPSWMM Model Calibration | Anoka County, MN | Modeler

Jordan Wochenske EIT

Modeler

Jordan's water resources experience includes stormwater best management practice (BMP) design, regulatory review, hydraulic and hydrology modeling, stream restoration and stabilization design, floodplain analysis, and stormwater management. His field experience includes erosion and sediment control inspections, BMP inspections, construction observation, MS4 illicit discharge inspections and sampling, and stormwater pond sampling and analysis. Jordan is proficient in XPSWMM, PCSWMM, HydroCAD, HEC-RAS, MIDS, Win-SLAMM, and AutoCAD Civil 3D software/modeling programs.

RELEVANT EXPERIENCE

- Coon Creek Watershed District XPSWMM Model | Ham Lake, MN | Modeling Assistant
- Biochar and Iron-Enhanced Sand Filters | Fridley, MN | Assistant Design Engineer
- Coon Creek Watershed District Permit Reviews | Ham Lake, MN | Permit Review
- Coon Creek Watershed District Erosion and Sediment Control Inspections | Ham Lake, MN | Inspection
- Minnesota MS4 General Permit and SWPPP | MN | Assistant Design Engineer

Education

BS, Biology, University of Wisconsin, Madison, Wisconsin

MS, Civil and Environmental Engineering, University of Wisconsin, Madison, Wisconsin

Registrations

Engineer-In-Training: WI

Michael Frett

GIS

Michael specializes in water resources management at Stantec, where his work focuses on lake response modeling, water quality assessments, and watershed modeling. He has four years of experience as an aquatic biologist managing long term water quality projects centered on nutrient dynamics, water quality modeling, invasive species management, and ecosystem responses to water quality shifts.

RELEVANT EXPERIENCE

- West Norway Lake and Watershed Feasibility Study | Pine River, MN | Watershed Scientist
- Pine and Big Pine Lake Response Model | Finlayson MN | Water Modeler
- Eagan-Inver Grove Heights Watershed Plan Update | MN | Watershed Planner
- Eagle and Pike Lake Internal Phosphorus Loading Assessment | Maple Grove, MN | Water Quality Scientist

Education

MS, Water Resources Science, University of Minnesota, Minneapolis, Minnesota

BA, Biology, Carleton College, Northfield, Minnesota

Tom Beneke

Water Quality

Tom specializes in water quality assessment, geospatial data analysis and mapping, and water quality modeling. He recently worked on a team to develop the most recent release of EPA's Recovery Potential Screening tool, which is a state-specific analysis tool that allows users to comparatively evaluate watershed health by selecting from a suite of over 300 indicators of watershed health. For EPA's Creating Resilient Water Utilities (CRWU) program, he led the development of a utility-focused streamflow projection mapping application; this project required translating raw point-based projections to interpretable hydrography-based projections, creating a map application for visualizing multiple climate projection scenarios, and facilitating a positive user experience.

Education

MS, Water Resources Management, University of Wisconsin, Madison, Wisconsin

BA, Environmental Studies, Lawrence University, Appleton, Wisconsin

RELEVANT EXPERIENCE

- County Road 6 P8 Model Calibration | Hennepin County, MN | Water Quality Modeling Technical Lead
- Diamond Lake Sediment BMP Assessment | Montezuma, IA | Technical Lead
- Lake Independence Sediment and Phosphorus Modeling | Hennepin County, MN | Technical Lead
- Lake Mallalieu Desktop Sediment Delivery Analysis | St. Croix County, WI | Technical Lead
- Auburn Wetland Phosphorus Transport Study | Carver County, MN | Technical Support

Ryan Ness LSIT

Survey

Ryan has six years of experience on diverse land survey projects including topographic, ALTA, boundary, and construction layout surveys. Work with public and private industries in Minnesota. Specialties include drone mapping, boundary and topographic surveys, high accuracy geodetic surveys, terrestrial laser scanning, construction layout, and Civil 3D drafting.

Education

BS, Marketing, Minnesota State University, Mankato

Land Survey Certificate, Dunwoody College of Technology, Minneapolis, Minnesota

Registration

Land Surveyor in Training: MN

Certification

FAA Part 107 Unmanned Aircraft System Pilot

RELVEVANT SURVEY EXPERIENCE

- Lead and support survey field crew members on projects in the office and field from start to finish
- Lead drone photogrammetry mapping projects; delegate and support field work, complete post processing, QA/QC analysis, and finalize topographic surface
- Research and gather project needs for field crews which includes utility mapping and marking requests, control points, benchmarks, as-built plans, zoning information, flood zone maps, georeferenced aerial photography, calculation points, and DXF line work
- Utilize terrestrial laser scanning technology workflows to produce 3D and 2D deliverables
- Post processing and registration of point cloud data with feature linework extraction to create output for final deliverable of an existing conditions map in Civil 3D paired with a 3D model

5. Work Plan and Budget

Project Understanding

The LMRWMO is located in the southeast part of the Twin Cities metropolitan area, in northern Dakota County and southern Ramsey County. The watershed is bordered to the north and east by the Mississippi River, to the west by the Eagan-Inver Grove Heights and Lower Minnesota River watersheds, and to the south by the Vermillion River watershed.

The LMRWMO and its member cities ultimately seek to develop watershed-wide hydrologic and hydraulic (H&H) modeling and priority watershed water quality modeling. Although this project scope and budget will not allow for the entire 35,493-acre (55.8 mi^2) watershed to be modeled, this project is the first step in that process and will include H&H modeling for approximately 1,070 acres and water quality modeling for approximately 9,000 acres. The guidance document that will be created as part of this scope will facilitate easier, more consistent model expansion in the future.

Our work plan, detailed herein, will assist the LMRWMO to create H&H and water quality models and allow the Watershed to identify and prioritize water quality improvement practices to maximize pollutant reduction benefits in its most critical subwatersheds. Stantec is qualified to provide the services to meet the project goals and recognizes that these models will be valuable planning and design tools. Our team will sharpen these tools to help the LMRWMO, and its member cities allocate resources to achieve the most significant water quality improvements and build stronger, more sustainable infrastructure.

Work Plan

Task 1: Project Kickoff and Communication

Before a formal project kickoff meeting, Stantec will perform a desktop analysis of the project areas to identify information needs. Stantec will compile a database containing publicly available information as well as any existing data provided by the Cities and WMO, including but not limited to subwatershed boundaries, storm sewers, municipal utilities, contaminated sites, soils, LiDAR, seeps, city stormwater (H&H and WQ) models, and land use layers.

Stantec assumes that most data gaps could be filled by Watershed or City staff. However, project critical data that does not exist may need to be collected by Stantec as part of the field reconnaissance task. Alternatively, assumptions in the modeling based on sound engineering judgement could be made to address the data gaps.

After reviewing and compiling the identified data, Stantec will schedule an in-person kickoff meeting with the LMRWMO, City staff, and other identified stakeholders to talk through data gaps, project approach, and assumptions. Throughout the project, Stantec will provide monthly virtual project meetings with City and WMO staff to provide updates on project progress and allow for timely feedback during critical tasks.

After H&H modeling, water quality modeling, and project identification are complete, Stantec will lead a virtual project partner meeting with City and LMRWMO staff to discuss potential projects and receive feedback. Stantec will evaluate and incorporate input and reconvene with the project team detailing significant changes (if any) before finalizing the report.

Once the project work is substantially complete, Stantec will present project findings to the LMRWMO board. The presentation will summarize modeling methodology, key accomplishments, and identify next steps for the cities and the WMO.

Task 2: Field Reconnaissance

Following the data gap analysis in Task 1, if there is any critical elevation information missing needed to complete the modeling, Stantec will mobilize a survey crew to collect the desired information. For the initial survey, Stantec has assumed a total of 40 hours, which will cover survey for approximately 60 traditional manhole structures, excluding survey on Interstate or State Highways. A survey plan will be determined with a priority matrix so that critical information is surveyed first. A scope change may be needed if the number of critical items to survey exceeds our allotted survey budget.

The team will assess the available LiDAR terrain datasets to determine if and where additional terrain data resolution is needed to validate subwatershed boundaries. During model development, the hydraulic modeling team will continue assessing the additional data needs for model refinement. Once modeling is complete, Stantec has budgeted 20 hours for the survey crew to validate findings from the desktop mapping if desired.

Task 3: Watershed Based Implementation Funding (WBIF) Project

The objective of the WBIF project is to develop H&H and water quality models for the three-priority level 1A lakes. These lakes include Thompson Lake, Rogers Lake, and Seidls Lake, which have a combined watershed area of approximately 1,070 acres. Stantec proposes to use PCSWMM as the H&H modeling software for consistency with the City of Inver Grove Heights recent modeling efforts. For water quality, Stantec intends to use the P8 (Program for Predicting Polluting Particle Passive through Pits, Puddles, and Ponds) Urban Catchment Model.

The first part of the H&H acronym stands for hydrology, which in modeling terms represents the quantity and timing of runoff that is generated from a simulated storm/rainfall event. Stantec will use Atlas-14 rainfall depths and an MSE 3 rainfall distribution curve to model the desired 24-hour design storm events (2-, 10-, 100-, and back-to-back 100-year). Stantec will use publicly available elevation information and strategically placed pour points in GIS to automate subwatershed delineations. Approximate watershed size will follow the current City of Inver Grove

Heights modeling effort. Stantec will develop a draft figure of subwatershed divides for the LMRWMO and partner cities to review and provide comment. Stantec will incorporate one round of revisions to the final subwatershed divides. Once delineations are finalized, hydrologic inputs such as curve number and time of concentration will be calculated in GIS using standard assumptions based on land use, impervious area, flow length, watershed slope, etc.

The latter part of the H&H acronym stands for hydraulics, which in modeling terms represents the computations of rate and quantity of runoff through a network of pipes, surface channels, and storage basins. Stantec will collect available GIS storm sewer information from the partner cities and enter critical the "mainstem" storm sewer into the model. The threshold for "critical" storm sewer is typically 24-36 inches in diameter or bigger, but will be refined once we receive and review the data. As-built information and supplemental survey may need to be utilized to fill in gaps in the available GIS data to complete the storm sewer network. In addition to the storm sewer network, Stantec will identify and develop stage-area-storage relationships and surface overflows to input into storage nodes using LiDAR data and available as-built information. Although continuous monitoring data and true model calibration are not included as part of this scope, once the model is running, Stantec will validate model results to the extent practical based on the best available information and historical/local knowledge of the area within the available budget.

To model water quality, Stantec proposes to use the P8 Urban Catchment model. This program is used to predict the generation and transport of sediment associated with pollutants mobilized by stormwater runoff in urban watersheds. The subwatershed delineations and much of the input data needed for the PCSWMM model will be input into P8 to quantify pollutant transport for the three-priority level 1A lakes.

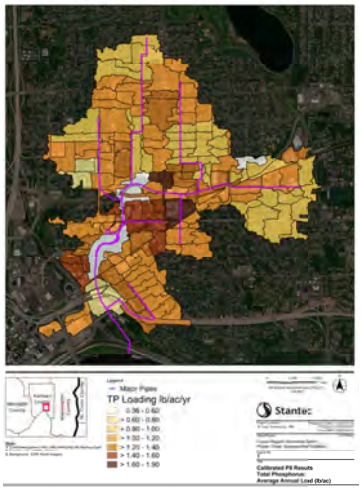
Much like the H&H modeling, true calibration is unable to be performed based on available data, but the model results will be validated to the extent practical based on best available information and historical/local knowledge within the available budget. Stantec will target annual pollutant loads within 20% of available monitoring data or literature values. The modeling will identify pollutant loading hotspots, areas with insufficient or no treatment, and identify and prioritize regional treatment opportunities.

Once model results have been reviewed and accepted by the LMRWMO and the partner cities, Stantec will use the output to generate a list of 10 projects in the level 1A lake watersheds. Proposed projects will focus on improving water quality, reducing runoff volume, and mitigating flooding. Stantec will take these projects to feasibility level design and present the preliminary list to the WMO and partner cities for input. Stantec will incorporate one round of feedback from the project team to finalize the project list. Stantec will calculate expected pollutant reductions and create opinions of probable cost for each of the final options. This will allow us to normalize each project based on cost per pound of pollutant removed.

The final list of projects will be ranked based on pollutant removals, volume reduction, flood storage, and cost. Stantec has successfully implemented a "points" system to rank potential water quality BMPs for other agencies such as the Minnehaha Creek Watershed District and the City of Eagan. A similar approach could be applied for this effort to rank the pollutant reduction, volume reduction, and flooding impact.

Task 4: Accelerated Implementation Grant (AIG) Project
The objective of the AIG project includes the development of water quality models for the Priority 1A and 1B lakes and creeks within the WMO. These watersheds cover approximately 9,000 acres and include Interstate Valley Creek, Ivy Falls Creek, Kaposia Creek (Simon's Ravine), Lake Augusta, Hornbeam Lake, Rogers Lake, Seidls Lake, Sunfish Lake, and Thompson Lake watersheds. There are approximately 1,070 acres of overlap with the WBIF project for Thompson Lake, Rogers Lake, and Seidls Lake watersheds.

For consistency with the WBIF project, Stantec proposes to use P8 to model water quality within the AIG project area. Stantec will use a similar approach in GIS to delineate subwatersheds and generate model inputs based on LiDAR, soil type, land use, and available BMP information. Stantec will provide subwatershed delineations to the LMRWMO and partner cities for review and will incorporate one round of feedback into the final delineations. P8 has node limitations of 250 watersheds and 75 devices (BMPs). Based on the desired average watershed size, watersheds may need to be combined to stay under the program node limitation or there may need to be multiple P8 models to cover the project area. Stantec will seek input from the LMRWMO on their desired approach.



Water quality modeling will quantify estimated sediment and nutrient loading from the watersheds and treatment achieved by existing best management practices. Stantec will use the model results to characterize and prioritize treatment needs throughout the modeled watersheds. To identify pollutant loading "hot spots", Stantec will generate pollutant loading maps that will depict local and cumulative treatment within the study area, which will focus future treatment needs. An example pollutant loading map that was generated for the Phalen Creek Subwatershed project has been included above for reference. To aid in the future planning and prioritization of BMP implementation and maintenance, Stantec will include a preliminary evaluation of treatment opportunities and recommended practices.

Task 5: Final Deliverables
Stantec will provide a comprehensive final report that outlines completion of grant objectives. At a minimum, the report will include:

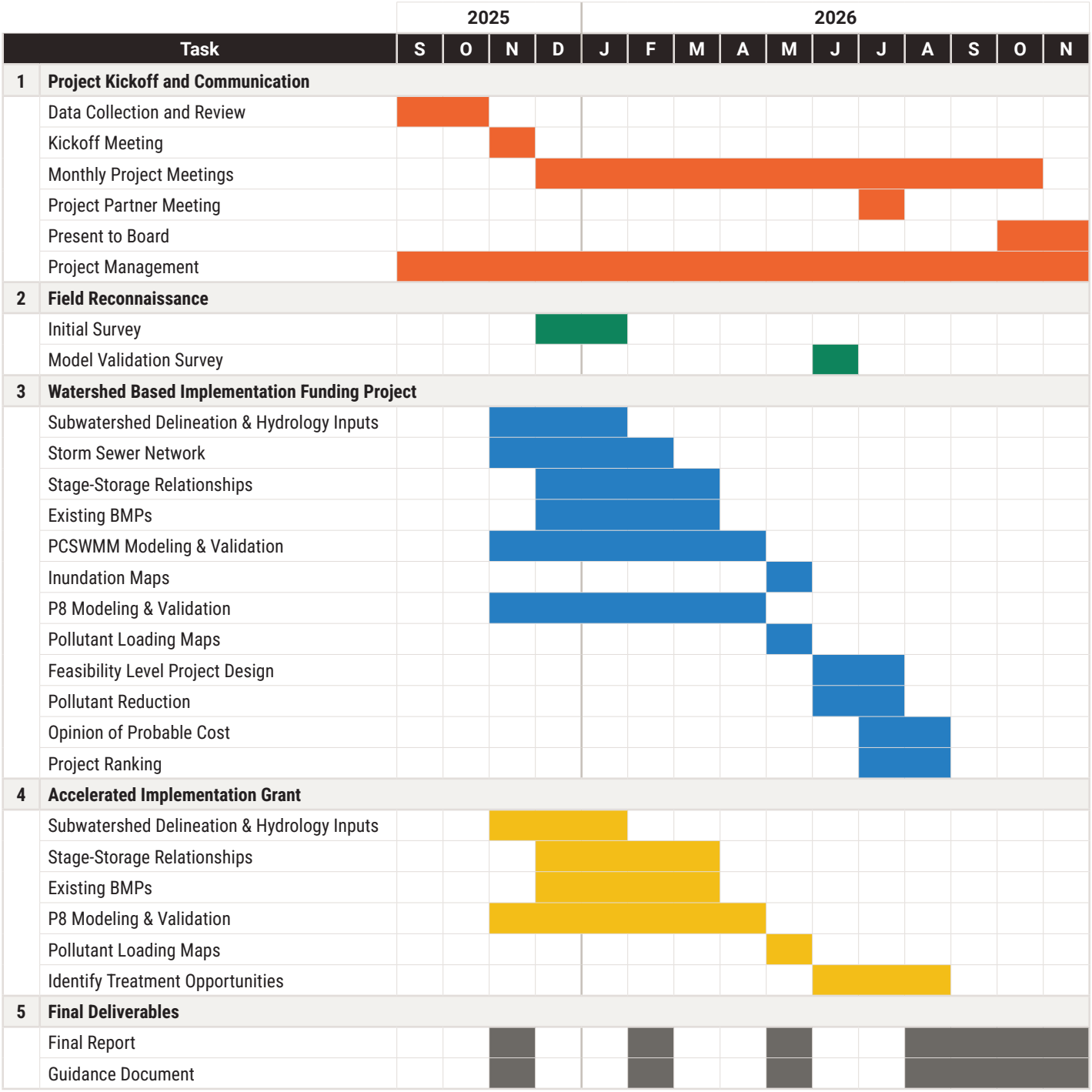
- Project background
- PCSWMM model development
- P8 model development
- Analysis of pollutant loading
- Priority projects for WBIF task
- Recommendations

Once the final report has been submitted, Stantec will present project findings to the LMRWMO board. The presentation will summarize modeling methodology, key accomplishments, and identify next steps for the cities and the WMO.

In addition to the final report, Stantec will develop a guidance document that outlines standards and best practices for future H&H and water quality modeling projects. This document will be comprehensive in nature and determine a process to maintain and update the models to promote their continued accuracy and effective uses.

Project Schedule

We have provided a preliminary project schedule with the timeline for each task, meetings, report review, and final deliverables.



Project Budget

Stantec will perform the work on a time and material basis and will not exceed this cost without prior written authorization. We will provide these services according to the LMRWMO Contract Terms and Conditions and will invoice the work monthly in proportion to the amount of work completed. Stantec understands that invoices shall clearly track work between each grant/funding source.

Project Team	Osterdyk	Shoemaker	Megow	Avidan	Wochenske	Flynn	Frett	Beneke	2-Man Survey Crew		
Role	PM	PIC	Sr. Review	Modeler	Modeler	Sr. Modeler	GIS	Water Quality			
Rates	$176	$221	$189	$146	$155	$189	$146	$176	$261	EXPENSES	COST
Task 1: Project Kickoff and Communication											
Data Collection and Review	4		2	12	12		8	2			$6,214
Kickoff Meeting	8	1	5	2	2			5		$250	$4,306
Monthly Project Meetings	18										$3,168
Project Partner Meeting & Follow-up	8	1	2	2	2		8	2			$4,129
Present to Board	8	1	5	2	2		8	5		$250	$5,474
Project Management	56										$9,856
Task 1 Hour and Cost Totals	102	3	14	18	18		24	14		$500	$33,147
Task 2: Field Reconnaissance											
Initial Survey	1			1	1		1		20		$5,843
Model Validation Survey	1			1	1		1		10		$3,233
Task 2 Hour and Cost Totals	2			2	2		2		30		$9,076
Task 3: Watershed Based Implementation Funding Project											
Subwatershed Delineation & Hydrology Inputs	4		1	4	4	2	16				$4,811
Storm Sewer Network	4		1	16	16	2	4				$6,671
Stage-Storage Relationships	4		1	4	4	2	16				$4,811
Existing BMPs	2		1	12	12	2					$4,531
PCSWMM Modeling & Validation	4		1	20	20	8					$8,425
Inundation Maps	2		1	8	8	2	16				$5,663
P8 Modeling & Validation	2		1	16	16			8			$6,765
Pollutant Loading Maps	2		1	4	4		8	2			$3,265
Feasibility Level Project Design	10		1	20	20						$7,969
Pollutant Reduction	2		1	15	15			10			$6,816
Opinion of Probable Cost	4		1	15	15						$5,408
Project Ranking	10	1	4	20	20						$8,757
Task 3 Hour and Cost Totals	50	1	15	154	154	18	60	20			$73,892
Task 4: Accelerated Implementation Grant											
Subwatershed Delineation & Hydrology Inputs	4		1	12	12	4	48				$12,269
Stage-Storage Relationships	4		1	12	12	4	48				$12,269
Existing BMPs	4		1	24	24	2					$8,495
P8 Modeling & Validation	2		1	30	30			12			$11,683
Pollutant Loading Maps	2		1	8	8		16	2			$5,637
Identify Treatment Opportunities	8	1	4	16	16			12			$9,313
Task 4 Hour and Cost Totals	24	1	9	102	102	10	112	26			$59,666
Task 5: Final Deliverables											
Final Report	12	2	8	24	24	4	16	8			$15,790
Guidance Document	12	2	6	16	16	4	8	6			$11,484
Task 5 Hour and Cost Totals	24	4	14	40	40	8	24	14			$27,274
Totals	**202**	**9**	**52**	**316**	**316**	**36**	**222**	**74**	**30**	**$500**	**$203,055**

6. Conflict of Interest

Our team has no conflict of interest for providing the services contained in the RFP.

Stantec

Stantec is a global leader in sustainable architecture, engineering, and environmental consulting. The diverse perspectives of our partners and interested parties drive us to think beyond what's previously been done on critical issues like climate change, digital transformation, and future-proofing our cities and infrastructure. We innovate at the intersection of community, creativity, and client relationships to advance communities everywhere, so that together we can redefine what's possible.